SECOND INTERNATIONAL CONFERENCE ON AIR POLLUTION AND COMBUSTION

ABSTRACT BOOK

19-23 September 2011

Antalya-Turkey

Editors

S. Yurdakul, D. Genç Tokgöz, G. Doğan, E. Taylan, G. Güllü, M. Aydınalp Köksal, S.G. Tuncel, G. Tuncel

COMMITTEES

General Conference Chair

• Prof. Gürdal Tuncel, Middle East Technical University, Turkey

Plenary Session Chair

• Prof. Semra G. Tuncel, Middle East Technical University, Turkey

Plenary Session Vice Chair

• Prof. Judith C. Chow, Desert Research Institute, USA"

Technical Chair

• Prof. Gülen Güllü, Hacettepe University, Turkey

Organizing Committee

- Prof. Gürdal Tuncel, Middle East Technical University, Turkey
- Prof. Semra G.Tuncel, Middle East Technical University, Turkey
- Prof. Judith C. Chow, Desert Research Institute, USA"
- Prof. Gülen Güllü, Hacettepe University, Turkey
- Prof. Bülent Topkaya, Akdeniz University, Turkey
- Assoc. Prof. Tolga Elbir, Dokuz Eylul University, Turkey
- Asst. Prof. Merih Aydınalp Köksal, Hacettepe University, Turkey
- Güray Doğan, Middle East Technical University, Turkey
- Deniz Genç Tokgöz, Middle East Technical University, Turkey
- Sema Yurdakul, Middle East Technical University, Turkey
- Emin Taylan, Middle East Technical University, Turkey
- Hakan Moral, Middle East Technical University, Turkey

Honorary Committee

- Prof. Ahmet Acar, President of Middle East Technical University, Turkey
- Dr. Ahmet Altıparmak, Governor of Antalya
- Dr. Mustafa Akaydın, Mayor of Antalya Metropolitan Municipality

Scientific Committee

- Prof. Aysel Atımtay, Middle East Technical University, Turkey
- Prof. Abdurrahman Bayram, Dokuz Eylul University, Turkey
- Prof. Tuncay Döğeroğlu, Anadolu University, Turkey
- Prof. Ekrem Ekinci, İstanbul Technical University, Turkey
- Dr. Maria Do Carmo Freitas, Nuclear and Technological Institute, Portugal
- Asst. Prof. Eftade Gaga, Anadolu University, Turkey
- Prof. Roy M. Harrison University of Birmingham, UK
- Prof. Philip K. Hopke Clarkson University, USA
- Prof. Liaquat Husain, SUNY, USA
- Prof. George Kallos, University of Athens, Greece
- Assoc. Prof. Duran Karakaş, Abant İzzet Baysal University, Turkey
- Prof. Deniz Karman, Carleton University, Canada
- Assoc. Prof. Nesrin Ekinci Machin, Kocaeli University, Turkey
- Prof. Paul Monks, University of Leicester, UK
- Prof. Aysen Müezzinoğlu, Dokuz Eylul University, Turkey
- Prof. Mustafa Odabaşı, Dokuz Eylul University, Turkey
- Prof. John Ondov, University of Maryland, USA
- Dr. Fatma Öztürk, Abant İzzet Baysal University, Turkey
- Assoc. Prof. Hakan Pekey, Kocaeli University, Turkey
- Dr. Beyhan Pekey, Kocaeli University, Turkey
- Prof. Nicola Pirrone- CNR, Italy
- Prof. Cemal Saydam, Hacettepe University, Turkey
- Assoc. Prof. Aysun Sofuoğlu, İzmir Institute of Technology, Turkey
- Assoc. Prof. Sait C. Sofuoğlu, İzmir Institute of Technology, Turkey
- Prof. Yücel Taşdemir, Uludağ University, Turkey
- Prof. Jay Turner, University of Washington, USA
- Prof. John G. Watson, Desert Research Institute, USA"
- Dr. Ronald E. Wyzga, EPRI, USA
- Assoc. Prof. Serpil Yenisoy Karakaş, Abant İzzet Baysal University, Turkey

SCIENTIFIC PROGRAM

	uncel	-	rticles	c - oarse		rrison	lçin İsuman dınalp	o Gate	s of a ower an urkey	met Pekey, Güray ivan, Isal,	Health ardous fferent ali				_		
Friday	Chair Person: G.Tu	Plenary Talk Prof R Harriso	The behaviour of pa	from road traffi nanoparticles to co aerosol		Chair Person: R. Ha	Emre Yöntem, Gü Salihçavuşoğlu, Elif A Korkusuz, Merih Ay Köksal. Zevnen Yö	A Case Study: Gate t	Life Cycle Analyse Combined Cycle Po Plant Located at Industrial Park in T	Hakan Pekey, De: Arslanbaş, Beyhan I Zehra Bulut Bozkurt Doğan, Mihriban C Öznur Oğuz Kuntı Gürdal Tuncel	An Evaluation of the Risks of Selected Haz Air Pollutants for Di Groups in Koca				Poster Session		_
Thursday	Chair Person: G. Güllü	Plenary Talk Prof M Odahasi	1101. PT. Ouabay1	Persistent organic pollutants (POPs) and their industrial sources	eak	Chair Person: M. Odabaşı Co-Chair- T. Döğəroğlu	Iulian Băncuță, Ion V. Popescu, Claudia Stihi, Anca Gheboianu, Roxana Bancuta, Andrei Chilian		The Study of Air Pollution with Heavy Metal	Serpil Yenisoy-Karakaş, Muhammed Öz, Eftade O. Gaga	Seasonal Variation, Sources of PCBs and OCPs In High Altitude Site of Western Black Sea Region of Turkey	Break	Chair Person: G. Tuncel	Plenary Talk Prof F Fleinci	Energy utilisation trends	and their effect on global warming	
Wednesday	Chair Person: S. Tuncel	Plenary Talk Prof 1 Chow	1101. J. CHOW	Multiple-pollutant air quality management	Bre	Chair Person: J.Chow Co.Chair: S. Karakas	Nik Nurul-Hidayah Nik Yahya and Shamzani Affendy Mohd Din		Effect of Particulates Matter From Construction Industry Towards Workers' Health and Project Cost	R. Tavares, A.I. Miranda and C. Borrego	Modelling and Assessing Risks from Accidental Release of Hazardous Gases	Coffee	Chair Person: G. Güllü	Plenary Talk Prof C Savdam	In cloud alterations of	desert dust matrix and its impact on climate	
Tuesday	Chair Person: G. Tuncel	Plenary Talk Prof T Husain	Atmospheric black carbon	burden over a millennium as revealed by lake sediments	-	Chair Person: L. Husain Co.Chair: F. Gaga	André Tessier and Charles Gobeil		Using Lake Sediment Archives to Assess Air Pollution by Trace Elements	Clara Schembari, Fabrizia Caralli, Eleonora Cuccia, Jens Hjorth, Silvia Nava, Paolo Prati, Frank Raes	Impact of Ship Emissions on Air Pollution Over the Western Mediterranean: Observations from a Cruise Ship	- '	Chair Person: S. Tuncel	Plenary Talk Prof 1 Watson	Dool world Course	Characterizations	
Monday									Registration						Opening Talks		
LA			09:40		09:50	10:30		10:10		10:30		11:00			11:40		
HAL			00:60		09:40	09:50		09:50		10:10		10:30			11:00		

HAI	LLA	Monday	Tuesday	Wednesday	Thursday	Friday
11:50	12:50		Chair Person: J. Watson Co-Chair: M.AydınalpKöksal	Chair Person: C. Saydam Co-Chair: H. Pekey	Chair Person: E. Ekinci Co-Chair: B. Pekey	Chair Person: C. Saydam Co-Chair: S. Karakaş
			Gülen Güllü, Douglas Clark, Valts Vilnitis, Özşen Albayrak, Tolga Baki	Gülen Güllü, Douglas Clark, Valts Vilnitis, Özşen Albayrak, Tolga Baki	Jan Schächtele	R. Ladji, N. Yassaa, C. Balducci, A. Cecinato and B. Y. Meklati
11:50	12:10		Air Quality of Northern Cyprus	Identifying Gaps and Needs in the Development of a National Air Quality Management Policy in Northern Cyprus	Where are CO ₂ Emission Allowance Prices Heading? The Ambiguous Role of Capital Mobility in a World with Several Independent Emissions Trading Schemes	Particle Size Distribution of N-Alkanes and Polycyclic Aromatic Hydrocarbons (PAHs) in Urban Aerosol of Algiers, Algeria
			Jasem M. Al-Awadhi	Gonca Gülçiçek, İsmail Toröz, Kadir Alp, Asude Hanedar, Edip Avşar, Gizem Karaca	Yeser Aslanoğlu & Merih Aydınalp Köksal	Eftade O.Gaga, Akif Arı, Nesimi Akyol, Özlem Özden, Tuncay Döğeroğlu, Mustafa Odabaşı
12:10	12:30	Opening Talks	Measurement Of Noise And Air Pollution In Kuwait City, Kuwait	The Study of Applicability of Limit Values for PAHs on Soil in Turkey	Determining Regional Carbon Dioxide Emissions and Its Long Term Forecast For Turkey	On-road particulate matter emissions measured in a roadwaytunnel in the Osmangazi tunnel, Bilecik, Turkey
			Aiga Kāla, Valts Vilnītis	A. Lupascu, K. Sellegri, E. Freney, J.Boulon, G. Foret, G. Siour, A. Colomb, J.M. Pichon, J. Gourdeau and W. Wobrock	Izzet Arı and Merih Aydınalp Köksal	Mihriban Civan, Arzu Erener and Gürdal Tuncel
12:30	12:50		Six Years of Air Quality Management in the Baltic Countries - Lessons Learnt	Mesoscale Modeling of Aerosol Physical and Chemical Properties for Observational Stations at Different Althudes	Using Renewable Energy Potential of Turkey to Reduce Electricity Generation Associated CO2 Emissions	Improvement Land Used Regression Model for Predicting Inorganic Pollutants Concentrations in Bursa/Turkey
12:50	14:00			Lunch Break		
		Chair Person: G. Tuncel			Chair Person: G. Güllü	Chair Person: S. Tuncel
		Plenary Talk Prof. P.K. Hopke			Plenary Talk Prof. T. Salthammer	
14:00	14:40	Forty + Years of Development and	Poster Session	Conference Tour	- - -	-
		Application of Receptor Modeling: Where are we			Dynamics and Keactions of Indoor Pollutants	Closing Remarks
		now?				
14:40	14:50	Break			Break	

Fridav	>				Closing Remarks							
Thursday	Chair: T.Salthammer Co-Chair: H. Pekey	S.M. Almeida, M. Pinto, D. Rodrigues	Indoor Air Quality In Portugal	S. Sinan Keskin, Selen Kılıç	Indoor Air PM Mass and Elemental Concentrations in a Selected Hospital	Coffee Break	Chair: T. Salthammer Co-Chair: H. Pekey	Naadem Ahmad Ramadan, Nadhira Shaban Sali	Isolation and Identification of Airborne Fungi and Their Relation to Allergy Disease in Sulaimani City	Esra Karaman, Gülen Güllü, Sibel Menteşe	Determining the Effect of Antimicrobial PVC Meteorials that Contain	Protect lats that Contain Silver Ions for Improving Indoor Air Quality
Wednesdav	2				Conference Tour							
Tuesdav	Chair: V. Vilnitis Co-Chair: T. Elbir	A.M.J.Cruz, M.C. Freitas, Tona G. Verburg, H.Th. Wolterbeek Effect of Atmospheric Dollicers and	Pollutants and Environmental Data on Respiratory and Circulatory Diseases in Lisbon, Portugal	S.M. Almeida, M.C. Freitas, A. Silva, N. Canha, M. Almeida-Silva, C. Galinha, T. Sitoe, I. Dionisio, S. Garcia, G. Domingues, J. Perim de Faria, V. Torre Suarez, B. Fernandez	Integration of Biomonitoring and Instrumental Techniques to Assess the Air Quality in an Industrial Area Located in the Coastal of Central Asturias, Spain	Break	Chair Person: A. Atımtay Co-Chair: N. Machin	A.V. Silva, S.M. Almeida, A.I. Miranda	Air Pollution and Hospital Admission for Cardiorespiratory Diseases in Setübal, Portugal	Yetkin Dumanoglu, Abdurrahman Bayram	Parameters Affecting The Surface Ozone	Concentration in Izmir's Atmosphere
Mondav	Chair Person: P. K. Hopke Co-Chair: T. Döğeroğlu	Yungang Wang, Xiaoyan Xia, David C. Chalup, Yuanxun Zhang, Philip K. Hopke, Mark J. Utell	source Apportionment of Airborne Particulate Matter in Rochester, NY	Jiang Xue, Binggang Shen	The Statistical Distributions of SO2, NO2 and PM10 Concentrations in Xi'an, China	Coffee	Chair Person: J. Watson Co-Chair: M. Odabaşı	Yilmaz Ocak, Akın Kilıçvuran, Aykut Balkan Eren, Aysun Sofuoglu, Sait C. Sofuoglu	Exposure to Particulate Matter in a Mosque	Wan Wiriya and Somporn Chantara	Source Identification of Airborne PM10-Bound	Polycyclic Aromatic Hydrocarbons in Chiang Mai, Thailand
L A	15:30	15:10		15:30		16:00	17:20	00.21	07.01		16:40	
HAI	14:50	14:50		15:10		15:30	16:00	00.21	00.01		16:20	

_										
Friday										
Thursday	Avril Challoner, Laurence Gill	Indoor / Outdoor Air Quality Relationship In An	Urban Environment: Dublin Case Studies		Muhammed Jarra		Cook with the Power of the	sun save money and Fire Wood		Gala Dinner
Wednesday										
Tuesday	Kvetoslava Rimarova	Effect of Environmental Pollution and Social Factors	on respiratory Disease Among Children in Slovakia		L.Delgerzul, B.Suvd, A.Enkhjargal		Health Impact Assessment of Ambient PM Air	Pollution PM10 and PM25 of		
Monday	Burcu Der, Húlya Semercioğlu, Búllent Odabaş, Hasan Güven and Seref Soylu	Inventoryingof Transport, Heating and Industry	sourced Frimary Foundants and CO ₂ in Adapazari	Melik Kara, Yetkin Dumanoglu, Hasan Altiok,	Anil Hepyucel, Abdurrahman Bayram,	Tolga Elbir, Mustafa Odabasi	Elemental composition of ambient particulate matter	collected at a heavily	Welcome Cocktail	
LA		1/:00				17:20			19:30	24:00
HAL		16:40				17:00			18:30	20:00

09:40					/mm11
04-60	T	Plenary Talk at Hall A	Plenary Talk at Hall A	Plenary Talk at Hall A	Plenary Talk at Hall A
20.00		Break	Break	Break	Break
10:30			Chair Person: M.D. Kantarcı Co-Chair: M.AydınalpKöksal	Chair Person: A. Bayram Co-Chair: D. Karakaş	Chair Person: P. Hopke Co-Chair: B. Onat
	I		Eiliv Steinnes, Torunn Berg, Hilde Thelle Uggerud	M.Doğan Kantarcı, Özlem Şahin	Sümeyra Bayır, Gaye Özdemir, Gökhan Bilsel, Mine Bilsel, Naciye Öztürk, Pınar Ergenekon
				Impact of Warming and Aridification on the Relationship Between	
10:10		Oral Presentations at Hall A	Three Decades of Atmospheric Metal	Sulphur Content of Cedar (Cedrus Libani), Black Pine (Pinus Niera) Scotch Pine	Passive Sampling Under Investigation: Is Accuracy in Amhient Weekly VOC
			Deposition in Norway as Evident From Analysis of	(Pinus Sylvestris) and Red	Concentrations Severly
			Moss Samples	Prine (Prinus Bruua) and Harmful Entomological	Allected by Using Experimental Uptake Rates?
				Species in the Reforestration Areas in the Central Anatolia Region	
	Registration		N. Canha, A.M.J.Cruz, M.C. Freitas, S.M. Almeida, T.G. Verburg H Th. Molterback	S. Hazrati, S. Rahimzadeh, F. Rahimzadeh	J. M. Lim, J. H. Jeong, J. H. Lee, J. H. Moon, Y. S. Chung
10:30			Spatial and Temporal	Assessment Of	Distribution Characteristics of
			Variation of Biomonitors	Environmental Gamma	Platinum Group Element in
			Conductivity at Lisbon City, Portugal	Radiation Dose Rate In Ardabil And Sar Ein	Airborne PM10 at the Roadside Area
11:00				Coffee Break	
11:40		Plenary Talk at Hall A	Plenary Talk at Hall A	Plenary Talk at Hall A	Doctor Coccion
11:50			Break		ILUSSEC LEUSUT
12:50		Chair Person: L. Husain	ChairPerson: T.Salthammer	Chair Person: M. Vana	Chair Person: E. Ekinci
	-	CO-UNAIT: I. EIDIT Omid Babhtiari Samira	LO-LUAIT: B. PEREY	CO-Chair: B. Uhat	LO-UNAIT: M.AYAINAIPKOKSAI jemail And Naciva Öztürk
		Mosleh. Tavebeh Khosravi.	Rıza G. Oraltay, Buğra Çelik,	M. Almeida-Silva, S. M.	omar Alagha. Pinar Omar Alagha. Pinar
		Toraj Mohammadi	Burcu Yollu, Selin Işgüven	Almeida, S. Viegas, C. Viegas	Ergenekon
					Optimization of Solid Phase
12:10		Polyimide Mixed Matrix	Seasonal Variation of the		Micro-Extraction (SPME)
		Membranes Preparation And	Size and Concentration of	Indoor air quality in urban	Method by Taguchi Design
		Characterization For CO2	the Urban Particles: Göztepe	environments	for the Analysis of Polycyclic
		Selective Separation	Field Study		Aromatic Hydrocarbons

Friday	Elizabeth Somervell	Evaluation of the UM-CMAQ Modelling System for Urban Air Quality	Halij Arı	Greenhouse Gas Emissions From A Landfill				Closing Remarks at Hall A	
Thursday	Ceren Barlas, Andrea Pozzer, Jos Lelieveld	An Estimate of Present Day and Future Global Mortalities Due to Anthropogenic Fine Particulate Matter and Ozone Pollution Using Atmospheric Modeling	Songul Akbulut, Barbara Krupińska, Anna Worobiec, Ugur Cevik, Lucyna Samek, Ewa Wifkojć, Halim Taskın, René Van Grieken Gross Anha And Rata	Activities Of Airborne Particulates Samples From Wawel Royal Castle Museum In Crocow, Poland		Plenary Talk at Hall A	DI eak Chair Person: E. Gaga Co-Chair: B. Onat	AH. Bu-Olayan and BV. Thomas	Distribution and Seasonal Variations of Trace Metals Levels in Kuwait Governorates Aerosol (PM10, PM25, PM1)
Wednesday	Murat Varol, Aysel T. Atimtay, Mustafa Can Çelebi, Hayati Olgun, Hüsnü Atakül, Ufuk Kaya-han, Berrin Bay, Alper Ünlü	Co-combustion of hazelnut shells with a high-sulfur Turkish lignite in a circulating fluidized bed com-bustor with air staging	J. M. Balzani Lööv, B. Alfody, F. Lagler, J. Hjorth and A. Borowiak	SIRENAS (Ships Investigation Remotely About NOX And SOX): The Rotterdam And Genoa Campaigns	Lunch Break			Conference Tour	
Tuesday	Hojjatollah Maghsoodloorad, Afshin Pak, Toraj Mohammadi	Synthesis of W-Type Zeolite Membrane for SF ₆ Purification	Abbas Ahmed Khaleel, Shamsa Al-Mansouri Catalvitic combustion and	catanytic controlorinated abatement of chlorinated hydrocarbons by high- surface-area mixed metal oxides		Poster Session	Chair Person: J. Chow Co-Chair: E. Gaga	B. Turóczi, A. Hoffer, N. Kováts, A. Ács, A. Gelencsér	Sampling and Characterization of Resuspended and Respirable Urban Particulate Matter
Monday						Plenary Talk at Hall A	DI EAK Chair Person: A. Bayram Co-Chair: B. Keskinler	Mahmood M. Barbooti, Neran K. Ibraheem, Ihsan H. Dakhil	Removal Of Sulfur Dioxide From Gas Streams By Absorption Into Dilute Urea Dilute Solutions
TB		12:30	12:50		14:00	14:40	15:30		15:10
HAL		12:10	12:30		12:50	14:00	14:50		14:50

HAL	ΓB	Monday	Tuesday	Wednesday	Thursday	Friday
15:10	15:30	Nesrin E. Machin Catalytic Combustion of Methane as a Way to Reduce Emissions	Vanes Poluzzi, Isabella Ricciardelli, Silvia Ferrari, Arianna Trentini, Linda Passoni, Claudio Maccone, Fabiana Scotto, Claudio Sartini Aerosol Size Distribution and Number Concentration of Particles (5.6 – 560 Nm) Near an Urban Waste Incinerator Plant		Milan Váňa, Jaroslav Pekárek Long-Term Trends of VOCs at The Czech EMEP Observatory Košetice 1993–2010	
15:30	16:00	Coffee	Break		Coffee Break	
16:00	17:20	Chair Person: A. Atımtay Co-Chair: N. Machine	ChairPerson:A.Müezzinoğlu Co-Chair: J.Al-Awadi		Chair Person: M.D. Kantarcı Co-Chair: S. Keskin	
16:00	16:20	Ferdi Brahushi, Aida Bani, Çela Elvis Air Quality Assessment of Sharra Landfill-Albania	Anca Gheboianu, Ion V. Popescu, Claudia Stihi, Otilia Culicov, Iulian Bancuta, Roxana Bancuta, Andrei Chilian Air Pollution Monitoring Using Neutron Activation Analysis and Mosses as Bioindicators		Pérola C. Vasconcellos, Davi Z. Souza, Minna Aurela, Karri Saarnio, Kimmo Teinilä, Risto Hillamo PM ₂₅ and PM ₁₀ Chemical Composition of Urban and Biomass Burning Areas of São Paulo State, Brazil	
16:20	16:40	Riham R. Mohamed and Reem K. Farag Preparation And Characterization Of Carboxymethyl Chitosan– Poly (Vinyl Alcohol) Nanogels For Antibiological Activity	Martins, P.C.A., Barison A.F., Mauad, T., Saldiva, P.H.N. Carvalho-Oliveira, R. Use Of Biomonitoring with Native Plant Associated with Areas of Environmental Atmospheric Attention in Camagari – Bahia, Brazil	,	Elif Özlü, Serpil Yenisoy- Karakaş Investigation of Chemical Composition and Seasonal Variation of Aerosols in Bolu Atmosphere	
16:40	17:00	Canan Uraz, Tuğba Gürmen Özçelik Removal of Nıtrobenzene Vapors in the Industrial Waste Gas Streams	Mustafa. Z. Ozel, Jacqueline F. Hamilton, Alastair C. Lewis Determination of Organic Nitrogen Compounds in Air, Rain and Snow Samples Using Comprehensive Gas Chromatography With a Nitrogen Chemiluminescence Detector (GCXGC-NCD)		Nirankar Singh, Susheel K Mittal, Ravinder Agarwal, Amit Awasthi and Prabhat K Gupta Gupta Monitoring of Trace Gases and Aerosols During Open Agricultural Residue Burning In Patiala (NW-India)	

ix

_			
Friday			
Thursday	Alaa EI-Din Kh. Omar, Elsayed B. Belal and Abd EI- Naiem A. EI-Abd Effects of Foliar Application with Compost Tea and Filtrate Biogas – Slurry Liquid on Yield and Fruit Quality of Navel Orange (Citrus Saneness Osbeck) Trees		Gala Dinner
Wednesday			
Tuesday	Cervantes, M.L., Ruvalcaba, J.L., Cuapio, L.A. Sansone, U. PIXE Analysis for fhe Multielemental Determination in Biomonitors (Thillandsia Recurvata and Flavopunctelia Flaventior) for the Study of Polluting Agents in the Valley of Mexico		
Monday	Nalan Ilhan, Aysegul Derya Altinay, Naɗir Dizge, Elif Erhan, Ahmet Karagunduz, Pinar Ergenekon, Bulent Keskinler Keskinler NOx Removal Process in a Jet-Loop Bioreactor	Welcome Cocktail	
L B	17:20	19:30	24:00
HAL	17:00	18:30	20:00

TABLE OF CONTENTS

SOURCE APPORTIONMENT OF AIRBORNE PARTICULATE MATTER IN	
Yungang Wang, Xiaoyan Xia, David C. Chalupa, Yuanxun Zhang, Philip K. Hopke,	
Mark J. Utell	1
EXPOSURE TO PARTICULATE MATTER IN A MOSQUE	2
THINAZ OCAK, AKHI KHIÇVUTAH, AYKUL DAIKAH ETEH, AYSUH SOTUOGIU, SAIL C. SOTUOGIU SEASONAL WADIATION AND SOUDCE IDENTIEICATION OF AIDRODNE DM10	Z
ROUND POLYCYCLIC AROMATIC HYDROCARRONS IN CHIANG MAL THAILAND	
Wan Wiriya and Somnorn Chantara	3
INVENTORYING OF TRANSPORT. HEATING and INDUSTRY SOURCED PRIMARY	5
POLLUTANTS AND CO2 IN ADAPAZARI	
Burcu Der, Hülya Semercioğlu, Bülent Odabaş, Hasan Güven and Seref Soylu	4
ELEMENTAL COMPOSITION OF AMBIENT PARTICULATE MATTER COLLECTED AT	
A HEAVILY POLLUTED INDUSTRIAL REGION	
Melik Kara, Yetkin Dumanoğlu, Hasan Altıok, Anıl Hepyücel, Abdurrahman Bayram,	
Tolga Elbir, Mustafa Odabaşı	6
USING LAKE SEDIMENT ARCHIVES TO ASSESS AIR POLLUTION BY TRACE	
ELEMENTS	
André Tessier, Charles Gobeil	7
IMPACT OF SHIP EMISSIONS ON AIR POLLUTION OVER THE WESTERN	
MEDITEKKANEAN: UBSEKVATIONS FROM A UKUISE SHIP	
Ulara Schembari, Fabrizia Gavaili, Eleonora Guccia, Jens Hjorui, Silvia Nava, Paolo	0
AIR OILAL ITY OF NORTHERN CYPRUS	0
Gülen Güllü Valts Vilnitis, Douglas Clark, Özsen Albavrak, Tolga Baki	9
MEASUREMENT OF NOISE AND AIR POLLUTION IN KUWAIT CITY KUWAIT)
Jasem M. Al-Awadhi	10
SIX YEARS OF AIR QUALITY MANAGEMENT IN THE BALTIC COUNTRIES –	
LESSONS LEARNT	
Aiga Kāla, Valts Vilnītis	11
EFFECT OF ATMOSPHERIC POLLUTANTS ON RESPIRATORY AND CIRCULATORY	
DISEASES IN LISBON, PORTUGAL	
Ana Januário Cruz, Susana Morais Sarmento, Tona Verburg, Alexandra Viana Silva,	
Célia Alves, Maria do Carmo Freitas, Hubert Wolterbeek	13
INTEGRATION OF BIOMONITORING AND INSTRUMENTAL TECHNIQUES TO	
ASSESS THE AIR QUALITY IN AN INDUSTRIAL AREA LOCATED IN THE COASTAL	
UF LENIKAL ASIUKIAS, SPAIN Susana Marta Almaida, Maria da Carma Fraitas, Ana Isabal Badra, Tiaga Pibaira	
Jusana Maria Alineita, Maria uo Carino Freitas, Ana Isaber Feuro, Tiago Kiberro,	
Isabel Dionisio Sílvia Garcia Goncalo Domingues Julia Perim de Faria Beatriz	
González Fernández. Diane Cianarra	14
AIR POLLUTION AND HOSPITAL ADMISSION FOR CARDIORESPIRATORY	
DISEASES IN SETÚBAL. PORTUGAL	
Alexandra Viana Silva, Susana Marta Almeida, Susana Morais Sarmento, Ana	
Januário Cruz, Tona Verburg, Ana Isabel Miranda	15
PARAMETERS AFFECTING THE SURFACE OZONE CONCENTRATION IN İZMIR'S	
ATMOSPHERE	
Yetkin Dumanoğlu, Abdurrahman Bayram	16
EFFECT OF ENVIRONMENTAL POLLUTION AND SOCIAL FACTORS ON	
RESPIRATORY DISEASE AMONG	
CHILDREN IN SLOVAKIA	4 🗖
KVETOSIAVA KIMATOVA	17
DEALTH IMPAUT ASSESSMENT OF AMBIENT PM AIK POLLUTION PM10 and	
Delgerzul Lodoisamba Suvd Bathaatar Enkhiargal Altangerel	10
2018 or 201 Doublanibu, buvu bubaatar, biikijargar maligerer	1)

EFFECT OF PARTICULATES MATTER FROM CONSTRUCTION INDUSTRY	
TOWARDS WORKERS' HEALTH AND PROJECT COST	
Nik Nurul-Hidayah Nik Yahya and Shamzani Affendy Mohd Din	20
MODELLING AND ASSESSING RISKS FROM ACCIDENTAL RELEASE OF	
HAZARDOUS GASES	
Richard Tavares, Ana Isabel Miranda, Carlos Borrego	21
IDENTIFYING GAPS AND NEEDS IN THE DEVELOPMENT OF A NATIONAL AIR	
QUALITY MANAGEMENT POLICY IN NORTHERN CYPRUS	
Valts Vilnitis, Gülen Güllü, Douglas Clark, Özşen Albayrak, Tolga Baki	22
THE STUDY OF APPLICABILITY OF LIMIT VALUES FOR PAHs ON SOIL IN TURKEY	
Gonca Gülçiçek, Ismail Toroz, Kadir Alp, Asude Hanedar, Edip Avsar, Gizem Karaca MESOSCALE MODELING OF AEROSOL PHYSICAL AND CHEMICAL PROPERTIES FOR OBSERVATIONAL STATIONS AT DIFFERENT ALTITUDES	23
Aurelia Lupascu, Karine Sellegri, Evelyn Freney, Julien Boulon, Gilles Foret,	
Guillame Siour, Aurelie Colomb, Jean M. Pichon, Justine Gourdeau and Wolfram	
Wohrock	24
THE STUDY OF AIR POLLUTION WITH HEAVY METAL	21
Julian Băncută Jon V. Ponescu, Claudia Stibiă, Anca Chebojanu, Rovana Băncută	
Andrei Chilian And Cheorghe Valerică Cimpoca	25
SEASONAL VARIATION SOURCES OF DORS AND OODS IN HIGH ALTITUDE SITE OF	25
WESTERN RI ACK SEA RECION OF THREEV	
Sorpil Vanisov Karakas, Muhammed Öz, Eftade O, Caga	26
WHEDE ADE CO2 EMISSION ALLOWANCE DDICES HEADINC2 THE AMBICHOUS	20
WHERE ARE CO2 EMISSION ALLOWANCE FRICES HEADING: THE AMDIGUOUS DOLE OF CADITAL MODILITY IN A WODED WITH CEVEDAL INDEDENDENT	
KULE OF CAPITAL MODILITI IN A WORLD WITH SEVERAL INDEPENDENT EMICCIONS TRADING COHEMES	
Len Schächtele	27
JAII SUIJUILUU DETEDMINING DECIONAL CADDON DIOVIDE EMICCIONS AND ITS LONG TEDM	27
DETERMINING REGIONAL GARDON DIOAIDE EMISSIONS AND ITS LONG TERM	
FURELASI FUR TURKEY	20
Teser Asianogiu anu Merin Ayumaip Koksai Licing denemadi e enedov dotential de tudicevito deduce el ectidicity	28
USING RENEWABLE ENERGY PUTENTIAL OF TURKEY TO REDUCE ELECTRICITY	
GENEKATION ASSOCIATED CO2 EMISSIONS	20
	29
INDUOK AIK QUALITY IN PORTUGAL	20
Susana Marta Aimeida, Marina Aimeida- Silva, Margarida Pinto, Dinis Rodrigues	30
INDOUR AIR PM MASS AND ELEMENTAL CONCENTRATIONS IN A SELECTED	
HOSPITAL	0.1
5. Sinan Keskin, Selen Kilic	31
ISOLATION AND IDENTIFICATION OF AIRBORNE FUNGIAND THEIR RELATION	
TO ALLERGIC DISEASE IN SULAIMANI CITY, IRAQ	
Nadeem Ahmad Ramadan and Nadhira Shaban Salih	32
DETERMINING THE EFFECT OF ANTIMICROBIAL PVC MATERIALS THAT	
CONTAIN SILVER IONS FOR IMPROVING INDOOR AIR QUALITY	
Esra KARAMAN, Gülen GULLU, Sibel MENTEŞE	33
INDOOR / OUTDOOR AIR QUALITY RELATIONSHIP IN AN URBAN ENVIRONMENT:	
DUBLIN CASE STUDIES	
Avril Challoner and Dr Laurence Gill	34
A CASE STUDY: GATE TO GATE LIFE CYCLE ANALYSES OF A COMBINED CYCLE	
POWER PLANT LOCATED AT AN INDUSTRIAL PARK IN TURKEY	
Emre Yöntem, Gülçin Salihçavuşoğlu, Elif Asuman Korkusuz, Merih Aydınalp	
Köksal, Zeynep Yöntem	35
PARTICLE SIZE DISTRIBUTION OF n-ALKANES AND POLYCYCLIC AROMATIC	
HYDROCARBONS (PAHs) IN URBAN AEROSOL OF ALGIERS, ALGERIA	
R. Ladji, N. Yassaa, C. Balducci A. Cecinato and B. Y. Meklati	36
ON-ROAD PARTICULATE MATTER EMISSIONS MEASURED IN A ROADWAY	
TUNNEL IN THE OSMANGAZI TUNNEL, BILECIK, TURKEY	
Eftade O.Gaga, Akif Arı, Nesimi Akyol, Özlem Özden, Tuncay Döğeroğlu,	
Mustafa Odabaşı	37

AN EVALUATION OF THE HEALTH RISKS OF SELECTED HAZARDOUS AIR	
POLLUTANTS FOR DIFFERENT GROUPS IN KOCAELI	
Demet ARSLANBAŞ , Hakan PEKEY, Beyhan PEKEY, Zehra Bulut Bozkurt, Güray	
Doğan, Mihriban Civan, Öznur Oğuz Kuntasal, Gürdal Tuncel	38
IMPROVEMENT LAND USED REGRESSION MODEL FOR PREDICTING INORGANIC	
POLLUTANTS CONCENTRATIONS IN BURSA/TURKEY	
Mihriban Civan, Arzu Erener and Gürdal Tuncel	39
REMOVAL OF SULFUR DIOXIDE FROM GAS STREAMS BY ABSORPTION INTO	
DILUTE UREA DILUTE SOLUTIONS	
Mahmood M. Barbooti, Neran K. Ibraheem, Ihsan H. Dakhil,	40
CATALYTIC COMBUSTION OF METHANE AS A WAY TO REDUCE EMISSIONS	
Nesrin E. Machin	42
AIR QUALITY ASSESSMENT OF SHARRA LANDFILL-ALBANIA	
Ferdi Brahushi, Aida Bani, Elvis Çela	43
PREPARATION AND CHARACTERIZATION OF CARBOXYMETHYL CHITOSAN-	
POLY (VINYL ALCOHOL) NANOGELS FOR ANTIBIOLOGICAL ACTIVITY	
Riham R. Mohamed and Reem K. Farag	44
REMOVAL OF NITROBENZENE VAPORS IN THE INDUSTRIAL WASTE GAS	
STREAMS	
Canan Uraz, Tuğba Gürmen Özçelik	45
NOX REMOVAL PROCESS IN A JET-LOOP BIOREACTOR	
Nalan Ilhan, Aysegul Derya Altinay, Nadir Dizge, Elif Erhan, Ahmet Karagunduz,	
Pinar Ergenekon, Bulent Keskinler	46
CO-COMBUSTION OF HAZELNUT SHELLS WITH A HIGH-SULFUR TURKISH	
LIGNITE IN A CIRCULATING FLUIDIZED BED COMBUSTOR WITH AIR STAGING	
Murat Varol, Aysel T. Atimtay, Mustafa Can Çelebi, Hayati Olgun, Hüsnü Atakül,	
Ufuk Kayahan, Berrin Bay, Alper Ünlü	47
POLYIMIDE MIXED MATRIX MEMBRANES PREPARATION AND	
CHARACTERIZATION FOR CO2 SELECTIVE SEPARATION	
Omid Bakhtiari, Samira Mosleh, Tayebeh Khosravi, Toraj Mohammadi	48
SYNTHESIS OF W-TYPE ZEOLITE MEMBRANE FOR SF6 PURIFICATION	
Toraj Mohammadi , Hojjatollah Maghsoodloorad	49
CATALYTIC COMBUSTION AND ABATEMENT OF CHLORINATED HYDROCARBONS	
BY HIGH-SURFACE-AREA MIXED METAL OXIDES	
Abbas Ahmed Khaleel, Shamsa Al-Mansouri	50
SAMPLING AND CHARACTERIZATION OF RESUSPENDED AND RESPIRABLE	
URBAN PARTICULATE MATTER	
Beatrix Turóczi, András Hoffer, Ilona Nyírő-Kósa, András Gelencsér	51
AEROSOL SIZE DISTRIBUTION AND NUMBER CONCENTRATION OF PARTICLES	
(5.6 – 560 NM) NEAR AN URBAN WASTE INCINERATOR PLANT	
Vanes Poluzzi, Isabella Ricciardelli, Silvia Ferrari, Arianna Trentini, Linda Passoni,	
Claudio Maccone, Fabiana Scotto, Claudio Sartini	52
AIR POLLUTION MONITORING USING NEUTRON ACTIVATION ANALYSIS AND	
MOSSES AS BIOINDICATORS	
Anca GHEBOIANU , Ion V. POPESCU, Otilia CULICOV, Claudia STIHI, Marina	
FRONTASYEVA, Gh. Valerica CIMPOCA, Iulian BANCUTA, Roxana BANCUTA,	
Andrei CHILIAN	53
USE OF BIOMONITORING WITH NATIVE PLANT ASSOCIATED WITH AREAS OF	
ENVIRONMENTAL ATMOSPHERIC ATTENTION IN CAMAÇARI – BAHIA, BRAZIL	
Martins, PCA, Barison, AF, Mauad T, Saldiva, PHN;, Carvalho-Oliveira, R	54
Determination of Organic Nitrogen Compounds in Air. Rain and Snow Samples	
Using Comprehensive Gas Chromatography with a Nitrogen Chemiluminescence	
Detector (GCXGC-NCD)	
Mustafa. Z. Ozel, Jacqueline F. Hamilton, Alastair C. Lewis	55

PIXE ANALYSIS FOR THE MULTYELEMENTAL DETERMINATION IN BIOMONITORS	
(THILLANDSIA KEUUKVATA AND FLAVOPUNUTELIA FLAVENTIOK) FOR THE	
STUDY OF POLLUTING AGENTS IN THE VALLEY OF MEXICO	FC
UERVANTES, M.L., KUVAICADA, J.L., UUAPIO, L.A., SANSONE, U.	56
THREE DECADES OF ATMOSPHERIC METAL DEPOSITION IN NORWAY AS	
EVIDENT FROM ANALYSIS OF MOSS SAMPLES	F7
	57
LISBON CITY, PORTUGAL	
N. Canha, A.M.J.Cruz, M.C. Freitas, S.M. Almeida, T.G. Verburg3, H.T. Wolterbeek	58
SEASONAL VARIATION OF THE SIZE AND CONCENTRATION OF THE URBAN PARTICLES: GOZTEPE FIELD STUDY	
Riza Gürcan Oraltay, Bugra Çelik, Burcu Yollu, Selin Isguven3	59
SIRENAS (SHIPS INVESTIGATION REMOTELY ABOUT NOX AND SOX): THE	
ROTTERDAM AND GENOA CAMPAIGNS.	
J. M. Balzani Lööv, B. Alfody, F. Lagler, J. Hjorth and A. Borowiak	60
IMPACT OF WARMING AND ARIDIFICATION ON THE RELATIONSHIP BETWEEN	
SULPHUR CONTENT OF CEDAR (Cedrus libani), BLACK PINE (Pinus nigra),	
SCOTCH PINE (Pinus sylvestris) AND RED PINE (Pinus brutia) AND HARMFUL	
ENTOMOLOGICAL SPECIES IN THE REFORESTRATION AREAS IN THE CENTRAL	
ANATOLIA REGION	
M.Doğan Kantarcı and Özlem Sahin	62
ASSESSMENT OF ENVIRONMENTAL GAMMA RADIATION DOSE RATE IN ARDABIL	
AND SAR FIN	
Sadegh Hazrati 1, Soheila Rahimzadeh 2, Fatemeh Rahimzadeh 3	64
INDOOR AIR OUALITY IN URBAN ENVIRONMENTS	01
M Almeida-Silva S M Almeida A Dias	65
An Estimate of Present Day and Future Global Mortalities Due To Anthronogenic	00
Fine Particulate Matter and Ozone Pollution Using Atmospheric Modeling	
Ceren Barlas Andrea Pozzer Jos Lelieveld	66
CROSS ALPHA AND RETA ACTIVITIES OF AIRBORNE PARTICIILATE SAMPLES	00
FROM WAWFI ROVAL CASTLE MUSEUM IN CRACOW POLAND	
Songul Akhulut Barbara Krunińska Anna Worobiec Hour Cevik Lucyna Samek	
Fwa Wiłkojć Halim Taskin and René Van Grieken	67
DISTRIBUTION AND SEASONAL VARIATIONS OF TRACE METALS I EVELS IN	07
KIWAIT COVEDNODATES AEDOSOL (DM10 DM2 5 DM1)	
AU Pu Olavan and PV Thomas	60
An. DU-Olayali aliu DV. Hiolilas I ONC TEDM TDENDE OF VOLATILE ODCANIC COMPOLINDE AT THE CZECH EMED	00
DONG-TERM TRENDS OF VOLATILE ORGANIC COMPOUNDS AT THE CLECH EMER	
UDSERVATURI RUSETILE 1993-2010 Milan Vana Janaglav Dalvavaly	60
MILIAII VAIIA, JATOSIAV PEKATEK	69
PM2.5 AND PM10 CHEMICAL COMPOSITION OF UKBAN AND BIOMA55 BUKNING	
AKEAS OF SAU PAULU STATE, BKAZIL	
Perola C. Vasconcellos, Davi Z. Souza, Minna Aurela, Karri Saarnio, Kimmo Teinila,	70
KISTO HIIIAMO.	70
INVESTIGATION OF CHEMICAL COMPOSITION AND SEASONAL VARIATION OF	
AEROSOLS IN BOLU ATMOSPHERE	
Elif OZLU, Serpil YENISOY-KARAKAŞ	72
MONITORING OF TRACE GASES AND AEROSOLS DURING OPEN AGRICULTURAL	
RESIDUE BURNING IN PATIALA (NW-INDIA)	
Nirankar Singh,Susheel K Mittal, Ravinder Agarwal,Amit Awasthi, Prabhat K Gupta	73
EFFECTS OF FOLIAR APPLICATION WITH COMPOST TEA AND FILTRATE BIOGAS	
– SLURRY LIQUID ON YIELD AND FRUIT QUALITY OF NAVEL ORANGE (CITRUS	
SANENESS OSBECK) TREES	
Alaa El-Din Kh. Omar, Elsayed B. Belal and Abd El-Naiem A. El-Abd	75

PASSIVE SAMPLING UNDER INVESTIGATION: IS ACCURACY IN AMBIENT WEEKLY VOC CONCENTRATIONS SEVERLY AFFECTED BY USING EXPERIMENTAL UPTAKE RATES?	
Sümeyra Bayır, Naciye Öztürk, Pınar Ergenekon, Gaye Özdemir ,Gökhan Bilsel, Mine Bilsel	76
DISTRIBUTION CHARACTERISTICS OF PLATINUM GROUP ELEMENT IN AIRBORNE PM10 AT THE ROADSIDE AREA	
J. M. Lim, J. H. Jeong, J. H. Lee, J. H. Moon, Y. S. Chung OPTIMIZATION OF SOLID PHASE MICRO-EXTRACTION METHOD FOR THE ANALYSIS OF PARS IN RAINWATER	77
İsmail Anıl, Naciye Öztürk, Ömer AĞA, Gaye Özdemir, and Pınar Ergenekon EVALUATION OF THE UM-CMAQ MODELLING SYSTEM FOR URBAN AIR QUALITY	78
Elizabeth Somervell GREENHOUSE GAS EMISSIONS FROM A LANDFILL	79
Halil Arı ASSOCIATION OF OZONE WITH NO2, BTEX AND METEOROLOGICAL PARAMETERS	80
Özlem Özden, Ethem Cem Keskin, Tuncay Döğeroğlu MERCURY SPECIATION IN ON-LINE MONITORING OF AIR QUALITY – THE	81
PRELIMINARY RESULTS OF MEASUREMENTS IN ZABRZE, SOUTHERN POLAND Halina Pyta, Marek Pawlowski DETERMINATION OF ORGANOCHLORINE PESTICIDES	83
CONCENTRATIONS IN DEPOSITION SAMPLES COLLECTED SEQUENTIALLY Hatice Karadeniz, İlker Köprü, Serpil Yenisoy- Karakaş, Duran Karakaş COULD MYCOTOXINS IN THE AIR BE A PUBLIC HEALTH PROBLEM IN PORTUGAL?	84
Carla Viegas, Cristina Veríssimo, Raquel Sabino, Marina Almeida-Silva, Susana Viegas EFFECT OF SO2 CONCENTRATION AT THE FLUE GAS DESULPHURIZATION WITH	85
CALCINED PHOSPHATE ROCK Jale Naktiyok, Hatice Bayrakçeken, A.Kadir Özer, M.Şahin Gülaboğlu	86
Science highlights from the Cape Verde Atmospheric Observatory (CVAO) Read, K.A., Lee, J.D., Carpenter, L.J., Lewis, A.C., Moller, S.J., Neves, L.M., Fleming Z.F.,	07
BIOMONITORING WITH TRADESCANTA PALLIDA USED AS COMPLEMENTARY TOOL TO THE SURVEILLANCE PROGRAM IN ENVIRONMENTAL HEALTH- RELATED AIR QUALITY IN AREA WITH BIOMASS BURNING AT BRAZIL Wagner Luiz Peres1, Cláudia Lúcia Pinto, Poliana Cristina Alves da Silva, Rodrigo	07
Pereira de Souza, Felipe Duarte Coelho de Sousa, Oberdan Ferreira Coutinho Lira, Paulo Hilário do Nascimento Saldiva, Regiani Carvalho de Oliveira SECTORAL VARIATION IN THE CONCENTRATION OF BTEX AT DIFFERENT CELECTED SUTES IN DEL U	89
Pallavi Saxena and Chirashree Ghosh	91
ELEMENTAL CHARACTERIZATION OF PM2.5 IN THE DENSE TRAFFIC AREA IN ISTANBUL	
Burcu ONAT, Ülkü ALVER ŞAHİN, Tanıl AKYÜZ BIOMONITORING OF TRACE ELEMENTS IN ASUNCION PARAGUAY BY TILLANDSIAS AND XRF TECHNIOUES	92
F.A.Doncel, Z.Villanueva; Riquelme, Insaurralde A DETERMINATION OF UPTAKE RATES FOR BTEX COMPOUNDS DURING PASSIVE	93
SAMPLING ONTO SORBENT TUBES Arslan SARAL, Selami DEMİR MEASUREMENTS OF THE LIGHT SCATTERING PROPERTIES OF BLACK CARBON AND GRAPHITE PARTICLES BY USING A DETECTOR ARRAY INCORPORATED	94
Ankur Gogoi, Amarjyoti Choudhury and Gazi Ameen Ahmed	95
DETERMINATION OF PAHS IN RAIN WATER İlker Köprüa, Duran Karakaşb, Serpil Yenisoy-Karakaşa	96

ANALYSIS AND INTERPRETATION OF HEAVY METALS ATMOSPHERE CONCENTRATION OBTAINED BY NUCLEAR TECHNIQUES IN ALGIERS URBAN

SITE	
K.Baddari, M.Djeddi, Gh.Brahmi	97
GREENHOUSE GASES AND EMISSION INVENTORY	
Sevda Ocak	98
HYDKOGEN – THE FUTUKE ENEKGY SOURCE AND	
IIS ENVIRUNMENTAL IMPACT Violeta Niculascu, Mihai Anghal Joan Stafanascu	00
RIGHVDROGEN – THE ENVIRONMENTALLY ERIENDLY ALTERNATIVE	99
AUTOMOTIVE FIIFL	
Mihai Anghel. Violeta Niculescu. Ioan Stefanescu	100
LINKAGES AMONG GLOBALISATION. INDUSTRIALIZATION, AND CLIMATE	100
CHANGE	
Raza Mohsin	101
IMPACTS OF CLIMATE CHANCE AND ETHICAL SOCIAL ENVIRONMENTAL	
RESPONSIBILITIES IN TURKEY	
Ali Raza Hassan	102
AN EVALUATION OF THE 2000S' AIR POLLUTION PANORAMA IN TERMS OF	
HEALTH IMPACTS AND COSTS IN SÃO PAULO, BRAZIL	
Miraglia Simone Georges El Khouri, Rodrigues-Silva Fernando, Amato-Lourenço	
Luís Fernando, Saldiva Paulo Hilário Nascimento	103
THE EFFECTS OF FINE (PM2.5) AND ULTRA-FINE (PM1.0 & 0.1) PARTICULATES	
TOWARDS HUMAN HEALTH	
Shamzani Affendy Mohd Din and Frederick D. Pooley	104
INDOOR RADON CONCENTRATION MEASUREMENT IN BASHIKA DISTRICT	105
A.K.MINEEMEEG, H.I.HASAN, Y.Y.KASIM	105
DETERMINATION OF N-NITROSAMINES, NICOTINE AND TOBACCO-SPECIFIC	
NITROSAMINES IN HOUSE DUST DI PRESSURISED LIQUID EXTRACTION AND	
DETECTION	
Mustafa 7 Özel Noelia Ramírez Jacqueline F. Hamilton, Rosa Maria Marcé	
Francesc Borrull Alastair C Lewis	106
EVALUATION OF DUST CONCENTRATIONS IN AN IRANIAN PORTLAND CEMENT	100
INDUSTRY	
Rahimzadeh Soheila, Hazrati Sadegh	107
CLEAN COOKSTOVE IMPROVES INDOOR AIR QUALITY AND REDUCES RISK OF	
CHILDHOOD RESPIRATORY DISEASES IN RURAL BANGLADESH	
G H Rabbani, MD, PhD, Mohammad Alauddin, PhD, Atiqul Haque, MD, MPH	108
THE MAIN INDICATORS FOR INDOOR AIR QUALITY IN NON-INDUSTRIAL	
OCCUPATIONAL ENVIRONMENT	
Zanna Martinsone, Marite-Arija Bake, Dagmara Sprudza, Svetlana Lakisa, Anita	
Seile, Pavels Sudmalis, Jurijs Svedovs, Mairita Zellane	110
AIR POLLUTION FROM TAILINGS AND MASS TRANSPORT OF DEPOSITED	
AEROSOL IN MITROVICA AIR	
Afrim Syla	111
EXTERNAL COSTS OF ELECTRICITY GENERATION IN TURKEY	110
Asii Firat	112
SIMULATION OF CO EMISSIONS FROM DETROI FUM	
ΣΠΑΤΙΟΝ ΟΓ ΟΓΕΜΙΣΣΙΟΝΣ ΓΚΟΜ ΓΕΙΚΟΓΕΟΜ ΙΝΠΙζΤΡΥ ΙΝ ΙΡΔΝ	
Majid Nevestani Hasti Hasheminejad	112
STUDENTS' AND PROSPECTIVE TEACHERS' UNDERSTANDINGS AROUT AIR	113
POLLUTION	
Cetin Doğar, Ahmet Gürses, Metin Acikyildiz. Mehtap Eider Korucu	114
DEVELOPMENT IN KONYA AIR QUALITY CHANGE FOR LAST 20 YEARS	_
Fatma Kunt, Sükrü Dursun	115

SECONDARY PROCESSING OF MULTILAYERED FOOD PACKINGS AS THE WAY OFPROTECTION OF SURROUNDING ATMOSPHERE	
Yu.A. Grigoriev, M.A. Meshchaninov, S.B. Strashnova	116
THERMAL BEHAVIOUR OF PHOSPHATE ROCK IN CALCINATION/CARBONATION	
CYCLES FOR CO2 CAPTURE	
Hatice Bayrakçeken, Jale Naktiyok, A.Kadir Özer, M.Şahin Gülaboğlu	118
ABATEMENT OF VOCS WITH CATALYTIC INCINERATION	
Tuğba Gürmen Özçelik	119
STUDY OF CATALYTIC COMBUSTION OF PROPANE IN A CONVERTER	
Sanchita Chauhana and V. K. Srivastavab	120
EFFECT OF COAL MOISTURE ON CARBONMONOXIDE AND PARTICULATE	
EMISSIONS IN FIXED BED COMBUSTION SYSTEMS	
Nalan Erdöl Aydın, Hasancan Okutan, Ekrem Ekinci	121
IMPACTS OF AIR POLLUTION ON HUMAN HEALTH	
Sevda Ocak	122
DETERMINATION OF POLYCYCLIC AROMATIC HYDROCARBONS AT ATMOSPHERE	
OF BALIKESIR CITY AND İKIZCETEPELER DAM LAKE	
Emin Taylan, Semra G. Tuncel	123

SOURCE APPORTIONMENT OF AIRBORNE PARTICULATE MATTER IN ROCHESTER, NY

Yungang Wang^a, Xiaoyan Xia^a, David C. Chalupa^b, Yuanxun Zhang^c, Philip K. Hopke^a, Mark J. Utell^b

^aCenter for Air Resource Engineering and Science, Clarkson University, Potsdam, NY 13699-5708, USA
^bDepartment of Environmental Medicine, University of Rochester Medical Center, Rochester, NY 14642, USA
^cGraduate University of Chinese Academy of Sciences, Beijing, China 100049

Particle composition data from the Chemical Speciation Network (CSN), organic molecular marker measurements, particle number size distributions and other ambient pollutants were analyzed in this study. The measurements were conducted at the New York State Department of Environmental Conservation (NYSDEC) site in Rochester, the third largest city in New York State from October 2009 to October 2010. The particle composition and organic molecular marker data were 24-hr average mass concentrations and obtained for samples taken every third day. Meteorological data including wind direction, wind speed, ambient temperature, relative humidity, barometric pressure and precipitation were also recorded in 1-hr intervals. The number size distributions of 10-500 nm particles and other pollutants including PM_{2.5}, CO, black carbon (BC), Delta-C (UVBC_{370nm} - BC_{880nm}), SO₂ and O₃ were measured simultaneously and their concentrations were hourly averaged. Positive matrix factorization (PMF2) will be applied to each of the three datasets and different dataset combinations to identify the sources and their contributions to the airborne particulate matter (PM). Potential source contribution function (PSCF) and conditional probability function (CPF) analyses were used to locate the regional and local sources, respectively.

EXPOSURE TO PARTICULATE MATTER IN A MOSQUE

Yılmaz Ocak, Akın Kılıçvuran, Aykut Balkan Eren, Aysun Sofuoğlu, Sait C. Sofuoğlu

İzmir Institute of Technology Department of Chemical Engineering and Environmental Research Center, Gülbahçe, Urla 35430 İzmir, Turkey

Mosques are places of worship where floor is carpeted wall-to-wall. The ambient air particulate matter (PM) concentrations may be moderate to high due to resuspension of the settled dust. Carpets may act as a source of health risk factors (i.e., physical and biological agents) such as PM, dust mites. Finally, infrequent cleaning is common; usually four to two times per month. Because of these characteristics, indoor air quality during worship may be of concern for sensitive groups of the population. Since no indoor air pollutant levels of the probable potent agents has been reported in the literature, this study aimed to measure PM exposure concentrations in a mosque on Friday in which the mid-day prayer receives a high attendance. The study was designed to measure PM number and CO₂ concentrations before, during, and after prayer in three different vacuuming schedules: a week before and a day before the prayer, and on the morning of the prayer in spring and fall for nine sampling days in consecutive three-week groups. Number concentrations of PM in 0.3-0.5 µm, 0.5-1 µm, 1-5 µm, >5 µm diameter size ranges were monitored. The maximum PM number concentrations were observed on the most crowded days of each campaign which were also the days when the cleaning was performed on the morning of the prayer day. PM number concentrations pointed out that better ventilation would result in significantly reduced PM exposures. PM_{2.5} concentrations that were based on a four to six-hour sampling that covered the periods of before, during, and after the prayer were high compared to other indoor environments reported in the literature. CO_2 concentrations pointed out that ventilation was not sufficient in the mosque during the prayer and CO₂ concentrations were significantly affected from the use of air conditioning. The results showed that better ventilation, a preventive cleaning strategy, and a more detailed study are needed.

Keywords: indoor air quality, particulate matter, carbon dioxide, ventilation, mosque.

SEASONAL VARIATION AND SOURCE IDENTIFICATION OF AIRBORNE PM10-BOUND POLYCYCLIC AROMATIC HYDROCARBONS IN CHIANG MAI, THAILAND

Wan Wiriya¹ and Somporn Chantara^{1, 2}

 ¹ Environmental Science Program, Faculty of Science, Chiang Mai University, Chiang Mai 50200
² Environmental Chemistry Research Laboratory, Chemistry Department, Faculty of Science, Chiang Mai University, Chiang Mai 50200
E-mail: wanwiriya484@hotmail.com, sp_chan@chiangmai.ac.th

The analysis of airborne PM_{10} -bound polycyclic aromatic hydrocarbons (PAHs) was conducted in Chiang Mai, Thailand. Fifty PM_{10} samples were collected in wet season (August to October 2010) and dry season (January-March 2011) and analyzed for 16 EPA-PAHs. The average PM_{10} concentrations in wet and dry season were 10.4 ± 7.1 , $33.8\pm20.6 \ \mu g/m^3$ and the total PAHs concentrations were 1.2 ± 1.2 , $4.2\pm1.7 \ ng/m^3$, respectively. Indeno(1,2,3-cd)pyrene was the main components of 16 PAHs in PM₁₀ samples. The average PM_{10} concentration in the dry season of 2011 was lower than annual average during the past 12 years because of high frequency of rain. Value of toxicity equivalent concentrations equivalent indicated that human health risk from PAHs in dry season (0.35 ± 0.26) was higher than wet season (0.16 ± 0.26). Diagnostic ratio and principal component analysis were used to find out sources of PM_{10} -bound PAHs. It was found that fuel combustion, vehicle emission and biomass burning were main sources of PM_{10} and PAHs in dry season.

Keywords: PAHs; Diagnostic ratio; Principal component analysis; PM₁₀

INVENTORYING OF TRANSPORT, HEATING and INDUSTRY SOURCED PRIMARY POLLUTANTS AND CO2 IN ADAPAZARI

Burcu Der, Hülya Semercioğlu, Bülent Odabaş, Hasan Güven and Şeref Soylu

Sakarya University, Department of Environmental Engineering

Preparing emission inventory is especially important for a city such as Adapazarı which has very low average wind speeds and pollution is observed intensely. In this work, transport, heating, and industry sourced pollutant emissions were inventoried for Adapazarı for five parameters; PM, SOx, NOx, CO, and CO2 by using emission factors from CORINAIR and EMEP/EEA.

To expose the characteristic of local traffic and emissions levels of transport all the streets and districts of Adapazarı were examined. According to frequency of municipality busses and population, these streets and districts were split into three regions. After that, six streets were determined in each region that represent the regions. To determine the vehicle activation, the traffic was video recorded. Vehicles were counted by using these records and classified as follows; passenger cars, light duty vehicle, busses, trucks and motorcycles by using the video records. The emissions levels of transport were calculated by using CORINAIR Emission Inventory Guidebook. It was observed that at five o'clock, transport sourced emissions reach to the maximum amount. According to the results, NOx, CO, HC and PM emissions arising from passenger cars and light duty vehicles were 1228 g/km, 9499 g/km, 241 g/km and 481 g/km for 1st region, 923 g/km, 9451 g/km, 207 g/km and 544 g/km for 2nd region and 2529 g/km, 19039 g/km, 538 g/km and 888 g/km for 3rd region at 17:00, respectively.

To expose the emissions levels of industry, 48 industrial organizations which are located in Adapazarı and their combustion technologies and fuel types were examined by using registration files of Sakarya Provincial Department of Environment and Forestry. It was observed that, the commonly used types of fuel are coal, fuel oil and natural gas. To calculate industrial sourced emissions, the emissions factors were taken from EMEP/EEA. The Tier 2 method which uses technology specific emission factors was chosen to estimate emissions of primary pollutant. For this sector CO_2 was also estimated by using IPCC-Tier 1 method. To expose the emissions arising from domestic heating survey study was conducted in 11 districts. According to survey results, the sources types of emissions and its number, fuel types and its amount and combustion technologies which are used in these sources were determined. It was seen that, the distribution of combustion technologies for the 91.339 households in Adapazarı center is, 43.1% gas-fired combi boiler, 42 % heating stove and 14.9% central coal heating. The emission factors were determined also by using CORINAIR Emission Inventory Guidebook. As the emissions from domestic heating were examined on monthly basis, it was clearly seen that the maximum amount of emissions released to the atmosphere in December with 24.219 tons coal and 9.470.000 m³ natural gas consumptions. In December, 783 tons of SO₂, 86 tons of NO₂, 2170 tons of CO, 196 tons of PM and 71.606 tons of CO₂ emissions were released to the atmosphere.

ELEMENTAL COMPOSITION OF AMBIENT PARTICULATE MATTER COLLECTED AT A HEAVILY POLLUTED INDUSTRIAL REGION

Melik Kara¹, Yetkin Dumanoğlu¹, Hasan Altıok¹, Anıl Hepyücel¹, Abdurrahman Bayram¹, Tolga Elbir¹, Mustafa Odabaşı¹

¹ Dokuz Eylul University, Department of Environmental Engineering, Tınaztepe Campus, Buca, Izmir, Turkey

Atmospheric particulate matter (PM_{10}) samples were collected at six sites (Aliaga city center, Helvaci, Bozkoy, Horozgedigi Cakmakli villages and ship dismantling area) located in Aliaga industrial region, Izmir, Turkey. Samples were analyzed for 23 selected trace elements (Ag, Al, As, Ba, Ca, Cd, Co, Cr, Cu, Fe, K, Mg, Mn, Mo, Na, Ni, Pb, Sb, Se, Sn, Sr, V, Zn) using ICP-MS. The annual averages of PM_{10} concentrations were 57.6, 41.2, 54.6, 56.9, 56.2 and 47.0 $\mu g/m^3$ in Bozkoy, Aliaga City Center, Helvacı, Horozgedigi, Cakmaklı villages and ship dismantling area, respectively. Factor analysis was applied to the elemental concentrations in PM_{10} and their main sources were identified as steel production and other industrial emissions, soil, traffic and road dust, fuel combustion and sea salt. Steel production emissions were linked to high correlation of Cd, Cu, Fe, Mn, Pb, Se, Sn, Zn. Soil contribution showed high levels of Al, Ba, Fe, Mg, Na, Sr. The petrochemical plant and fuel combustion appears to be associated with Mo, Ni, and V.

Keywords: trace elements, particulate matter, Principal Factor Analysis, Aliaga industrial region

USING LAKE SEDIMENT ARCHIVES TO ASSESS AIR POLLUTION BY TRACE ELEMENTS

André Tessier¹, Charles Gobeil¹

¹INRS-ETE, Université du Québec, 490 rue de la Couronne, Québec (Qc), G1K 9A9, Canada

We collected sediment cores and porewaters at the deepest sites of remote headwater lakes from the Province of Quebec, Canada where atmospheric deposition was the only source of anthropogenic contaminants. The profiles of ²¹⁰Pb activity as a function of cumulative mass of sediments showed no sign of sediment mixing. The measured solid-phase trace element (TE) concentrations were first corrected for post-depositional TE redistribution by modeling the porewater TE concentration profiles with a transportreaction equation, assuming steady-state. This correction for TE mobility was found to be negligible for Ag, Hg, Pb, In and U, moderate for Mo and Tl and large for As and Re. To take into account variations in sediment accumulation rate the TE data were expressed in term of flux. Lastly, these TE fluxes were normalized with respect to the unsupported ²¹⁰Pb inventory at the coring sites to take into account internal lake processes such as sediment focusing and loss of material via lake outflow. The dated TE deposition fluxes thus reconstructed show, in most cases, a significant decrease in TE deposition over the last 20-30 years, highlighting the success of recent actions to reduce atmospheric TE contamination in North America. Comparison of the TE profiles with those obtained at the same sites for stable Pb isotopes and for organic compounds emitted from known sources allows inferences to be made on anthropogenic TE sources.

Keywords: air pollution, sediment, archive, trace elements.

IMPACT OF SHIP EMISSIONS ON AIR POLLUTION OVER THE WESTERN MEDITERRANEAN: OBSERVATIONS FROM A CRUISE SHIP

Clara Schembari¹, Fabrizia Cavalli¹, Eleonora Cuccia², Jens Hjorth¹, Silvia Nava³, Paolo Prati², Frank Raes¹

¹ European Commission, JRC, Institute for Environment and Sustainability, I-21027, Ispra (VA), Italy.

 ² Department of Physics, University of Genova and I.N.F.N., Italy.
³ NFN-sect. Florence, National Institute of Nuclear Physics, Via Sansone 1, 50019, Firenze, Italy

Seaborne trade has been growing rapidly in recent years and as ship emissions are less regulated than other emissions from the transport sector, ships have become an important source of air pollution. An analysis of the contribution of ships to air pollution in the Western Mediterranean has been carried out based on measurements of air pollutants over the sea. The measurements have been performed regularly during spring-summerautumn since 2006 from a monitoring station placed on Costa Crociere cruise ships following a fixed weekly route in the Western Mediterranean. Ozone and Black Carbon (using an Aethalometer) were measured, along with SO₂, NO_x and particle size distributions. Elevated concentrations of SO₂ and NO_x were observed when crossing the main ship route passing from the Strait of Gibraltar to the Suez Channel. Four week-long campaigns with filtersampling and subsequent chemical analysis have been carried out and also time-resolved analysis of the elementary composition of submicron aerosols was performed by streaker-sampling followed by PIXE analysis. The data have been analyzed with the aim of gaining knowledge about the contributions of different sources to air pollution in the area. This analysis has been carried out by a combination of back-trajectory calculations, observations of correlations among trace gases as well as chemical and elemental components of aerosol and the use of the receptor model (Positive Matrix Factorisation, PMF) to perform a source apportionment. Among the findings are that SO₂, and sulphate concentrations generally show a geographical distribution similar to that of vanadium and nickel, tracers of heavy fuel combustion. The ratio between vanadium and nickel was within the range that typically is found for ship emissions. Measurements in harbours of EU countries along the route of the cruise ship showed a significant decrease in SO₂ concentrations after the introduction of a lower legal limit for sulphur content of fuels used by ships in harbours.

AIR QUALITY OF NORTHERN CYPRUS

Gülen Güllü¹, Valts Vilnitis², Douglas Clark³, Özşen Albayrak⁴, Tolga Baki⁴

¹Hacettepe University, Dept. Of Environmental Engineering, Beytepe Ankara 06800 Turkey ²Estonian, Latvian & Lithuanian Environment (ELLE), Skolas 10-8, Riga LV-1010, Latvia ³AirQuality.dk, Denmark

⁴ Environmental Protection Division, Air Quality Department, Nicosia, Northern Cyprus

This paper provides an overview of ambient air quality levels in the northern part of Cyprus based on monitoring data from five monitoring stations located at traffic locations in urban centers (Nicosia, Kyrenia and Famagusta), an urban background station located in Nicosia and a regional background station located in Alevkayası region. The air quality analysis presented in this work is based on concentration measurements of particulate matter, nitrogen dioxide and oxides of nitrogen, sulphur dioxide, ozone and carbon monoxide. The pollutants of most concern are particulate matter, expressed as PM10, nitrogen dioxide and ozone. Particulate matter (PM10) concentrations exceeded the limit values at all urban traffic stations. The highest exceedences were recorded at Kyrenia station, where the PM10 levels were higher than the daily limit value 73% of the time. Annual mean PM10 concentrations measured at the urban traffic stations were also above the 40 μ g/m³ limit value. Natural dust transport may contribute more than 37 % to the annual number of exceedances. The majority of dust events is observed in spring and winter seasons. The high levels of solar irradiation observed in the Mediterranean, in combination with the emitted anthropogenic and biogenic ozone precursors, favor photochemical ozone production. The highest annual mean ozone concentrations was measured at the regional background station as 113.4 μ g/m³. The number of exceedences at urban traffic stations Nicosia, Famagusta and Kyrenia are 19, 15 and 2, respectively, well within the permitted number of 25 days.

MEASUREMENT OF NOISE AND AIR POLLUTION IN KUWAIT CITY, KUWAIT

Jasem M. Al-Awadhi

Kuwait University Faculty of Science, Department of Earth and Environmental Sciences, PO Box 5969, 13060 Safat, Kuwait.

Traffic is one of the main sources of ground pollutions in Kuwait City and it is a main source of CO, NO₂, HC and a main agent producing photochemical oxidants such as O₃. The Kuwait City is also affected by possible emission of H₂S and NH₃ which are generated from existing old landfills in the vicinity of the City and agricultural activities, respectively. This project mainly aims to measure: (1) concentrations of air pollutants including sulphur dioxide (SO₂), nitrogen monoxide and dioxide (NO, NO₂), hydrogen sulfide (H₂S), ozone (O₃), ammonia (NH₃), and volatile organic compounds (VOCs) using diffusion sampling tubes, and (2) noise level using a portable sound level meter. To meet different spatial requirements for level pollution assessment, measurements was conducted on March 2011, for a period of 23 days, at 10 locations geographically distributed in the Kuwait City. The average concentrations (in μ g/m³) of the measured pollutants are found to be as follow:

H_2S	SO ₂	NH ₃	03	NO	NO ₂	
3-4.9	5.5-11.9	2.6-6.1	29-51	22.3-72.6	19-39.3	
BENZENE	TOLUENE	n-OCTANE	BENSENE	m+pXYLENE	o-XYLENE	n-NONANE
1.7-3.3	7.1-19	0.7-1.5	1.9-5.8	7.2-22	3.1-8.8	0.45-1.7

The overall mean levels of the pollutants are reasonably low and below the Kuwait Ambient Air Quality Standard (AAQS). A distance of at least 5 meters was maintained from traffic noise sources during the noise measurements. The results of the average ambient noise level measurements at the 10 locations are found to be as follow:

Worki	ng Days - Leq(A) (dB)	Weekend Days - Leq(A) (dB)		
Day 7:00 to 14:00	Evening 14:00 to 22:00	Night 22:00 to 7:00	Day 7:00 to14:00	Evening 14:00 to 22:00	Night 22:00 to 7:00
57.1-73.7	72.5-61.5	68.2-54.9	61.3-70.8	61.1-72.2	54-66.2

The measured ambient noise levels are in excess of the established Kuwait EPA standards; 65 (dB) under Category Traffic- Urban Residential with Commercial.

SIX YEARS OF AIR QUALITY MANAGEMENT IN THE BALTIC COUNTRIES – LESSONS LEARNT

Aiga Kāla¹, Valts Vilnītis²

^{1, 2} Estonian, Latvian & Lithuanian Environment (ELLE). Skolas 10-8, Riga LV-1010, Latvia

The aim of the paper is summarizing practical experience from more than twenty air quality studies and management projects in all the three Baltic countries, covering air pollution dispersion modeling, action planning, and ambient air quality monitoring studies. The paper focuses at air quality issues, which are common to the Baltic region, the ways the countries address them, and suggests the areas, where further studies have to be targeted.

Air quality monitoring provides comprehensive information about air quality status in the Baltic countries and the main trends in the past. In all countries the base line assessment is also supported by air quality modelling. The main issues are related to nitrogen oxide and particulate matter pollution in cities, as well as benzene concentration in few cases.

The air quality management system faced significant changes in beginning of the 21st century. In line with the EU accession process there was a need to revise the methodological basis for air quality system – the main issue was changing from short term assessment of air quality (20-30 min) to long term approach. Each Baltic country took different approach that still is influencing performance in 2011.

Nonetheless there is a significant improvement in air quality management in the past years. There are number of plans and programmes as well as large scale environmental impact assessments that included also comprehensive air quality studies. Furthermore, the first round of air quality planning process has been finished. This provides an opportunity to analyse achievement of the targets set and lessons learnt. Presently the second round of air quality planning takes place in the region, taking into account new challenges, arising from the provisions set by the new Air Quality Directive. During this stage it is important to learn from the experience, acquired during the last decade, in order to streamline the planning process and optimize air quality management system in the Baltic countries. Specific attention is paid to such issues as fine particulate matter and introduction of integrated air quality assessment, particularly by applying such techniques as source apportionment or complementing air quality monitoring data with air pollution dispersion modelling. Several studies, which have been carried out in the region, will be presented in greater detail.

Keywords: air quality management, air quality plans, air pollution dispersion modelling, air quality monitoring.

EFFECT OF ATMOSPHERIC POLLUTANTS ON RESPIRATORY AND CIRCULATORY DISEASES IN LISBON, PORTUGAL

Ana Januário Cruz^{1*}, Susana Morais Sarmento³, Tona Verburg³, Alexandra Viana Silva², Célia Alves⁴, Maria do Carmo Freitas², Hubert Wolterbeek³

¹Rua General Santos Costa, 3400-124 Oliveira do Hospital/Department of Science and Technology, Technology and Management High School of Oliveira do Hospital/Coimbra Polytecnic Institute

²E.N. 10, 2686-953 Sacavém, Portugal/Instituto Tecnológico e Nuclear (ITN), URSN
³Mekelweg 15, 2629 JB Delft, Delft University of Technology, The Netherlands /Department of Radiation, Radionuclides and Reactors, Faculty of Applied Sciences
⁴3810-193 Aveiro, Portugal/ University of Aveiro/Environmental and Marine Studies, Department of Environment

Hospital admissions data were collected to establish a relationship with air pollution; the considered diseases are cardiovascular and respiratory diseases and the data are distributed by age in order to conclude if each age group is a relevant factor in the relationships. The records were daily registered in Lisbon hospitals and compiled by age: <15, 15-64; >64 years old for the period 2005-2008. Air quality data (PM₁₀, SO₂, NO, NO₂, CO, and O₃) were obtained from monitoring stations of the Portuguese Environmental Agency, which provide hourly observations for different atmospheric pollutants. The measuring stations to be considered are in counties whose population is served by the hospitals where disease data were collected. Statistical significance tests were applied to understand the correlations between hospital admissions and air pollutants.

Keywords: air pollutants; epidemiological trends; hospital admission, multilinear regression models.

INTEGRATION OF BIOMONITORING AND INSTRUMENTAL TECHNIQUES TO ASSESS THE AIR QUALITY IN AN INDUSTRIAL AREA LOCATED IN THE COASTAL OF CENTRAL ASTURIAS, SPAIN

Susana Marta Almeida¹, Maria do Carmo Freitas¹, Ana Isabel Pedro¹, Tiago Ribeiro¹, Joana Lage¹, Alexandra Silva¹, Nuno Canha¹, Marina Almeida-Silva¹, Timóteo Sitoe¹, Isabel Dionisio¹, Sílvia Garcia², Gonçalo Domingues², Julia Perim de Faria³, Beatriz González Fernández³, Diane Ciaparra⁴

 ¹ Instituto Tecnológico e Nuclear, URSN, E.N. 10, 2686-953 Sacavém, Portugal
² Instituto de Soldadura e Qualidade, Taguspark, 2740-120 Porto Salvo, Portugal
³ Global R&D – ArcelorMittal, 33400 Avilés, Spain
⁴ Tata Steel Research, Development and Technology, Swinden Technology Centre, Moorgate, Rotherham, UK

In this study, instrumental and biomonitoring techniques were integrated with three main objectives: (i) to analyze temporal patterns of PM_{10} concentrations in order to identify emissions sources; (ii) to investigate spatial patterns of lichen conductivity in order to identify the impact of the studied industrial area in the air quality and (iii) to identify relationships amongst lichen conductivity with some site-specific characteristics.

Samples of the epiphytic lichen *Parmelia sulcata* were transplanted in a grid of 18 km per 20 km, having the industrial area in the center. Lichens were exposed for a 5 month period, starting in April 2010. After exposure, lichen samples were soaked in 18 M Ω water aiming the determination of the water electrical conductivity and, consequently, the lichen vitality and cell damage. A marked decreasing gradient of the lichens conductivity relative to the distance from the emitting sources was observed. Transplants from a sampling site close to the industrial area reached values 10 times higher than the ones far from it. This fact showed that the lichens react in the polluted industrial area by a physiological response increasing their conductivity accordantly to the contamination level.

The integration of temporal PM_{10} measurements and the analysis of wind direction corroborate the importance of this industrialized area for the air quality and identify the relevance of traffic for the urban area. This study showed that biomonitoring was an effective and low cost complementary method to automatic systems of measurement.

Keywords: air pollution, biomonitors, conductivity, PM₁₀, Spain.

AIR POLLUTION AND HOSPITAL ADMISSION FOR CARDIORESPIRATORY DISEASES IN SETÚBAL, PORTUGAL

Alexandra Viana Silva¹, Susana Marta Almeida¹, Susana Morais Sarmento², Ana Januário Cruz¹, Tona Verburg², Ana Isabel Miranda³

¹ Instituto Tecnológico e Nuclear (ITN), URSN, E.N. 10, 2686-953 Sacavém, Portugal ²Delft University of Technology, Department of Radiation, Radionuclides and Reactors, Mekelweg 15, 2629 JB Delft, the Netherlands ³ University of Aveiro, Department of Environment and Planning, CESAM, 3 810-193 Aveiro, Portugal

Several epidemiological studies have shown associations between air pollution and adverse effects on human health. Specific–cause effects were found for cardiovascular and respiratory diseases including an aggravation of asthma, acute reductions in lung function, myocardial infarction, heart failure, low birth weight in newborns and death.

The aim of this study was to find a relationship between air pollution (with special focus onto PM_{10} , $PM_{2.5}$, and O_3) and hospital admissions in Setúbal region, Portugal. Setúbal is a Portuguese city where heavy industrial activities coexist with an urban area that has 125.293 inhabitants and with an environmentally sensible region (Sado Estuary and Arrábida Natural Park).

A database with air quality and hospital admission data was built for 5 years (2005-2009). Hourly air quality concentration values were obtained from 4 measuring stations located in Setúbal region (Setúbal and Palmela municipality's). Regarding hospital admissions, health data was obtained from the Central Administration of the Health System (ACSS). Daily counts of hospital admissions in 1 institution were assessed for all circulatory-related causes and all respiratory related causes, according to the International Statistical Classification of Diseases, Ninth Revision (ICD-9). A longitudinal time-series study was conducted, with risks being quantified by means of multiple linear regression models considering as dependent variable the weekly hospital admissions registered in Setúbal and as independent variable the weekly mean PM₁₀, PM_{2.5} and O₃ concentration values.

Keywords: air pollutants, hospital admissions, multilinear regression models, health effects, PM, O_3
PARAMETERS AFFECTING THE SURFACE OZONE CONCENTRATION IN İZMIR'S ATMOSPHERE

Yetkin Dumanoğlu¹, Abdurrahman Bayram¹

¹Dokuz Eylül University/Engineering Faculty/Environmental Engineering Faculty

The objectives of this study were to measure ozone concentrations in air and investigate ozone investigate the parameters affecting the surface ozone concentration in urban and suburban atmospheres in the city of Izmir. Ozone concentrations were measured at two urban and suburban sites in Izmir, Turkey. In addition to ozone, nitrogen oxides (NO, NO₂, NO_x) were also measured continuously at the suburban station. It was observed that O_3 concentrations were at the lowest levels during rush hours of 07:00-09:00 based on the hourly results of continuous measurement devices. NO₂, resultant of a reaction between traffic based NO and O_3 , showed high concentration levels during rush hours (morning time 07:00-09:00 and evening time 19:00-21:00).

Daily average NO and NO₂ concentrations for suburban sites between March and August 2007. Daily average of NO₂ concentration changed between 10 μ g m⁻³ and 50 μ g m⁻³. Besides that daily average of NO concentrations were approximately 10 μ g m⁻³. There was a parallel trend in NO₂ and NO daily average concentration changes. There was no change observed in two pollutants during March-August period. This was due to their anthropogenic source that is not showing seasonal changes. NO is a pollutant occurring upon combustion process and especially upon traffic.

In order to identify the correlation between ozone and precursors (NO and NO₂) the overall correlation factors between O₃ and its precursors were calculated. As expected, negative correlations resulted and agreed with the chemistry. Correlations between O₃ and NO_x were calculated to be – 0.51 and – 0.39 in winter and summer respectively in suburban area.

Keyword: Air pollution, ozone, nitrogen oxide.

EFFECT OF ENVIRONMENTAL POLLUTION AND SOCIAL FACTORS ON RESPIRATORY DISEASE AMONG CHILDREN IN SLOVAKIA

Kvetoslava Rimarova

Institute of Public Health, Faculty of Medicine, University of P.J. Safarik, Kosice, Slovakia

Background. The air pollution belongs to the most important environmental threat to human health. Particularly sensitive are children, elderly people and patients with chronic conditions. Individual susceptibility is influenced by many factors: age, nutrition, presence of disease, genetic determination, global health status and socio-demographic status. Children are a focus points in the health protection considering possibilities of early organs and functions impairment. Project has been designed in support to confirm air quality and its impact on respiratory diseases together with socio-economic status of the children and their families. Project focuses on research for the understanding of air pollution and the processes, which determine the impact of pollutants on human respiratory health. Impact assessment of air pollutants is confirming not only higher frequency of respiratory disease and respiratory symptoms but also on cardiopulmonary mortality and cancer.

Material and methods. Cross-sectional study of respiratory health included self reported questionnaires about respiratory disease and symptoms and SES in the family (1994 - 2000). Parents questionnaires collected data about socio-economic status and reported respiratory morbidity and symptoms in children. Data were received from 8 exposed and 1 control area in eastern Slovakia. Databases included totally 1805 randomly selected and filled questionnaires from parents of children 6 - 11 years old, 1537 children from exposed areas and 268 children from control area.

Results. Results confirmed impact of SES and Air Pollution index (based on PM 10 particles and SO_2 concentrations) on the incidence of acute respiratory infection (ARI) and on incidence of lower respiratory infection (LRI). ARI were statistically more frequent in families with lower education, local heating system, in children with respiratory allergy and in children living in higher outdoor air pollution score - AP. Lower respiratory infection were influenced by air pollution score, parents education, allergy in children and parents. ETS - environmental tobacco smoke - wasn't confirmed as statistically important factor neither for respiratory symptoms nor for

disease frequency. ETS exposure might be influenced by domestic habits where indoor smoking is mostly refused by families.

Conclusions. The results of the project confirmed effect of air pollution and socioeconomic factors on respiratory disease and respiratory symptoms of schoolchildren.

*Supported by grants VEGA1/0451/09, VEGA MŠ 1/0359/10, KEGA 260-002 UPJŠ-4/20010.

Keywords: air pollution, health effect, children

HEALTH IMPACT ASSESSMENT OF AMBIENT PM AIR POLLUTION PM₁₀ and PM_{2.5} OF ULAANBAATAR, MONGOLIA

Delgerzul Lodoisamba¹, Suvd Batbaatar², Enkhjargal Altangerel²

 ¹ Master student of School of Public Health, Health Science University of Mongolia
 ² Doctor Student of School of Public Health, Health Science University of Mongolia E-mail address: delgerzul@yahoo.com

Results of particulate matter (PM) measurement in 8 points of Ulaanbaatar city, capital of Mongolia, and health impact assessment according to those measurements are presented. Study of case of the 9th khoroo of Sukhbaatar district was highlighted. Extremely high PM concentration in Ulaanbaatar city, namely, yearly average concentration of PM_{10} 350-700 µg/m³ and 200-350 µg/m³ for $PM_{2.5}$ in the poor ger areas makes Ulaanbaatar city the highest polluted capital in the world. Cardiovascular and respiratory diseases are increasing in fall and winter season and upper respiratory disease is increasing when heating of houses is started at cold season.

Keywords: air quality, respiratory disease, cardiovascular disease, Mongolia

EFFECT OF PARTICULATES MATTER FROM CONSTRUCTION INDUSTRY TOWARDS WORKERS' HEALTH AND PROJECT COST

Nik Nurul-Hidayah Nik Yahya¹ and Shamzani Affendy Mohd Din¹

¹Department Of Building Technology & Engineering, Kulliyyah Of Architecture and Environmental Design, International Islamic University Malaysia

Contaminated air usually filled with pollutants namely carbon dioxide, particulates matter, radon, nitrogen dioxide, asbestos, mercury, volatile organic compounds, ozone, and lead. Particulates matter (PM) with aerodynamic diameter dimension between 2.5 and 10 micrometers are the largest type of air pollutant that emitted by the construction industry that brings negative impact towards human health. For the purpose of this research, Kuala Lumpur International Airport (KLIA) and KLIA 2 have been taken as the case studies. Interviews and data collections has been done with relevant government officer from Public Work Department, Department of Environment; Social Security Organisation; Department of Safety and Health; contractors; and consultants from the Malaysian Airport Holding Berhad, the contractor, civil engineer on behalf of the contractor and finally the quantity surveyor on behalf of the consultant. Inhalable and respirable air quality sample from the KLIA 2 construction site also has been collected and analysed. The key finding of this research shows that PM are the largest pollutant emitted in construction site during earthwork and lorry as the main vehicle that emits PM. This research also found that 42.86% has exceed safety standard of outdoor PM_{2.5} in construction site. It is also to be agreed that inhalable dust concentration is higher than the respirable particulates at 68.53% for indoor and 99.34% at outdoor ambient. All respondents agreed that it provide temporary and permanent health impact toward workers, include 25% agree on poor visibility. This affect surround aircraft activities and construction workers productivity simultaneously. Indirectly, mitigation measures cost additional RM150,000 per month in maintenance expenses. Furthermore, project cost also has increased due to the preparation of face masks and goggles as the prevention measures. It can be concluded that PM grounds from the construction industry is turning back it cycle by affecting construction workers' health and the project cost itself.

Keywords: Airborne Particulates, PM, PM2.5 Construction, Health, Mitigation Measures, Project Cost.

MODELLING AND ASSESSING RISKS FROM ACCIDENTAL RELEASE OF HAZARDOUS GASES

Richard Tavares¹, Ana Isabel Miranda¹, Carlos Borrego¹.

¹ CESAM- Centre for Environmental and Marine Studies, Department of Environment and Planning, University of Aveiro, 3810-193 Aveiro, Portugal.

The renewed concern in assessing risks from technological hazards in industrial and urban areas continues emphasizing the development of localscale consequence analysis modelling tools for the prediction of short-term pollution episodes and exposure consequences from accidents with hazardous gases (hazmat) release. In this context, the main objective of this work is the development and validation of the EFRHA (Effects of Released Hazardous gAses) model. It is designed to simulate the outflow and atmospheric dispersion of heavy and passive hazmat gases in complex and build-up areas, and to estimate exposure consequences of short-term pollution episodes based on regulatory/safety threshold limits. Five main modules comprising up-to-date methods constitute the model: meteorological, terrain, source term, dispersion, and effects modules. Two alternative modelling approaches are implemented to predict hazmat gas atmospheric dispersion: a fast-run modified Gaussian model coupled with a box model, and a forecast shallow layer model. A two stages model validation exercise includes comparative analyses of modelled concentrations results against measurements databases for dispersion in obstructed areas and accident scenarios involving hazmat gas release and dispersion. The validation exercise demonstrates EFRHA aptness to reasonably predict the various stages of hazmat gases accidental release and atmospheric dispersion in case of accident scenarios and obstructed areas. Overall the present work shows that EFRHA model can be applied as a reliable tool to support forecast consequence analysis studies, training and planning measures, as well as, fast-run decision and emergency response actions in case of hazmat gases accidental release in industrial and urban (built-up) areas.

Keywords: accidental release, air quality, consequence analysis, hazardous gases, modelling.

IDENTIFYING GAPS AND NEEDS IN THE DEVELOPMENT OF A NATIONAL AIR QUALITY MANAGEMENT POLICY IN NORTHERN CYPRUS

Valts Vilnitis¹, Gülen Güllü², Douglas Clark³, Özşen Albayrak⁴, Tolga Baki⁴

¹Estonian, Latvian & Lithuanian Environment (ELLE), Skolas 10-8, Riga LV-1010, Latvia
²Hacettepe University, Dept. Of Environmental Engineering, Beytepe Ankara 06800 Turkey
³AirQuality.dk, Denmark

⁴ Environmental Protection Division, Air Quality Department, Nicosia, Northern Cyprus

This study aims to explore the gaps in baseline data and tools used in identifying policies needed to provide recommendations in air quality management that are responsive to the unique geographical condition, type of government hierarchy and the level of public awareness in Northern Cyprus. A pilot project to plan a programme of actions to comply with the EU limit values for particulate matter (PM_{10}) in the Nicosia air quality zone has been prepared to initiate the development of an air quality management plan for Nicosia, so that the institutions in the northern part of Cyprus will be prepared to meet the EU requirements when they come into force in the northern part of Cyprus. This paper highlights the results of an emission inventory and modeling applied to assess air quality management in Nicosia zone. Analysis of the modeling results in combination with monitoring data, clearly shows that elevated levels of particulate matter are not caused by car engine exhaust or known industrial emissions, but are likely combination of natural sources, mining, and fugitive dust from uncovered sand/soil areas and from the roads. Number of measures for improving air quality, all related to the reduction of particulate matter pollution will be presented.

THE STUDY OF APPLICABILITY OF LIMIT VALUES FOR PAHs ON SOIL IN TURKEY

Gonca Gülçiçek¹, Ismail Toroz¹, Kadir Alp¹, Asude Hanedar², Edip Avsar¹, Gizem Karaca³

¹Istanbul Technical Univ., Civil Engineering Fac., Environmental Engineering Dep., 34469, Maslak-ISTANBUL ²Namik Kemal Univ. Corly Engineering Fac. Environmental Engineering Dep. 50860

²Namik Kemal Univ., Corlu Engineering Fac., Environmental Engineering Dep., 59860, Corlu-TEKİRDAG

³Uludag Univ., Engineering Fac., Environmental Engineering Dep., 16059, Borukle-BURSA

In the study, surface soil sample, extracted from 6 points by considering a big petroleum refinery as a reference point and taking the dominant wind direction into account, were analyzed for determination of 16 species of polycyclic aromatic hydrocarbons (PAHs) by GC/MS in June 2010 in Kocaeli, Turkey. The acquired data were assessed in the light of meteorological and topographical information by taking the distance of sample point to facility and other possible pollution sources into consideration, the compliance of findings with the literature was analyzed and the applicability of "The Regulation Regarding Control of Soil Pollution and Point Source Pollution Zones" came into force on 08.06.2010 was examined by comparing existing limitations. In the study limitations in other countries for PAHs in soil were investigated in detail for comparing with regulation in Turkey. It appears that existing limit values in the regulation are different especially for some of the PAH species in comparison with both values attained in this study, available data in the literature and limitations implemented in other countries. According to study outcomes, it was put forward that more detailed studies are needed regarding both levels of values and their correlation with soil and land use and studies aimed at redetection of these limit values for different risks are required with respect to diverse soil use objectives of these limit values.

Keywords: air pollution, Polycyclic Aromatic Hydrocarbons, soil pollution, generic value.

MESOSCALE MODELING OF AEROSOL PHYSICAL AND CHEMICAL PROPERTIES FOR OBSERVATIONAL STATIONS AT DIFFERENT ALTITUDES

Aurelia Lupascu¹, Karine Sellegri¹, Evelyn Freney¹, Julien Boulon¹, Gilles Foret², Guillame Siour², Aurelie Colomb¹, Jean M. Pichon¹, Justine Gourdeau³ and Wolfram Wobrock¹

 ¹Laboratoire de Meteorologie Physique, Universite Blaise Pascal, 24 Avenue des Landais, 63171 Aubiere Cedex, France
 ²Laboratoire Interuniversitaire des Systèmes Atmosphériques, CNRS/UPEC/Univ. Paris Diderot/IPSL, 75205 Paris Cedex 13, France
 ³Atmo Auvergne, 25 rue des Ribes, 63170 Aubiere, France

The ability of chemistry-transport models (CTMs) to accurately simulate aerosols at high altitude stations is still to be demonstrated due to reduced number of monitoring sites and difficulties to take into account the complexity of the air parcels dynamics in mountainous areas. The objective of this study is to evaluate the ability of the regional air-quality model CHIMERE coupled with WRF to simulate the atmospheric composition as a function of altitude, with a focus on aerosol properties.

High-altitude measurements made at the station Puy de Dôme in France (45° 46' 15'' N; 2° 57' 50'' E, 1460 m a.s.l.) were used together with ground based measurements in the boundary layer in order to assess the ability of the model to reproduce both observations. An intensive campaign was organized from February 24 to March 8 2009 at Puy de Dôme, using a Time-of-Flight Aerosol Mass Spectrometer and a Scanning Mobility Particle Sizer, which provide the size distribution and the source-apportioned chemical composition with high temporal resolution.

Other continuous measurements of gases and aerosol particles offer the possibility to assess the performances of model simulations for gaseous and aerosol pollutants on regional and also small scales. The fine scale simulations respect the complex topography with high accuracy. Moreover, because particle nucleation has been shown to significantly contribute to the aerosol number concentration in the boundary layer, but its impact on the adjacent free atmosphere/troposphere is quite uncertain. We therefore investigated the role of different nucleation schemes on the aerosol size distributions.

Keywords: Air pollution; Chemistry-transport models; Aerosol size distribution; Number concentration; Nucleation

THE STUDY OF AIR POLLUTION WITH HEAVY METAL

Iulian Băncuță¹, Ion V. Popescu^{1,2}, Claudia Stihi³, Anca Gheboianu¹, Roxana Băncuță¹, Andrei Chilian¹ And Gheorghe Valerică Cimpoca

¹Multidisciplinary Research Institute for Science and Technologies, Valahia University of Targoviste, No 2 Carol I Street, 130024 Targoviste, Romania
²Academy of Romanian Scientists, 54 Splaiul Independentei, Bucharest 050094, Romania ³Physics Department, Faculty of Science and Arts, Valahia University of Targoviste

The mosses *Mnium undulatum* were used as biomonitors to study the atmospheric deposition in Dambovita County, Romania. Thirteen locations with different degrees and types of industrial activity in Dambovita County were considered, one of them being a reference site.

Two complementary analytical methods, Particle Induced X ray Emission (PIXE) and Atomic Absorption Spectrometry (AAS) were used to determine the elemental composition of mosses samples.

Mosses are particularly effective biomonitors of atmospheric heavy metal contamination because of their bioaccumulative properties. These plant groups are amenable to biomonitoring because they are widespread, easy to handle and they lack a cuticle and root system thus reflecting directly atmospheric heavy metal deposition. It is important during metal biomonitoring programmes that background concentrations are established. The design of a monitoring programme was involve: sampling locations, sample collection, heavy metals to be analyzed, multi-element determination using PIXE and AAS techniques and data analysis.

The concentration of Cr, Fe, Mn, Ni, Cu, Zn, As, Sr, Cd and Pb were determined by PIXE method and the concentration of Fe from samples was determined by all methods to perform a comparison of the experimental results. The obtained results were compared with the elemental concentration of the same species from Norway.

Keywords: PIXE, AAS, elemental composition, mosses.

SEASONAL VARIATION, SOURCES OF PCBS AND OCPS IN HIGH ALTITUDE SITE OF WESTERN BLACK SEA REGION OF TURKEY

Serpil Yenisoy-Karakaş¹, Muhammed Öz¹, Eftade O. Gaga²

¹University of Abant Izzet Baysal, Faculty of Sciences, Department of Chemistry, 14280 Bolu, Turkey

²Anadolu University, Faculty of Engineering and Architecture, Department of Environmental Engineering, 26470 Eskişehir, Turkey

Daily particle and gas phase samples were collected during 60 days in winter and 60 days in summer season bu using PUF sampler in the city of Bolu which is located in the high altitude Western Black Sea Region of Turkey. Samples were analyzed to determine the concentrations of polychlorinated biphenlys (PCBs) and organochlorine pesticides (OCPs). The concentrations of endosulfan sulfate and methoxyxclor had the highest values in summer and winter period, respectively. The maximum concentrations of gas phase and particle phase OCPs were obtained in summer and in winter, respectively. Generally, 3- and 4-chlorinated biphenyls had higher concentrations which have higher vapor pressure than 5 and more-chlorinated biphenyls. PCBs were found predominantly in the gas phase in both seasons. The agricultural areas located mostly to the south south east and south west directions of the sampling point were identified as source regions. According to the back trajectories, the conversion was dominant at the sampling region; therefore the local sources had significant effect on the concentrations of the OCPs.

Keywords: POPs, wind sector analysis, seasonal variation, back trajectory

WHERE ARE CO₂ EMISSION ALLOWANCE PRICES HEADING? THE AMBIGUOUS ROLE OF CAPITAL MOBILITY IN A WORLD WITH SEVERAL INDEPENDENT EMISSIONS TRADING SCHEMES

Jan Schächtele

As a consequence of the missing global agreement in the fight against Climate Change, several independent emissions trading schemes are coming into operation. From an economic perspective it would be desirable if prices of CO_2 emission allowances were the same in each scheme, as this would ensure cost effectiveness and avoid competitive distortions. There are several factors that could lead to price convergence, one of them being capital mobility. The purpose of this paper is to reveal what impact capital mobility has on the CO_2 price levels. Based on a simple economic model, I derive a short-term and a long-term general equilibrium for which five scenarios, covering all possible combinations of capital endowment and CO_2 emission cap, are analyzed. The results reveal that the role of capital mobility is ambiguous and that depending on the initial situation capital mobility can lead to both price convergence and price divergence.

Keywords: Emissions trading; Capital mobility; CO₂ emission allowance price; Linking

DETERMINING REGIONAL CARBON DIOXIDE EMISSIONS AND ITS LONG TERM FORECAST FOR TURKEY

Yeser Aslanoğlu and Merih Aydınalp Köksal

Environmental Eng. Department, Hacettepe University, Beytepe Campus, Beytepe, 06800, Ankara, Turkey

Inventory studies and forecast models related to determining greenhouse gas emissions have become more important for Turkey after signing Kyoto Protocol in 2009. Turkey has a huge energy demand increasing day by day parallel with growing industry. Electricity generation is the biggest and most important contributor of total greenhouse gas emissions with about onethird of 370 MTeCO₂. Turkey has nine load distribution regions where electricity produced owned by Turkey Electricity Transmission Co. Inc.. But electricity is not consumed by its own producer region. Transmissions are available to the industrial regions where demand is highly strong. At this point, this study's aim is to help on site and technology selection for new plants with minimizing both transmission costs and environmental effects where available. Turkey's regional CO₂ emissions are determined between 2001 and 2008, and estimated until 2020 using data obtained from National Load Dispatch Center and Energy Market Regulation Agency. This study covers all public/privately owned, nearly 300 thermal power plants have been operating between 2001 and 2008 and also planned thermal power plants that will start to operate between 2009 and 2020. Data is ordered to nine load distribution regions due to their location data. IPCC's Tier 1 approach is used to determine CO_2 emissions of existing power plants and specific emission factors are derived from these calculations. These specific emission factors are used to determine forecasted CO₂ emissions for planned power plants. Regional characteristics are determined due to their electricity demand and associated emission capacities. Some regions show rapid increases within the years. In this context, to the authors' knowledge this is the first study that has determined the current and forecasted electricity generation associated CO2 emissions covers all thermal power plants in Turkey regionally.

USING RENEWABLE ENERGY POTENTIAL OF TURKEY TO REDUCE ELECTRICITY GENERATION ASSOCIATED CO₂ EMISSIONS

Izzet Ari¹, MerihAydinalp Koksal²

 ¹General Directorate of Social Sectors and Coordination, Ministry of Development, State Planning Organization, Necatibey Cad. No: 108, Yücetepe, Çankaya, 06100, Ankara
 ² Environmental Eng. Department, Hacettepe University, Beytepe Campus, Beytepe, 06800, Ankara

Turkey's growing population and economy have fuelled a rapidly growing demand for energy, particularly for electricity. A continuing increase in electricity demand over the next two decades is projected for Turkey. Fossil fuel combustion has the main responsibility for the increase in the amount of greenhouse gases (GHG), such as CO₂. Thermal power plants, as electricity generation facilities, are the most well-known fossil fuel combustion sources. These plants emit high amounts of CO_2 during the generation of electricity. Renewable energy sources can be used to supply some of the electricity demand to reduce GHG emissions, and thus decrease the adverse effects of climate change. In this study, the mitigation in CO₂ emission from electricity generation by using hydro, geothermal, biomass and wind power generating plants is investigated. A scenario named as *Renewable Energy Scenario* which is based on using economically feasible renewable energy sources of Turkey is developed to supply the deficit part of the demand that is expected to occur after 2011 are developed. It is found that by using this scenario the overall mitigation in CO₂ emissions between 2009 and 2019 is estimated to be 193 million tons lower than that of Business As Usual (BAU) Scenario which assumes that the fuel mix in 2008 stays the same till to 2019.

Keywords:CO₂ emissions, climate change, electricity generation

INDOOR AIR QUALITY IN PORTUGAL

Susana Marta Almeida¹, Marina Almeida- Silva¹, Margarida Pinto², Dinis Rodrigues²

¹ Instituto Tecnológico e Nuclear, URSN, E.N. 10, 2686-953 Sacavém, Portugal ² Agência para a Energia, R. Dr. António Loureiro Borges, n.º 5, 6º, 1495-131 Algés, Portugal

Indoor Air Quality (IAQ) is an important determinant of population health and wellbeing. Modern humans spend 90% of their lives in indoor spaces such as at home, work, school and vehicles. Exposure to the hazardous airborne agents present in indoor spaces causes adverse effects such as respiratory disease, allergy and irritation of the respiratory tract. According to The World Health Report 2002, indoor air pollution is responsible for 2.7% of the global burden of disease. In Portugal, a step forward was given towards the improvement of the IAQ, when the European Directive no. 2002/91/CE relative to energetic certification of buildings was transposed to the Portuguese law with the inclusion of IAQ requirements. Since 2009 a significant fraction of the Portuguese buildings are obliged to make the control of their indoor chemical and biological pollutants in order to obtain a certificate. Until December 2010, IAQ reports were emitted for 885 buildings. The main certified typologies were offices, supermarkets, banks and insurers subsidiaries, hotels and shopping centers. The objective of this work was to evaluate the IAQ in these 885 certified buildings, identifying the main air quality problems and associated sources. Results showed that besides the concentrations of CO₂, VOC, H₂CO and bacteria had exceeded the Portuguese limit concentrations in several buildings, the buildings certification in Portugal can be seen as an opportunity to improve the IAQ.

Keywords: Indoor Air Quality, Portugal, building certification, chemical pollutants, bacteria, fungi.

INDOOR AIR PM MASS AND ELEMENTAL CONCENTRATIONS IN A SELECTED HOSPITAL

S. Sinan Keskin¹, Selen Kılıc²

¹Marmara University, Department of Environmental Eng., Kuyubasi, 34722 Istanbul, Turkey ²Artek Müh., Mehmet Akif Mah., Tavukcu Yolu Cad. No:140 Umraniye, 34775, Istanbul, Turkey

Indoor air pollution level is an important factor in public health since people spend approximately 70 to 90 % of their time indoors. Much of this time is spent on the job and air quality is an important issue related to employee morale and productivity. Air pollution negatively affects human, animal, and plant health. Epidemiological studies show that the health effects seem to be most closely related to respirable particulate matter with aerodynamic diameters smaller than 10 μ m (PM₁₀) and to those less than 2.5 μ m (PM_{2.5}).

In this study, PM mass and elemental concentrations in both size fractions were examined in indoor air environments of Marmara University Hospital. The indoor air quality in a hospital can influence the health of both patients and hospital staff. The patient population in a hospital is largely drawn from just the very young to the elderly of people and in most cases they spend long times in indoor environments. For this reason, indoor air PM level is an important factor in the overall environmental quality in a hospital.

The obtained results in this study indicated that indoor air PM_{10} mass concentrations were below the Turkish standards for ambient air while they were above the limit of World Health Organization (WHO). Measurement results for $PM_{2.5}$ mass concentrations were above the ambient air limits of both WHO and EPA. Elemental concentrations in both size fractions were well below the annual average limit values set by WHO for certain elements.

Keywords: Indoor air, Hospital, PM, Element

ISOLATION AND IDENTIFICATION OF AIRBORNE FUNGI AND THEIR RELATION TO ALLERGIC DISEASE IN SULAIMANI CITY, IRAQ

Nadeem Ahmad Ramadan¹ and Nadhira Shaban Salih²

¹Biology Dept. Coll.of Sci. , University of Mosul, Iraq ²Biology Dept. Coll.of Sci. , University of Sulaimani, Iraq

Fungi are essential components of ecosystems and widely distributed in nature. Fungal spore may be easily dispersed into indoor environments associated with a number of adverse health effect.

This study was designed to investigate airborne fungi and their relation to allergic disease in Sulaimani city. The airborne fungi were isolated by settle plate method in different areas of Sulaimani city during two seasons; (Autumn October 2008) and (Spring April 2009), in which Sabouraud dextrose agar, containing plates chloramphenicole were opened and exposed to air for 1 hour. Standard fungal allergens of *Alternaria, Cladosporium, Penicillium* and *Aspergillus* were used in skin prick test for individuals consulted health center of asthma and allergy in Sulaimani city suffering from symptom allergy their ages ranged between (1-59) years old. Total IgE concentration and percentage eosinophiles were measured in patients whose skin prick tests were positive to at least one of allergens under study, and in control person.

These results were obtained from current study: a total of 24.09×10^2 CFU belonging to twenty genera with a group of yeasts and twenty four species, and the percentage of most predominant isolated fungi from the environment at different locations of Sulaimani city were *Penicillium spp.* 28.1%, *Aspergillus spp.* 20.25%, Yeast 13.33%, *Cladosporium spp.* 12.1%, and *Alternaria spp.* 6.72%. The highest number of fungi was isolated during spring 14.92×10^2 CFU compared to 9.17×10^2 CFU in Autumn , *A.niger* and *A.flavus* were the predominant species of *Aspergillus* isolated, while the most common *Penicillium* species were *P. chrysogenum* and *P.spinulosum*. The highest number of fungi were isolated from dietary factories 6.37×10^2 CFU followed by houses 4.71×10^2 , factories 4.21×102 CFU,dormitories 3.96×10^2 , schools 3.32×10^2 , and hospitals 1.52×10^2 .

Keywords: air borne fungi, allergy.

DETERMINING THE EFFECT OF ANTIMICROBIAL PVC MATERIALS THAT CONTAIN SILVER IONS FOR IMPROVING INDOOR AIR QUALITY

Esra KARAMAN¹, Gülen GÜLLÜ¹, Sibel MENTEŞE²

¹ Hacettepe University, Environmental Engineering Dept., 06800 Beytepe Ankara - Turkey
² Çanakkale Onsekiz Mart University, Environmental Engineering Dept., 17020 Çanakkale - Turkey

Studies on indoor air pollution have gained importance in recent years after emerging health problems. According to a lot of research has proven that significantly affecting the quality of indoor air pollutant is organic dust known as bio-aerosols. Products that used to improve the indoor air quality are both energy costs and negative effects on human health is known. Therefore sustainable solutions developed for reduction of concentrations of microorganisms in the indoor environment is important.

Silver ions that are subject to the study, affect on the microorganisms such as bacteria, fungi and viruses; and this effect is known and used since ancient times.

This work includes chamber test that made with the most common bacterial and fungal species in ambient air levels developed in other to determine the effectiveness of reducing the room model studies.

According to the chamber test results, silver ions doped PVC material has a specific surface area in 1m³ closed glass room model effective in reducing indoor air concentrations of microorganisms.

Keywords: bio-aerosols, indoor air quality, antimicrobial, silver ion, chamber test, PVC.

INDOOR / OUTDOOR AIR QUALITY RELATIONSHIP IN AN URBAN ENVIRONMENT: DUBLIN CASE STUDIES

Avril Challoner and Dr Laurence Gilll

Trinity College, Ireland

Background and Aims: Legislative reductions in air pollutant limits values seek to better outdoor air quality, in turn reducing associated illnesses such as cardiopulmonary mortality, strokes and lung cancer. This study focuses on two major traffic related pollutants NO_x ($NO_2 + NO$) and $PM_{2.5}$. Previous research suggests that people now spend up to 90% of their day indoors yet in Ireland no legislative indoor air pollutant limits exist. A study carried out a study on 57 office environments and found 75% of our daily NO_2 exposure occurred while at work (Lee et al., 2000). This research aims to determine the relationship between exposure of staff to specific air pollutants in Irish working environments (e.g. shops, offices) and factors such as ventilation systems and door design.

Methods: NO_x data is gathered by a monitor working on Chemiluminescence principles and $PM_{2.5}$ by a monitor using light scattering and Gravimetric techniques. Monitors are placed inside and outside (roof and street levels) of the buildings and run continuously for 4 days per run.

Results: To date monitored 7 work places located on busy street canyons of the city centre in Dublin, Ireland have been monitored. Clear relationships between indoor and outdoor concentrations could be seen for sites. Results indicate that indoor concentrations can be significantly greater than outdoor concentrations, Indoor Outdoor ratios of up to 2.3 for NO₂ and 2.13 for PM_{2.5}.

Conclusions: I/O indicate greater exposure to those working within the affected buildings than ambient outdoor concentrations indicate. The compliance of Ireland and many other European countries to air quality limit values is based on outdoor air quality; these results show that outdoor monitoring alone may not be enough to quantify true exposures of those working in urban areas.

A CASE STUDY: GATE TO GATE LIFE CYCLE ANALYSES OF A COMBINED CYCLE POWER PLANT LOCATED AT AN INDUSTRIAL PARK IN TURKEY

Emre Yöntem¹, Gülçin Salihçavuşoğlu¹, Elif Asuman Korkusuz¹, Merih Aydınalp Köksal², Zeynep Yöntem¹

¹ Ekodenge Ltd. Hacettepe Technoparkt 1. R&D Building No: 18 06800 Beytepe Ankara ²Hacettepe University Department of Environmental Engineering 06800 Beytepe Ankara

Industrial Ecology (IE) is an interdisciplinary systems approach that scientifically analyses materials and energy flows, and their impacts on humans and environment. Eco-Industrial Parks (EIPs) are based upon the principles of industrial ecology and offer possibilities to implement sustainable development policies.

This paper is a part of a European Union Eco-Innovation project, titled "*Eco-Industrial Park Environmental Support System*" (EPESUS), which is funded under the Entrepreneurship and Innovation Programme component of Competitiveness and Innovation Framework Programme (CIP) of EU. A system perspective is applied to industrial production processes within the EPESUS project in order to analyze the complex industrial activities. The main line of EPESUS project is to systematically investigate how environmental impacts evolve within industrial systems and integrate these outcomes into a web-based software tool – EPESUS Software.

This article specifically summarizes ongoing activities of the EPESUS project considering gate to gate life cycle assessment. There are four main industrial sectors examined under the context of the EPESUS project: polymer, large combustion plant (power plant), textile and foundry sectors. In this paper, the real field data of a combined-cycle power plant, which is operated in an industrial park in Turkey, has been presented.

Keywords: Combined cycle power plant, eco-industrial park, EPESUS, industrial ecology, life cycle assessment.

PARTICLE SIZE DISTRIBUTION OF *n*-ALKANES AND POLYCYCLIC AROMATIC HYDROCARBONS (PAHs) IN URBAN AEROSOL OF ALGIERS, ALGERIA

R. Ladji^a, N. Yassaa^{a,b,}, C. Balducci^c A. Cecinato^c and B. Y. Meklati^a

^aCentre de Recherche Scientifique et Technique en Analyses Physico-Chimiques (C.R.A.P.C), BP 248, Alger RP 16004, Algeria

^bLaboratoire d'Analyse Organique Fonctionnelle, Faculté de Chimie, Université des Sciences et de la Technologie, U.S.T.H.B., BP32 El-Alia, Bab-Ezzouar, 16111, Algiers, Algeria.

^cIstituto sull'Inquinamento Atmosferico del C.N.R., Area della Ricerca di Roma, Via Salaria Km 29.300, C.P. 10, 00016, Monterotondo Scalo, RM, Italy.

The size distribution of ambient air *n*-alkanes and polycyclic aromatic hydrocarbons (PAHs) associated to particles, was investigated at an urban site of Algiers, Algeria. Investigation took place during September of 2007. Size-resolved samples (<0.49 μ m, 0.49-0.95 μ m, 0.95–1.5 μ m, 1.5–3 μ m, 3–7.2 μ m and 7.2-10 μ m) were concurrently collected using five-stage high volume cascade impactors. After extraction and cleanup PAHs were analyzed by gas chromatography/mass spectrometry with electron impact ionization (GC/EI-MS) while n-alkanes were analyzed by gas chromatography/ flame ionization detector (GC/FID).

n-Alkanes and PAHs were primarily associated with small particles. Generally, more than 85 % of the total concentrations of *n*-alkanes and PAHs were accumulated in particles <1.5 mm. The size distribution diagram of *n*alkanes indicates the existence of a bimodal distribution, which can be explained by non-equilibrium. Unimodal distribution of high molecular weight PAHs basically reflects the gas-to-particle conversion after their emission, whereas the low molecular weight PAHs were distributed in bimodal distributions, which can be interpreted by partitioning to larger particles by vaporization and sorption processes.

Keywords: Size distribution; PAHs; n-alkanes; Aerosol; GC/MS

ON-ROAD PARTICULATE MATTER EMISSIONS MEASURED IN A ROADWAY TUNNEL IN THE OSMANGAZI TUNNEL, BILECIK, TURKEY

Eftade O.Gaga¹, Akif Arı¹, Nesimi Akyol¹, Özlem Özden¹, Tuncay Döğeroğlu¹, Mustafa Odabaşı²

¹Anadolu University, Faculty of Engineering and Architecture, Department of Environmental Engineering, 26555,Eskişehir, Turkey ²Dokuz Eylül University, Department of Environmental Engineering, Kaynaklar Campus, 35160, Buca, İzmir, Turkey

Mass **c**oncentrations of $PM_{2.5}$ and PM_{10} were measured in a traffic tunnel in Bilecik, Turkey. Samples were collected by dichotomous samplers located at the entrance and exit of the tunnel. Traffic volumes were recorded during morning and afternoon sampling periods.

Collectedsamplesweretransferredtothelaboratoryandmassconcentrations of $PM_{2.5}$ and PM_{10} were determined. Osman gazi tunnel is not a typical urban tunnel and approximately 80% of the vehicles were diesel powered during the study period. Concentrations of $PM_{2.5}$ were also monitored by dust track air monitor at the entrance site. Mean concentrations of $PM_{2.5}$ and PM_{10} was found to be 134.1±80.4 µg m⁻³ and 305.2± 141.4 respectively. The average $PM_{2.5}$ emission factor derived from dichotomous samplers was 0.316±0.2 g veh⁻¹ km⁻¹.

Keywords: particulate matter, tunnel, emission factor

AN EVALUATION OF THE HEALTH RISKS OF SELECTED HAZARDOUS AIR POLLUTANTS FOR DIFFERENT GROUPS IN KOCAELI

Demet ARSLANBAŞ¹, Hakan PEKEY², Beyhan PEKEY¹, Zehra BULUT BOZKURT¹, Güray DOĞAN³, Mihriban CIVAN¹, Öznur OĞUZ KUNTASAL³, Gürdal TUNCEL³

¹ Department of Environmental Engineering, Kocaeli University, Umuttepe Campus,41380 Kocaeli, Turkey

² Department of Environmental Protection and Control, Kocaeli University, 41285 Kocaeli, Turkey

³ Department of Environmental Engineering, Middle East Technical University, 06531 Ankara, Turkey

Today quality of indoor air gains importance as the healthy problems such as "sick building syndrome" and "building related illnesses" increases. People generally spend most of their time in indoor environments which have higher concentrations than outdoor environments. For this reason, indoor air plays an important role in exposure to air pollutants. Volatile organic compounds and trace elements associated with particles are the most common air pollutants both in indoor and outdoor environments and were found to cause serious health problems in previous studies.

Carcinogenicity effect levels of benzene, styrene, arsenic, chromium, nickel and lead compounds and non-carcinogen effect levels (hazard index) of hexane, benzene, styrene, cyclohexane, toluene, ethylbenzene, xylene, methylcyclohexane , 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene , manganese, chromium, aluminum and titanium compounds were calculated in this study on a total of 28 people from different microenvironments (residence, office, school) in Kocaeli for a 24-hour period sampling. The study found that housewives had the highest risk in terms of cancer and hazard index. Teachers and office workers followed housewives in terms of cancer risk, while office workers were under higher risk in terms of non-carcinogen effects.

Keywords: Kocaeli, VOC, trace elements, personal sampling, calculation of health risk

IMPROVEMENT LAND USED REGRESSION MODEL FOR PREDICTING INORGANIC POLLUTANTS CONCENTRATIONS IN BURSA/TURKEY

Mihriban Civan¹, Arzu Erener² and Gürdal Tuncel³

¹ Department of Environmental Engineering, Kocaeli University, Umuttepe Campus,41380 Kocaeli, Turkey

² Department of Geomatic Engineering, Selçuk University, Alaaddin Keykubat Campus, 42075 Konya, Turkey

³ Department of Environmental Engineering, Middle East Technical University, Inonu Bulvari, 06531 Ankara, Turkey

The parameters included SO_2 , NO_2 , O_3 were measured by passive samplings. These species were monitored at 49 locations at a 22 km x 10 km area, which includes residential, traffic impacted and industrial sectors in the city one week in April 2006. The main objective of the study was to predict concentrations of these pollutants through the city. The predictive equations were developed by regressing the passive monitor measurements at the 49 monitored locations on land-use variables derived from a geographic information system (GIS). The spatial variables used to create the Land Used regression (LUR) model are included five categories: road network data, land-use data focusing on industrial regions, population, topographic information and remote sensing derived indices. The reliability of the predictive equations was assessed at the one sampling periods conducted in October 2005. The improved regression models have R² ranging from 0.20 to 0.53. For all pollutants, the most useful predictive variables were determined as traffic. And vegetation was another important variable for ozone.

REMOVAL OF SULFUR DIOXIDE FROM GAS STREAMS BY ABSORPTION INTO DILUTE UREA DILUTE SOLUTIONS

Mahmood M. Barbooti*, Neran K. Ibraheem¹, Ihsan H. Dakhil,

School of Applied Sciences, and ¹Department of Chemical Engineering, University of Technology, Baghdad, Iraq. *Present Address: Earth & Environmental Studies Department, Montclair State University, Normal Ave 1, Montclair, NJ 07043, USA.

In modern sulfuric acid plants, sulfur dioxide content of the tail gas is 2000 ppm. The SO_2 is emitted from combustion processes. Among the three major approaches recognized to control SOx pollution absorption is probably the most common to a great number of processes. It involves the transfer of the material from gaseous phase boundary into liquid absorbents. Absorption is carried out in spray and packed column and utilizes mass transfer between a liquid and a gas stream flowing counter current wise through a specific packing material.

The present work focuses on studying the removal of SO_2 from a gas stream with a new sorbent (urea solution). The optimization was carried out on basis of Box-Wilson experimental Design.

The absorption was done in a thermally insulated Pyrex absorption column (77 mm diam. and 500 mm height), packed with glass Rashig rings. A counter flow was achieved by allowing the gas mixture to flow upward, while the absorbent liquid downward by gravity. SO_2 was generated and mixed with air stream at the ratios that ensure various concentrations. The outlet gas stream was introduced into standard iodine solution for the determination of residual SO_2 . The experiments were carried out at:

SO₂ Concentration: X_1 , 500 – 2500 ppm; X_2 ,Urea concentration: 0.01 – 0.05 M; and X_3 , Temperature: 5 – 35 °C.

The central composite rotatable design method and a second order polynomial regression analysis of the absorption efficiency were employed with Statistics-Software Windows version 5. The correlation equation was modified in accordance with the test of the significance of each term in the equation. The Absolute Error was 3.88 %. In this work (α) was chosen to be 0.05 (95% confidence) with (n-j-l) to give the critical F-value *F* α (1, 10) = 4.96. After the removal of insignificant interaction of variables, the net correlation equation was:

$$\label{eq:2.1} \begin{split} &Y\% = 88.66857 + 0.005377 \, X_1 + 84.93197 \, X_2 + 0.088102 \, X_3 - 0.0000012 X_{1^2} - \\ &953.3868 \, X_{2^2} - 0.003461 \, X_{3^2} \quad ..(4) \end{split}$$

The maximum absorption efficiency (%Y_{max}) can be obtained at: X₁ = 2240 ppm; X₂ =0.0445 Mole/L and X₃= 12.7 °C. %Y_{max} = 97.14 % The results indicated that the absorption efficiency increases as the SO_2 concentration increases and favored at lower temperature. Also, as the urea concentration in the absorption solution increases, efficiency of absorption increases regularly.

The used absorption solution was mixed with Cao which led to the precipitation of solid calcium sulfite $(CaSO_3)$ and regeneration of the urea solution which was re-used to absorb sulfur dioxide at nearly the same efficiency.

CATALYTIC COMBUSTION OF METHANE AS A WAY TO REDUCE EMISSIONS

Nesrin E. Machin¹

¹ Kocaeli University, Chemical Engineering Department, Kocaeli-Izmit 41040, Turkey

Fossil fuels are an important and economical source of energy, yet they are also a source of pollution. Due to the environmental considerations, cleaner and more effective energy conversion techniques are being sought, and the catalytic combustion of hydrocarbons is one of them. The lower operation temperatures of this process yields lower or no nitrogen oxides (NO_x), and because of the lower temperatures needed for catalyst activation, less energy is needed to preheat the reactant mixtures. The catalytic combustion has a wide range of application; stationary gas turbines, radiant heaters, process fluids heaters are examples of catalytic combustors for heat generation, while catalytic converters for gasoline and diesel engines, catalytic incineration of organic contaminants represent secondary combustion processes.

In this work, the catalytic combustion of methane, the main component of natural gas, has been studied by using LaMnO₃ perovskite catalyst to produce energy. The effect of preparation conditions on the catalyst properties, and the combustion efficiency was investigated. Catalysts were prepared by using the sol-gel citrate method and characterized by XRD, SEM and BET analysis. Activity tests were carried out in a quartz flow reactor at 60,000 h⁻¹ gas hourly space velocity (GHSV), and the product gas mixture was analyzed by an on-line GC/MS/TCD. LaMnO₃ perovskite calcined at 700 °C for 5 h yielded the best phase composition and the complete combustion of methane was achieved at 550 °C, a much lower temperature than a homogeneous complete combustion temperature.

Keywords: catalytic combustion, emission reduction, perovskite materials

AIR QUALITY ASSESSMENT OF SHARRA LANDFILL-ALBANIA

Ferdi Brahushi¹, Aida Bani¹, Elvis Çela^{1, 2}

¹Department of AgroEnvironment and Ecology, Agricultural University of Tirana, Tirana -Albania ² Department of Waste Treatments, Municipality of Tirana, Tirana - Albania

The Sharra landfill is the principal dumping site used by the Municipality of Tirana for urban solid waste and represents the first landfill for the management of solid wastes in Albania designed in accordance to the European Union standards for the management and administration of solid wastes.

The objective of this study was monitoring of the air quality in the areas nearby Sharra, before and after the implementation of the landfill as a remediation method. Air samples have been collected and analyzed before and after the remediation of the waste disposal site of Sharra, respectively on the years 2008 and 2009. Results show that the measured indicators used to assess the air quality such as: solid particles, PM_{10} , NO_2 , H_2S , CH_4 reach the respective average values of 372 µg m⁻³, 216 µg m⁻³, 97 µg m⁻³, 0.8 µg m⁻³, 350 µg m⁻³ in the year 2008 and 72 µg m⁻³, 30 µg m⁻³, 29 µg m⁻³, 0.22 µg m⁻³, 41 µg m⁻³ in the year 2009. Before the remediation, except H_2S , the concentrations of all the other components in air exceed the Albanian and European Union limits whereas in 2009 these values have dropped under the mentioned limits. Consequently, the implementation of landfill as a remediation method improves the air quality.

Keywords: air quality, gases, landfill, pollution, waste.

PREPARATION AND CHARACTERIZATION OF CARBOXYMETHYL CHITOSAN– POLY (VINYL ALCOHOL) NANOGELS FOR ANTIBIOLOGICAL ACTIVITY

Riham R. Mohamed¹ and Reem K. Farag²

¹Chemistry Department -Faculty of science-Cairo University- Giza 12613, Egypt ²Egyptian Petroleum Research INSTITUTE, Nasr City 11727, Cairo, Egypt.

Nanogels composed of carboxymethyl chitosan (CMCh) and poly (vinyl alcohol) PVA were successfully prepared by a novel and in situ process. Nanogels were characterized by various analyses; transmission electron microscopies (TEM), Fourier transform infrared spectrophotometer (FTIR) and x-ray diffraction (XRD). These nanogels exhibit unique swelling properties in water and different buffered solutions. These nanogels also have great ability to capture or isolate bacteria and fungi from aquatic environment.

Key words: Carboxymethyl chitosan; Poly (vinyl alcohol); nanogels; antimicrobial activity; swellability

REMOVAL OF NITROBENZENE VAPORS IN THE INDUSTRIAL WASTE GAS STREAMS

Canan Uraz, Tuğba Gürmen Özçelik

Ege University, Faculty of Engineering, Chemical Engineering Department 35100 Bornova-İzmir

Nitrobenzene removing is very difficult in the industrial waste gas streams. The recommended method is the gas phase catalytic oxidation to decrease the emission of the nitrobenzene amount before it releases to the atmosphere. In this study, the performances of the catalysts were investigated for the total oxidation of nitrobenzene in a fixed bed reactor. The experimental study was carried out in a laboratory scale fixed bed reactor using by two types of catalysts. One of them was prepared by recommended knowledge in the literature on the silica gel supported catalyst (Catalyst 1: $V_2O_5/MoO_3/Ni_2O_3$). The other one was a commercial type catalyst (Catalyst 2: Cu 0203 T 1/8, Engelhard). The influences of temperature, flow rates of nitrobenzene and air on the reaction were examined. The experiments were performed in the temperature range of 240-300°C, with a space-time range of (W/F_{B0}) 0.615*10⁶ - 2.96*10⁶ g.sec./mole, and with the air/nitrobenzene mole ratio values between 27.62-163.39, at atmospheric pressure and at constant nitrogen flow rate for 2 hours. According to the experimental results of Catalyst 1, the maximum conversion of nitrobenzene was obtained as 75.79 %; and the maximum conversion of nitrobenzene was obtained as 87.85 % by using Catalyst 2. Both catalysts are suitable catalysts for total oxidation of nitrobenzene in a fixed bed reactor. When the two experienced catalysts are compared each other, the maximum conversion of nitrobenzene is obtained by using Catalyst 2 as 87.85 %. Finally it can be said that, the experienced two catalysts are found successful for the total oxidation of waste gas streams that contain organic matter such as nitrobenzene in a fixed bed reactor.

Keywords: Nitrobenzene, catalytic oxidation, fixed-bed reactor, oxidation catalysts

NOx REMOVAL PROCESS IN A JET-LOOP BIOREACTOR

Nalan Ilhan, Aysegul Derya Altinay, Nadir Dizge, Elif Erhan, Ahmet Karagunduz, Pinar Ergenekon, Bulent Keskinler

Environmental Engineering Department / Gebze Institute of Technology

NOx (NO + NO₂) are one of the most important air pollutants in the atmosphere. They can be formed during the combustion of fossil fuel as well as industrial activities such as nitric acid production facilities. Today Selective Catalytic Reduction (SCR) techniques have been used extensively to control of NOx emissions. However SCR has several disadvantages such as high energy consumption, high capital cost, ammonia use and related ammonia emission risks. Hence biological NOx abatement technologies have been developed as an alternative to current control technologies. In those biological control processes, however, due to low solubility of NO in water, huge reactor volumes are required. This problem was overcome by so called BioDeNox process in which the solubility of NO in aqueous phase was increased by adding chelate forming compounds (Fe(II)EDTA) into the liquid absorbing water. The objective of our study is to develop a low cost BioDeNOx process to control NOx in waste gas streams by employing a jetloop bioreactor as both a NOx absorber and a denitrification bioreactor. To be able to achieve this goal a laboratory scale jet loop bioreactor was designed and installed. Before starting up the bioreactor, the system was operated to estimate the volumetric mass transfer coefficients (k_La) by absorption and off gas methods. k_La value for O₂ was determined as 0.24 min⁻ ¹ when liquid and gas flow rate are 23.3 L/min and 2 L/min, respectively. k_{La} values for NO with and without Fe(II)EDTA addition will also be determined by using off gas method.

Keywords: Jet-loop bioreactor, volumetric mass transfer coefficients ($\mathbf{k}_{L}\mathbf{a}$), NOx abatement, denitrification, air pollution control technology

CO-COMBUSTION OF HAZELNUT SHELLS WITH A HIGH-SULFUR TURKISH LIGNITE IN A CIRCULATING FLUIDIZED BED COMBUSTOR WITH AIR STAGING

Murat Varol¹, Aysel T. Atimtay¹, Mustafa Can Çelebi², Hayati Olgun³, Hüsnü Atakül⁴, Ufuk Kayahan³, Berrin Bay³, Alper Ünlü³

¹Middle East Technical University, Dept. of Environ. Eng., 06531 Ankara, Turkey
 ²Istanbul Technical University, Energy Institute, Maslak 34469, Istanbul, Turkey
 ³TUBITAK-MRC, Energy Institute, P.O.Box 21, Gebze 41470, Kocaeli, Turkey
 ⁴Istanbul Technical University, Dept. of Chem. Eng., Maslak 34469, Istanbul, Turkey

In this study, a high-S lignite coal was burned with hazelnut shells in a laboratory scale circulating fluidized bed (CFBC) with secondary air injection. The thermal capacity of the laboratory scale CFBC was 30 kW. The system consists of a stainless steel insulated combustor which is 6000 mm in height and 108 mm in inner diameter, two cyclones, a return leg, an angled L valve, a distributor plate, a wind box, an air pre-heater, an air blower, a bag filter, a fuel feeding system and a gas analyzer. The combustion temperature is kept in the range of 800–850°C. During the combustion experiments, emissions in the flue gas were continuously measured. In this study, cold and hot tests were performed. The objective of the study was to maximize combustion performance, minimize the emissions, and to see the effect of various amounts of secondary air injection on emissions. The results of this study have shown that the co-combustion of lignite coal with hazelnut shells in a CFBC can be performed with minimum emissions. The results showed that emissions can be reduced with the addition of secondary air. With the injection of secondary air into the combustor, CO emission trends were found to be different for SAR< 20% and SAR> 20%. CO presence in the emissions helped the NO reduction.

Keywords: biomass, co-combustion, air staging.

POLYIMIDE MIXED MATRIX MEMBRANES PREPARATION AND CHARACTERIZATION FOR CO₂ SELECTIVE SEPARATION

Omid Bakhtiari, Samira Mosleh, Tayebeh Khosravi, Toraj Mohammadi

Research Center for Membrane Separation Processes, Department of Chemical Engineering, Iran University of Science and Technology (IUST), Narmak, Tehran, Iran

 $\rm CO_2$ removal and / or capturing is one of the most important tasks in environmental protection. Some mixed matrix membranes (MMMs) were fabricated in order to improve membrane separation performance of $\rm CO_2$ selective permeation using polyimide of Matrimid 5218 as backbone and filler of zeolite 4A were used. Scanning Electron Microscopy (SEM) analysis showed acceptable connections between the two phases and the MMMs performed higher performances compared with the polymeric membranes to some extent. Although glassy polyimides were used, thermal treatment at temperatures around glass transition temperatures (T_g) of the polyimides repaired probable defects and there were no voids around the fillers, as gas permeation tests revealed. Gas separation tests showed a little improved separation properties of the MMMs compared with those of the pristine polymers with higher thermal stability where essential for many $\rm CO_2$ capturing operations.

Keywords: Mixed Matrix Membrane, CO2 permeation, Polyimides, zeolite 4A

SYNTHESIS OF W-TYPE ZEOLITE MEMBRANE FOR SF₆ PURIFICATION

Toraj Mohammadi¹, Hojjatollah Maghsoodloorad²

Research Centre for Membrane Separation processes, Faculty of Chemical Engineering, Iran University of Science and Technology, Narmak, Tehran, Iran, Tel +98 (21) 77240496; Fax +98 (21) 77240495

In this paper, effects of synthesis temperature and number of layers on synthesis of W-type zeolite membrane were investigated. Experiments were carried out at these levels of synthesis temperature: 165, 185 and 200 °C, number of layers: 1 and 2 and synthesis time: 12 h. Permeation measurements and SEM analysis were used for characterization of the synthesized membranes. The results showed that increasing synthesis temperature from 165 up to 185 °C increases separation factor of O_2/SF_6 , however, further increasing decreases the separation performance. Repetition of layering has a net positive effect on separation factor of O_2/SF_6 ; however, this has a negative effect on permeation flux through the membranes. In the optimum condition, W-type zeolite membrane was synthesized at 185 °C for 12 h with 2 repeating layers with a high separation factor of 18.8.

Keywords: W-type zeolite membrane, *SF*₆ Purification, gas separation, effect of number of layers.

CATALYTIC COMBUSTION AND ABATEMENT OF CHLORINATED HYDROCARBONS BY HIGH-SURFACE-AREA MIXED METAL OXIDES

Abbas Ahmed Khaleel, Shamsa Al-Mansouri

Department of Chemistry, United Arab Emirates University, Al-Ain, UAE

Catalytic decomposition of selected chlorinated organic compounds was studied on different solid catalysts. In the presence of water, Mg-Fe mixed oxides showed stronger ability to adsorb and decompose CCl₄ than the corresponding single metal oxides as well as MgO-supported iron(III) oxide, and main products were CO₂ and HCl. CCl₄ was also found to adsorb and decompose efficiently over sol-gel prepared high-surface-area 2-alumina which exhibited a stronger catalytic activity than alumina-supported CuO. While the products were CO_2 and HCl at 400°C over alumina, some C_2Cl_4 formed as a by-product from reactions over alumina-supported CuO catalyst. 2-alumina also showed a strong catalytic activity for the hydrodechlorination of 1,2-dichloroethane forming vinyl chloride and HCl. No further dechlorination of the vinyl chloride intermediate was observed at temperatures as high as 400 °C. The effect of water on the decomposition of CCl₄ and 1,2-dichloroethane over alumina, and on the oxidation of chlorobonzene over Ti-Fe mixed oxides were compared. The presence of water generally inhibited the formation of elemental carbon, Cl₂, COCl₂ and AlCl₃ in the reactions of CCl₄ over alumina resulting in significantly high However, water had no noticeable effect on the conversions. hydrodechlorination of 1,2-dichloroethane, whereas it had a negative effect on the oxidation of chlorobenzene over Ti-Fe mixed oxide catalysts.

Keywords: chlorinated organic compounds, catalytic combustion.

SAMPLING AND CHARACTERIZATION OF RESUSPENDED AND RESPIRABLE URBAN PARTICULATE MATTER

Beatrix Turóczi¹, András Hoffer², Ilona Nyírő-Kósa³, András Gelencsér¹

¹P.O. Box 158, H-8201 Veszprém, Hungary / Institute of Environmental Sciences / University of Pannonia

²P.O. Box 158, H-8201 Veszprém, Hungary / Air Chemistry Group of the Hungarian Academy of Science

³P.O. Box 158, H-8201 Veszprém, Hungary / Institute of Materials Engineering / University of Pannonia

Urban air quality is severely affected by traffic related particulate matter, including direct emissions from exhaust, brake pad, tire wear and road dust resuspended by vehicular motions. Deposited road dust can also be resuspended by wind force or other anthropogenic activities, and overall it may contribute up to 30 % to urban PM₁₀. A mobile resuspended road dust PM₁₀ sampler was developed and constructed which simulates the effects of fast traffic or gusting winds on road surfaces and collects resuspended PM₁₋₁₀ samples in a cyclone separator and PM₁ samples on filters. The sampler was tested by collecting resuspended particulate matter at kerbside locations in Veszprém, Hungary. The collected PM₁ and PM₁₋₁₀ fractions were analysed by various analytical methods to show the potential of size-selective on-line sample collection for the chemical characterization of resuspended road dust. The main constituents of the resuspended urban PM₁₀ were crustal elements, and it was also possible to determine the mineral phase composition of PM₁₋₁₀ dust which is generally not feasible from samples collected on filter substrate. The application of the sampling and analysis methods may facilitate the evaluation of resuspended road dust sources in cities as well as help constrain a better source apportionment of urban PM₁₀.

Keywords: PM₁₀ sampling unit, resuspension, PM₁₋₁₀, chemical composition, sources.
AEROSOL SIZE DISTRIBUTION AND NUMBER CONCENTRATION OF PARTICLES (5.6 – 560 NM) NEAR AN URBAN WASTE INCINERATOR PLANT

Vanes Poluzzi, Isabella Ricciardelli, Silvia Ferrari, Arianna Trentini, Linda Passoni, Claudio Maccone, Fabiana Scotto, Claudio Sartini

Urban Areas Reference Centre, Regional Agency for the Prevention and Environment of Emilia-Romagna, Via Rocchi 19, 40138 Bologna, Italy

This study presents the characterisation of the aerosol size distribution in an area surrounding an urban waste incinerator, located in a rural zone about 7 km northeast of the urban area of Bologna in the southeast region of Po Valley (Italy), which is known as a critical region for atmospheric pollution.

The ADMS-Urban (Cerc, Cambridge, UK) dispersion model was used to select two monitoring sites by taking into ac-count the emissions of NOx and PM10 from all sources affecting the monitoring area. The site of maximum fallout of plant emissions (MAX) was located close to the incinerator. A control site (CTS) was identified to represent the mini-mum fallout of plant emissions while still maintaining confounding sources similar to those affecting MAX site.

Measurements of aerosol size distribution were made using a Fast Mobility Particle Sizer (FMPS, TSI 3091).

Average number concentrations of total particles are presented for cold and warm season and for both sites investigated. The total particle number was decomposed into two categories: ultrafine particles (UFP, diameter <100 nm) and non-ultrafine particles (NoUFP, diameter >100 nm). Number concentration and size distribution of the three modes - nucleation, Aitken nuclei and accumulation - were estimated using Distfit software (Chimera Technologies, Minneapolis, USA). A statistical analysis of particle number concentrations and meteorological parameters was performed to investi-gate the contribution from the incinerator. Finally, apparent particle growth events measured at both sites are described.

Keywords: air pollution, aerosol size distribution, ultrafine particle, modeling, nucleation mode

AIR POLLUTION MONITORING USING NEUTRON ACTIVATION ANALYSIS AND MOSSES AS BIOINDICATORS

Anca GHEBOIANU ¹, Ion V. POPESCU^{1,2,3}, Otilia CULICOV^{4,5}, Claudia STIHI³, Marina FRONTASYEVA⁴, Gh. Valerica CIMPOCA^{1,3}, Iulian BANCUTA¹, Roxana BANCUTA¹, Andrei CHILIAN¹

 ¹Multidisciplinary Research Institute for Science and Technologies, Valahia University of Targoviste, No 2 Carol I Street, 130024 Targoviste, Romania
 ²Academy of Romanian Scientists, 54 Splaiul Independentei, Bucharest050094, Romania
 ³Physics Department, Faculty of Science and Arts, Valahia University of Targoviste, Romania
 ⁴Joint Institute for Nuclear Research, Dubna, Russia
 ⁵INCDIE ICPE-CA, Bucharest, Romania

The aim of this work is to demonstrate the applicability of nuclear method for environmental monitoring. Neutron activation analysis and the moss-bag transplant technique were used to investigate atmospheric element deposition in Dambovita County affected by a continuous industrial pollution during the last five decades.

Mosses, *Sphagnum girgensohnii*, collected from the background area in Moscow region, Russia, was hanged in bags at 18 locations and analyzed after 1, 2 and 3 months of exposure.

In order to optimize the assessment of atmospheric pollution in an industrial area using active biomonitoring a novel sampling design was introduced, and transplants the moss *Sphagnum girgensohnii* were deployed in parallel in order to study the uptake of a series of trace elements from the air over a defined time period. The site selected for this experiment was Dambovita County, Romania.

A total of forty-nine samples were analyzed by NAA. Neutron activation analyses were performed at the Frank Laboratory of Neutron Physics, Joint Institute for Nuclear Research, Dubna, Russia.

The results from this study will be used for establishing correlation between environmental and epidemiological data in the examined area.

Keywords: moss, biomonitoring, INAA method.

USE OF BIOMONITORING WITH NATIVE PLANT ASSOCIATED WITH AREAS OF ENVIRONMENTAL ATMOSPHERIC ATTENTION IN CAMAÇARI – BAHIA, BRAZIL

Martins^{1,2}, PCA; Barison^{2,3}, AF; Mauad^{2,3}, T; Saldiva^{2,3}, PHN; Carvalho-Oliveira, R^{2,3}

¹⁻Prefeitura de Camaçari ²⁻Instituto Nacional de Análise Integrada de Risco Ambiental (INAIRA) ³⁻Laboratório de Poluição Atmosférica Experimental da Faculdade de Medicina da Universidade de São Paulo (FMUSP)

The municipality of Camaçari is an important urban center located in the Metropolitan Region of Salvador. The industrial pole of Camaçari, the first planned petrochemical complex in the country, and the largest integrated industrial complex in the southern hemisphere. It has more than 60 chemical, petrochemical and other industries, such as metallurgy, textile, and beverages.

The aim of this study is the identification of exposure to air pollution and the definition of the participation of emission sources, using the biomonitoring with native plant.

Approximately 30 leaves of mature trees of *Pachira aquática* Aubl., a native species of American Continent, were collected in thirteen locations in the municipality of Camaçari on three different occasions, in October 2009, in March and July 2010. Metallic and non-metallic leaves content was determined using an energy dispersive X-rays fluorescence spectrometer (EDX). The X-rays spectra intensities were converted to element concentrations (µg g-1) according to fundamental parameters calibrations using the standard NIST1547-Peach Leaves. The principal components analyze (PCA) statistical multidimensional technique was applied on EDX data. Five factors were identified, factor score (1) Cu and Zn, (2) Fe and Ba, (3) Cl, (4) Al and K, and (5) S and P. Petrochemical and heavy vehicular traffic has been characterized by the factors which identifies elements that are aluminum, potassium, sulfur and phosphorus. These factors were predominant in sites of study located near from petrochemical pole and thermoelectric plant. Interesting, the factor represented for Chlorine, was predominant in site monitoring near the sea.

The PCA applied to data for bioaccumulation in leaves of *Pachira aquática* Aubl., allowed determining the contribution of individual sources of pollution in the municipality of Camaçari. In summary, this technique can be applied as alternative to the environmental screening of air quality in areas without conventional monitoring system.

Financial support: This work was made possible by the financial support of CNPq (Brazilian Council of Research) and LIM-HCFMUSP (Institute of the Laboratories of Medical Investigation, Clinical Hospital, School of Medicine, University of São Paulo).

Determination of Organic Nitrogen Compounds in Air, Rain and Snow Samples Using Comprehensive Gas Chromatography with a Nitrogen Chemiluminescence Detector (GCXGC-NCD)

Mustafa. Z. Ozel¹, Jacqueline F. Hamilton¹, Alastair C. Lewis²

¹. The University of York, Department of Chemistry, Heslington, York YO10 5DD, U.K. mzozel@hotmail.com

². National Centre for Atmospheric Science, The University of York, Department of Chemistry, Heslington, YO10 5DD, York, U.K.

The objective of this study was to optimize and determine the feasibility of using comprehensive gas chromatography (GCxGC) and a fast responding element specific nitrogen chemiluminescence detector (NCD) to speciate volatile and semi-volatile organic nitrogen (ON) compounds from air, rain and snow samples. Despite the fact that a significant number of organic and inorganic compounds have been measured in air samples, relatively little is known about the ON content. There are many potentially harmful organic nitrogen species in the atmosphere which have not been studied previously. A new method was developed for the extraction, pre-concentration and analysis of ONs in aerosol samples. Aerosol samples, collected on quartz microfiber filters, were extracted in water followed by solid phase extraction, elution and concentration before analysis by GCxGC-NCD. Rain and snow samples were extracted by solid phase extraction followed by GCxGC-NCD. Limits of detection (LOD) and limits of quantitation (LOQ) for four ON standards were determined to be in the range 0.16-0.27 pgN and 0.71-1.19 pgN respectively. Between 21 and 57 different ON compounds were found in urban aerosol, (including 10 nitriles, 9 alkyl nitro compounds, 4 nitrophenols, 4 amides, 3 nitrosamines and 2 nitro-PAHs). Some of the ON compounds were present in both air, rain and snow samples. Our results show that GCxGC-NCD is very sensitive and selective for the analysis of ON compounds from air, rain and snow samples.

PIXE ANALYSIS FOR THE MULTYELEMENTAL DETERMINATION IN BIOMONITORS (*THILLANDSIA RECURVATA* AND *FLAVOPUNCTELIA FLAVENTIOR*) FOR THE STUDY OF POLLUTING AGENTS IN THE VALLEY OF MEXICO

Cervantes, M.L¹., Ruvalcaba, J.L.², Cuapio, L.A.¹, Sansone, U.³

¹ Instituto Nacional de Investigaciones Nucleares, A.P. 18-1027, 11801, D.F., Mexico ² Instituto de Física, Universidad Nacional Autónoma de México (UNAM). Ciudad Universitaria, 04510 México D.F., México ³International Atomic Energy Agency (IAEA) A-2444 Seibersdorf Austria

In the last years, the project "Correlation Studies Between Atmospheric Deposition and Sanitary Problems in Latin America: Nuclear Analytical Tecniques and the Biomonitoring of Atmospheric Pollution during the year from 2008 and 2010" (RLA/2/013) has been undertaken within the framework of (ARCAL) Regional Cooperation Agreement for the Promotion of Nuclear Science and Technology in Latin America And The Caribbean supported by the International Atomic Energy Agency Research (IAEA). The aim of this project was to carry out a long term study on atmospheric air pollution in México City using biomonitors. The present paper describes the activities undertaken within the framework of this project.

Samples of Flavopunctelia flaventior (L.) Nyl, and Bromeliacea Thillandsia recurvata (Ruiz and Pay), specimens were used in environmental pollution monitoring. The biomonitors were transplanted into urban, rural and industrial sites in the valley of Mexico. The lichen an bromelia specimens were grown in a controlled area (Passive bio-monitoring), and subsequently transplanted (active bio-monitors) in suspended nylon bags, for a 6 month period in about 28 sampling location covering industrial zones, locations with heavy traffic, commercial and residential areas well identified and sites in the valley of Mexico located nearby the stations of the automatic network of atmospheric monitoring in the Metropolitan Area of the Valley of Mexico (ZMVM). The biomonitors samples and references were analyzed by Particle-Induced X-ray Emission (PIXE) at Instituto de Física with the Pelletron Acelerator the Universidad Nacional Autónoma de México (UNAM) in order to obtain information on the air quality in these regions and also to select regions of interest for future biomonitoring studies. Also the precision and the accuracy of the method were evaluated by analyzing certified reference materials: IAEA 336-482 lichen, IAEA 16 chard, NIST 1573 leaf the tomato, NIST 2711 Montana, NIST 2704 Bufalo. Among the detected elements: As, Al, Br, Ca, Cl, Cu, Cr, Fe, K, Mn, Ni, Mn, P, Rb, S, Sr, Si, Ti, Zn, Zr concentrations were measured by the external beam PIXE setup. In this paper, we report the two year exposition (2008-2009) and we compare with previous results. The elemental contents are mapped in a ZMVM area and discussed in terms of air quality. Final results of two periods of experiments show that biomonitors exposed to air contaminants at sites of toxic waste deposition, accumulated large amounts of elements related to pollution.

THREE DECADES OF ATMOSPHERIC METAL DEPOSITION IN NORWAY AS EVIDENT FROM ANALYSIS OF MOSS SAMPLES

Eiliv Steinnes

Department of Chemistry, Norwegian University of Science and Technology, Trondheim, Norway

Monitoring of atmospheric deposition of metals in Norway on a nationwide scale using samples of terrestrial moss started in 1977 and has been repeated every 5 years. This has facilitated a detailed record of temporal and spatial trends of metal deposition all over the country as a supplement to measurements based on bulk deposition sampling on a small number of sites. Calibration of concentrations in moss versus bulk deposition was successful for a number of trace elements. Lead, zinc, cadmium, arsenic, antimony, vanadium, tin, molybdenum, and bismuth all show highest deposition in the far south due to transboundary pollution from other parts of Europe, but the deposition of these elements has decreased substantially over the years. The distributions of iron, nickel, copper, chromium, and cobalt are more affected by local sources, but a decreasing time trend is also evident for these elements. Deposition of iodine and selenium is mainly from processes in the marine environment. In the case of Hg the observed deposition pattern indicates contribution from the hemispheric pool of Hg⁰, particularly in the north.

SPATIAL AND TEMPORAL VARIATION OF BIOMONITORS CONDUCTIVITY AT LISBON CITY, PORTUGAL

N. Canha¹, A.M.J.Cruz², M.C. Freitas^{1,*}, S.M. Almeida¹, T.G. Verburg³, H.Th. Wolterbeek³

 ¹ Instituto Tecnológico e Nuclear, URSN, E.N. 10, 2686-953 Sacavém, Portugal
 ² Department of Science and Technology, Technology and Management High School of Oliveira do Hospital, Coimbra Polytechnic Institute, Rua General Santos Costa, 3400-124 Oliveira do Hospital

³ Department of Radiation, Radionuclides and Reactors, Faculty of Applied Sciences, Delft University of Technology, Mekelweg 15, 2629 JB Delft, The Netherlands

The potential of transplanted lichens as effective biomonitors of air quality have been emphasized by several studies in the past years. Lichens stress caused by pollution can be shown by physiological parameters which can supply relevant information on the pollution impact. Changes in membrane permeability to ions, characterized by the electric conductivity of the lichen samples, are one of the most sensitive physiological responses to environmental stress. In fact, the loss of electrolytes correlates with the presence of gaseous pollutants, catalysts of lipid membrane peroxidation and with some high heavy metal cellular concentrations.

A biomonitorization survey using transplated lichens from a clean area was done in the urban area of Lisbon, Portugal, at primary schools courtyards in 2008 and 2010. Two species of lichens, *Parmotrema bangii* and *Parmelia caperata*, were collected from clean areas (Azores and a clean rural zone in the center of Portugal, respectively). In the laboratory, lichens were set into tree bark pieces of around 6 cm x 6 cm each and they were hanged at the courtyards trees of the studied schools, using nylon strings. After the exposure periods, lichens samples were processed at the laboratory and 100 mg of each sample (24h air-dried material) was immersed in 10 mL double distilled water for 60 min. The electric conductivity of each solution was measured afterwards by an electric conductivity meter (712 Metrohm conductometer).

For each sampling period, the spatial variation of the conductivity results was determined to assess the city areas where the pollution had a greater impact on the lichens. Temporal evolution of the conductivity was analyzed as well, concerning the two sampling periods, to understand if the pollution impact areas had changed. The assessment of the stress effects in lichens due to the transplanting process from unpolluted to air-polluted areas (with new meteorological and physical-chemical conditions) was performed as well.

Keywords: Biomonitors, Lichens, Conductivity, Spatial and Temporal variation, Lisbon, Air Quality

SEASONAL VARIATION OF THE SIZE AND CONCENTRATION OF THE URBAN PARTICLES: GOZTEPE FIELD STUDY

Riza Gürcan Oraltay¹, Bugra Çelik², Burcu Yollu², Selin Isguven³

¹Marmara University, Engineering Faculty, Environmental Eng. Dept. 34722 Goztepe-Istanbul-Turkey ²Marmara University, Graduate School, 34722 Goztepe, Istanbul-Turkey ³Robert College, Arnavutkoy, Istanbul-Turkey

During the Spring of 2010 (March-May), Fall/Winter 2010/2011 (November-January) and Spring/Summer of 2007(April-July), particles were collected on membrane filters with 0.4 µm pore size using a low volume sampler and PM₁₀ impactor for 24 hour sampling periods on the campus of Marmara University at Goztepe Istanbul. 129 filter samples were obtained in total. Samples were classified according to the meteorological conditions (wind direction, air mass trajectory and presence of precipitation). Mass concentrations were obtained via a microbalance system under controlled temperature and relative humidity conditions. Spring/Summer particles ranged between 12.5 and 123 μ g/m³, with an average value of 46 μ g/m³, while Fall/Winter particles ranged between 15 and 169 μ g/m³, with an average value of 52 μ g/m³. Selected samples were investigated via a scanning electron microscope-energy dispersive spectrometer (SEM-EDS) to obtain size distributions and elemental compositions of the particles. Effect of the passage of frontal systems was seen clearly on the reduction of the ambient mass concentrations. Episodes with high particle concentrations $(>100 \ \mu g/m^3)$ were associated with high pressure systems. Carbon rich particles constituted most of the particles, with increasing abundance in the winter period. Comparison of the number size distributions of winter particles to summer particles showed significant shift to the larger particle size range for winter particles.

Keywords: air pollution, individual particle analysis, SEM-EDS

SIRENAS (SHIPS INVESTIGATION REMOTELY ABOUT NO_x AND SO_x): THE ROTTERDAM AND GENOA CAMPAIGNS.

J. M. Balzani Lööv, B. Alfody, F. Lagler, J. Hjorth and A. Borowiak

Joint Research Centre, Institute for Environment and Sustainability, 21027 Ispra (Va), Italy.

Shipping is playing a fundamental role in the past, actual and future world economy moving 80-90% of world trade by volume. However, until recent years, the lack of atmospheric pollution regulations allowed ships to become a large and growing contributor to the total emissions from the transportations sector. There was no control on sulphur and nitrogen oxides (NO_X) emissions until year 2005 and it was possible to use everywhere pure Heavy Fuel Oil (HFO, the residue remaining after refining crude oil), characterized by high sulphur content subsequently emitted as sulphur oxides (SO_X). According to several studies (eg. *Eyring et al., 2005, Corbett, 2007*) the resulting pollution by NO_X and SO_x, which has negative effect on human health and the environment, will exceed the diminished pollution on land where emissions have been effectively controlled.

In order to fill this void the International Maritime Organization (IMO) established regulations in MARPOL Annex VI, which entered into effect in 2005. Currently, the Annex specifies that in the North Sea and Baltic Sea Sulphur Emission Control Areas (SECAs) no fuel can be burned if its sulphur content exceeds 1% by mass. Outside of SECAs, the limit is 4.5%. In addition it stipulates that ships at berth in EU ports must burn fuels with less than 0.1% sulphur. For NO_X the emission, limits are relative to power output (g NO_X/KWh) depending on the speed of the engine. According to the year of construction of the ship different, three different tiers exists for ships built after 2000, 2011, and 2016. This regulation should reduce NO_X emissions by 15-22% (relatively to the actual limits) for new ships built after 2011 and by 80% for ships built after 2016.

However, measuring and controlling the actual emissions from ships is not an easy task because the use of higher sulphur fuel is likely to happen outside the harbours. In addition the production of NO_X during real operating conditions might differ from the standard certification procedure of the engines.

In order to overcome the difficulties of performing on-board inspections, the Joint Research Centre (JRC) of the European Commission, on behalf of DG Environment, organized 2 campaigns between 2009-2010, in Rotterdam (Netherlands) and in Genoa (Italy), to evaluate potential remote sensing techniques for the detection of SO_2 and NO_X in exhaust gas plumes of ships. The methods included standard air parcel concentrations measurements

("Sniffing", using standard ambient air monitors or electrochemical sensors) and optical methods (see Table 1). The instruments were tested for use on different platforms: shore, boat, helicopter and small Unmanned Aerial Vehicle (UAV). An overview of the results and the performances of the different methods will be given.

Table 1:	Contribution and type of measurements of different Institutes	
	the SIRENAS-R campaign.	

Technique	Measured Compounds	Institute
"Sniffing"	NO-NO _X -CO ₂ -SO ₂ [ppb]	JRC (European Commission - Joint
		Research Centre)
"Sniffing"	NO-NO _X -CO ₂ -SO ₂ [ppb]	TNO (Netherlands Organization for
		Applied Scientific Research)
"Sniffing"/DOA	NO-NO _x -CO ₂ -SO ₂	Chalmers University of Technology
S	[ppb]//[Kg/s]	
"Sniffing" by	NO-NO _X -CO ₂ -SO ₂ [ppb]	JRC (European Commission - Joint
UAV		Research Centre)
LIDAR	SO ₂ [Kg/s]	RIVM (National Institute for Public
		Health and the Environment)
UV-Imaging	SO ₂ [Kg/s]	NILU (Norwegian Institute fo Air
		Research)
AIS Modelling	-	FMI (Finnish Metereological Institute)

IMPACT OF WARMING AND ARIDIFICATION ON THE RELATIONSHIP BETWEEN SULPHUR CONTENT OF CEDAR (*Cedrus libani*), BLACK PINE (*Pinus nigra*), SCOTCH PINE (*Pinus sylvestris*) AND RED PINE (*Pinus brutia*) AND HARMFUL ENTOMOLOGICAL SPECIES IN THE REFORESTRATION AREAS IN THE CENTRAL ANATOLIA REGION

M.Doğan Kantarcı¹ and Özlem Şahin²

¹Istanbul University, Faculty of Forestry, Department of Soil Science and Ecology (EM) Bahçeköy-Istanbul

²Ministry of Environment and Forest Central Anatolia Forestry Research Institute

The warming and aridification process as a result of rising levels of atmospheric CO_2 can be quantitatively determined by the measurements from the meteorology stations in Central Anatolia Region. This phenomenon prolongs the retention of SO_2 , which is one of the major air pollutants, in its gaseous form. Another impact of the warming and aridification process is on an increased growth, survival rate and reproduction accompanied by decreased mortality of the harmful entomological species. Such a change leads to a shift in balance between entomological populations causing harmful species becoming predominant in the ecological systems. As a result, sensitive ecological balance is damaged, tree health is impaired, and forests become more prone to disease.

In this study, the impact of these complex environmental and biological interactions on forest trees has been analyzed. Four tree species (*Cedrus libani, Pinus nigra, Pinus sylvestris, Pinus brutia*) in reforestations at arid zones were studied; sulphur content in needles, changes in needle length and weight with respect to needle age and years were examined. The data was then correlated to climate data and presence, prevalence, and density of harmful entomological species.

The results demonstrate that there is a significant relationship between aridification at low altitudes in Central Anatolia Steppe, rising sulphur content in needles of Cedar and Black pine trees and the presence of harmful insects. On the other hand, effect of warming and aridity is diminished by increasing altitude. Such a decrease could be attributed to the distance between the trees and the extent of the air pollution where the sulphur content in needles decreases. Overall, these findings indicate that the impact of warming and aridification increases at low lands while colder temperatures at higher elevations prevent the spread of harmful insects and shift in ecological balances.

Meanwhile, the sulphur content in needles of cedar trees is significantly higher than the black pines where the cedar and black pine forests were cultivated side-by-side in the same reforestation areas. This difference could be due to the cedar trees have more photosynthesis capacity than black pine trees per needle mass (100 gr) through which the air pollution could exert more pressure.

ASSESSMENT OF ENVIRONMENTAL GAMMA RADIATION DOSE RATE IN ARDABIL AND SAR EIN

Sadegh Hazrati¹, Soheila Rahimzadeh², Fatemeh Rahimzadeh³

¹Department of environmental Health, School of Public Health, Ardabil University of Medical Sciences, Daneshgah St., Ardabil, Iran ²Ardabil provincial health center, Ardabil University of Medical Sciences, Daneshgah St., Ardabil, Iran ³Education Office of Tehran Province, Tehran, Iran

Gamma rays, the most energetic photons within the any other wave in the electromagnetic spectrum, pose enough energy to form charged particles and adversely affect human health. Provided that the external exposure of human beings to natural environmental gamma radiation normally exceeds that from all man-made sources combined, environmental gamma dose rate and corresponding annual effective dose were determined in the cities of Ardabil and Sar Ein. Outdoor environmental gamma dose rates were measured using an Ion Chamber Survey Meter in 100 selected locations (one in city center and the remaining in cardinal and ordinal directions) in Ardabil and Sar Ein. Measurements of gamma radiation dose rate were performed at 20 and 100 cm above the ground for a period of one hour. Average outdoor environmental gamma dose rate were determined as 265 and 219 $nSv h^{-1}$ for Ardabil and Sar Ein, respectively. The annual affective dose for Ardabil and Sar Ein residents were estimated to be 1.45 and 1.39 mSv, respectively. Calculated annual effective dose of 1.49 and 1.35 *nSv* are appreciably higher than the population weighted average exposure to environmental gamma radiation worldwide and that analysis of soil content to different radionuclide is suggested.

Keywords: Gamma, Effective Dose Rate, Ardabil.

INDOOR AIR QUALITY IN URBAN ENVIRONMENTS

M. Almeida-Silva¹, S. M. Almeida¹, A. Dias²

 ¹ Instituto Tecnológico e Nuclear (ITN), EN 10, 2686-953 Sacavém, Portugal
 ² Instituto de Soldadura e Qualidade, Av.ª Prof. Dr.º Cavaco Silva, n.º33, 2740-120 Porto Salvo, Portugal

According to the World Health Organization clean air is a basic requirement of life. The quality of air inside homes, offices, schools and other private and public buildings is an essential determinant for a life with health and wellbeing. Several epidemiological studies have shown the relationship between the exposure of air pollutants and adverse effects on human health. It is important to study indoor environments because people, nowadays, spend more time indoors than outdoors. The present study was conducted in order to fulfil 2 primary goals: 1) to characterize selected indoor environments; and 2) to identify the sources of indoor air pollutants. Some indoor pollutants such as carbon dioxide (CO_2), carbon monoxide (CO), particulate matter with aerodynamic diameter <10 µm (PM_{10}), volatile organic compounds (VOCs), formaldehyde (H_2CO), ozone (O_3), fungi and bacteria were assessed in seven urban indoor environments, as well as, air temperature, relative humidity and air velocity. The pollutants concentrations that most exceeded the Portuguese legislation values were CO_2 , VOCs, H_2CO and fungi.

Keywords: indoor air quality, urban environments, health effects, HVAC

An Estimate of Present Day and Future Global Mortalities Due To Anthropogenic Fine Particulate Matter and Ozone Pollution Using Atmospheric Modeling

Ceren Barlas, Andrea Pozzer, Jos Lelieveld

Concentrations of pollutants in the atmosphere have been increasing since preindustrial times due to anthropogenic activity, and some of these pollutants are related to cardiovascular and respiratory mortality. Due to the global circulation of these pollutants, even remote regions with very little or no industrial activity have been suffering from the consequences of this increase in concentration. Therefore, it is becoming increasingly important to quantify and analyze the presence and the effects of atmospheric pollution in a global manner. Two important constituents of atmospheric pollution for public health, fine particulate matter [$\leq 2.5 \mu m$ in aerodynamic diameter (PM_{2.5})] and ozone, have been found in epidemiological studies to be factors that negatively affect the health of populations. For a given region, an increase in the exposure to these pollutants has been tied to an increase in the mortalities in that area. The concentrations of PM_{2.5} and ozone can be simulated by global atmospheric chemistry and circulation models to quantify the exposure, and the ECHAM5/MESSy general circulation model has been used in this study. Remote regions, where observational data is sparse, were also included using the simulations. The excess mortalities due to air pollution were estimated using health impact functions. These functions take into account baseline mortality rates, change in the concentrations of pollutants, concentration response factor and population numbers. The change in concentrations of PM_{2.5} and ozone were calculated as the difference from the natural (preindustrial) levels to the concentrations in years 2005 and 2010. Projections of pollutant concentrations and subsequent excess mortalities were also estimated for the years 2025 and 2050. Annual global excess mortalities were estimated for the years 2005, 2010, 2025 and 2050 by applying health impact functions to the changes in concentrations. Excess mortalities due to all causes, cardiopulmonary and lung cancer were estimated. Excess PM_{2.5} exposure due to anthropogenic activity was found to result in the highest mortalities in China, India and Bangladesh for all four time periods. Currently ongoing study directions include estimation of excess mortalities due to ozone and computation of years of life lost due to excess mortalities for each country.

GROSS ALPHA AND BETA ACTIVITIES OF AIRBORNE PARTICULATE SAMPLES FROM WAWEL ROYAL CASTLE MUSEUM IN CRACOW, POLAND

Songul Akbulut¹, Barbara Krupińska², Anna Worobiec², Ugur Cevik³, Lucyna Samek⁴, Ewa Wiłkojć⁵, Halim Taskın⁶ and René Van Grieken²

¹Rize University, Department of Physics, 53100 Rize, Turkey ²University of Antwerp, Department of Chemistry, Universiteitsplein 1, 2610 Antwerp, Belgium

³Karadeniz Technical University, Department of Physics, 61080 Trabzon, Turkey ⁴AGH University of Science and Technology, Department of Medical Physics and Biophysics, al. Mickiewicza 30, 30-059 Cracow, Poland

⁵Wawel Royal Castle, The National Art Collection, Department of Chief Curator, Wawel 5, 31-001 Cracow, Poland

⁶Turkish Atomic Energy Authority, Cekmece Nuclear Research and Training Centre, 34303 Istanbul, Turkey

The instrument used to count the gross alpha (α) and beta (β) activities was a proportional gas filled counter of the low background multiple detector type with 10 sample detectors. The gross α lpha and beta counting method was based on the collection of the aerosol particulates onto Teflon membrane filters. Size-resolved airborne particulate samples were collected during 8 hours each, both inside and outside the museum of Wawel Royal Castle in Cracow, Poland. The aerosol size distribution describes the number of particles observed in a certain diameter size ranges. PM-10, PM-2.5 and PM-1.0 are used to assign three different fractions of particle matters (PM). According to the results, the sampling locations and particle fractions showed differences for the alpha and beta activity dispersion. In general, a high level of beta activities was observed in PM-2.5 and a high level of alpha activities in the PM-10 fraction, while both the highest alpha and the lowest beta activities were found in PM-1.0 fraction.

Keywords: gross-alpha, gross-beta, particulate matter, impactor, aerosol size distribution

DISTRIBUTION AND SEASONAL VARIATIONS OF TRACE METALS LEVELS IN KUWAIT GOVERNORATES AEROSOL (PM₁₀, PM_{2.5}, PM₁)

AH. Bu-Olayan and BV. Thomas

POB 5969, Department of Chemistry, Kuwait University, Safat-13060, Kuwait

Our study reports the presence of changed air quality standards in Kuwait as a result of particles sized 1.0, 2.5 and 10 μ m Ø ((PM_{1.0}, PM_{2.5}, PM₁₀). Irrespective of the six Kuwait Governorate areas (GI-GVI) and seasons, high trace metal concentrations were observed in the sequence of $PM_{10} > PM_{2.5} > PM_{1.0}$ respectively. The annual mean concentrations for PM_{1.0}- PM₁₀ (15 ug m⁻³ - 93 ug m⁻³) exceeded the World Health Organization (WHO) standards. Trace metals in these aerosols in Kuwait were never evidenced before and hence this study. Samples in G-VI showed high trace metals levels (4.93 μ g g⁻¹-39.56 μ g g⁻¹: PM₁₀ - PM₁₀) among the six Governorates indicating the significance of trace metals from the re-suspension of dust and soil from the desert crust, dispersal from the oil industries, rise in population and urbanization. Metal-wise analysis revealed high metals levels in the sequence of Al > Cu > Fe > Ni >Zn > Pb >V. Season-wise analysis revealed high trace metals concentrations in aerosol during summer than in winter attributing to frequent dust storms and anthropogenic sources. Findings also revealed that these aerosols are detrimental to generate substantial health impacts. Hence, these aerosols can be characterized as indicators to trace metals pollution in the ambient air for a given area and also present opportunities to reduce airborne aerosols to improve public health.

Keywords: Trace metals, outdoor air pollution, Kuwait

LONG-TERM TRENDS OF VOLATILE ORGANIC COMPOUNDS AT THE CZECH EMEP OBSERVATORY KOSETICE 1993-2010

Milan Vana, Jaroslav Pekarek

Czech Hydrometeorological Institute, Kosetice Observatory, 394 22 Kosetice, Czech Republic

Košetice Observatory was established as a station specializing in air quality monitoring and research at the background scale of the Czech Republic in 1988. Monitoring of VOCs was launched in 1993 according to the EMEP guidelines. The sampling is implemented at 12.00 o'clock UTC every Monday and Thursday for the duration of 10 minutes. In the laboratory, a group of hydrocarbons (C2–C8) is quantified by gas chromatography in a capillary column with a flame-ionisation detector. The VOCs emissions in EMEP region were nearly constant until 1990, but from 1990 to 2008 dropped by almost 40%. The descrease in the Czech Republic was even more rapid. The reduction of VOCs emissions in last two decades was reflected in significant decrease of concentrations at the background scale of the Czech Republic. The nonparametric Mann-Kendall method was used for statistical evaluation of VOCs trends significance. More than 80% of measured VOCs have been characterized by the most significant downward trend. Less significant downward trend was registered for ethane and sum-butane. Isoprene is controlled first of all by natural conditions and shows different patterns and trends as other VOCs. Most of non-methane hydrocarbons follow an annual course that reflects their emission levels, i.e. with maximums in winter and minimums in summer. The highest concentrations of major VOCs are recorded in situations when air masses reach our territory from the southwest to southeast. The highest isoprene concentrations are measured in the situation with inflow of air from south-east sectors which usually bring warm weather.

Keywords: air pollution, VOCs, long-term monitoring, EMEP, Czech Republic

PM_{2.5} AND PM₁₀ CHEMICAL COMPOSITION OF URBAN AND BIOMASS BURNING AREAS OF SÃO PAULO STATE, BRAZIL

Pérola C. Vasconcellos, Davi Z. Souza, Minna Aurela, Karri Saarnio, Kimmo Teinilä, Risto Hillamo.

Particulate matter samples ($PM_{2.5}$ and PM_{10}) were collected at urban and biomass burning sites in São Paulo State, Brazil. In order to characterize the chemical composition, several chemical components were analyzed: inorganic ions (Cl^- , NO_3^- , SO_4^{2-} , PO_4^{3-} , Na^+ , K^+ , NH_4^+ , Ca^{2+} , Mg^{2+}), organic acid anions (acetate, formate, oxalate, glyoxylate, malonate, maleate, succinate, malate, adipate, pinonate, pinate and azelate), monosaccharide anhydrides as levoglucosan, galactosan and mannosan, organic carbon and elemental carbon.

The measurements were made in two cities. The urban and industrial site (SPA) is located at the western region of the São Paulo city, which is potentially impacted by different type emission sources. This city is the largest industrialized region in Latin America (petrochemical, pharmaceutical). The measurement site was approximately 2 km far from a major highway with dense vehicular traffic. São Paulo Metropolitan Area has over 19 million inhabitants and a fleet of over 7 million vehicles.

The second measurement site is located in Piracicaba city (PRB). It is an urban area 200 km far from SPA. The city has over 360,000 inhabitants and a vehicle fleet of over 185,000. The principal activities are agriculture (sugarcane, coffee, orange) and industries. Biomass burning has been the largest factor affecting the local air quality.

The dry and cold season and the long-range transport of the particulate matter during sugar cane burning period contributed to the increase of $PM_{2.5}$ and PM_{10} concentrations samples analyzed.

Sulphate, nitrate, ammonium, elemental carbon and particulate organic material were major components of the total $PM_{2.5}$ and $PM_{2.5-10}$.

In the dry periods and low temperatures, the SO_4^{2-}/NO_3^{-} ratio and its high correlation found in SPA08 and PRB08 samples indicates strong influence of vehicle emissions for $PM_{2.5}$ and $PM_{2.5-10}$ and the stability of nitrate. Conversely, at SPA09 in the summer, the high nitrate volatility is observed in this ratio.

The high correlation between SO_4^{2-} , NO_3^{-} , and NH_4^+ in $PM_{2.5}$ and $PM_{2.5-10}$ confirms the *in situ* secondary formation of these species. Cl⁻/Na⁺ ratio at

SPA08 site in PM_{2.5} was 1.8 differently from the other sites where chloride depletion can indicate several sources beyond sea salt.

The presence of levoglucosan and the correlations with potassium confirm the contribution of local biomass burning (PRB) and long-range transported particles at the other sites investigated. OC/EC ratios and the correlation coefficients indicated secondary formation of OC at all sites.

The present study demonstrated that several emission sources contributed to the formation of particulate matter $PM_{2.5}$ and $PM_{2.5-10}$ at the different characteristic sites.

Further studies are necessary for better understanding of atmospheric chemistry of species emitted by different emissions sources including the combustion of alternative fuel.

INVESTIGATION OF CHEMICAL COMPOSITION AND SEASONAL VARIATION OF AEROSOLS IN BOLU ATMOSPHERE

Elif ÖZLÜ, Serpil YENİSOY-KARAKAŞ

Department of Chemistry, Faculty of Art and Sciences, University of Abant Izzet Baysal, Bolu, Turkey

In this study the composition of aerosols regarding with ions, trace and major metals and total carbon (TC) was investigated. Daily aerosol samples were collected during two campaigns (summer and winter) in Abant Izzet Baysal Universty campus in Bolu. Over the sampling period both PM_{2.5} and PM_{2.5-10} particulates were sampled and were analyzed by using FAAS, FAES, GFAAS, IC and elemental analyzer. Fifteen metals (Al, Cd, V, Mg, Ca, Fe, Pb, K, Cr, Mn, Ni, Cu, Zn, Co, As), ions (F⁻, Cl⁻, NO₂⁻, NO₃⁻, SO₄²⁻, Li⁺, Na⁺, NH₄⁺, K⁺, Mg²⁺, Ca²⁺) and total carbon were determined. Sulfate has the maximum concentration percent ratio (28.3 %) in PM_{2.5} with average concentration of 2.7 μ g m⁻³. In $PM_{2.5-10}$ the maximum concentration percent ratio belongs to Al (17.4 %) with 1.62 μ g m⁻³ and Ca (37.5 %) with 3.3 μ g m⁻³. Total carbon showed no significant difference in both PM_{2.5} and PM_{2.5-10} samples. In order to determine the sources of the parameters PM_{2.5}/PM_{2.5-10} ratio in summer period was calculated. This ratio was greater than 1 for SO₄²⁻, NH₄⁺, Cl⁻ and Pb. In winter the ratio for As, K, SO_4^{2-} , NH_4^+ , NO_3^- and Pb was greater than 1. This indicates that these pollutants were mostly originated from the anthropogenic sources and they showed seasonal variation due to change of transboundary movement of pollutants with respect to meteorological parameters and also due to change in human activities. Wind sector analysis and trajectories showed that the main pollution sources were from local sources such as residential coal burning, traffic, waste incineration and some small scale industries and the effect of long range transport of air masses coming from Düzce, Karabük, Kocaeli, Europe and Russia was determined.

Keywords: metals, ions, wind sector analysis, PM_{2.5}, PM_{2.5-10}

MONITORING OF TRACE GASES AND AEROSOLS DURING OPEN AGRICULTURAL RESIDUE BURNING IN PATIALA (NW-INDIA)

^{ad}Nirankar Singh, ^aSusheel K Mittal, ^bRavinder Agarwal, ^bAmit Awasthi and ^cPrabhat K Gupta

^aSchool of Chemistry & Biochemistry, Thapar University, Patiala, India; ^bUniversity Science Instrumentation Centre, Thapar University, Patiala, India; ^cChemical Metrology Section, National Physical Laboratory, New Delhi, India; ^dDepartment of Applied Sciences, Rayat Institute of Engineering & Information Technology, Ropar, India

Outdoor biomass burning, such as forest fires and agricultural residue burning emit substantial amounts of particulate matter and other pollutants into the atmosphere. An air quality study conducted in Patiala revealed that periodic agricultural burning activities greatly influence the ambient air quality of the area. Concentration levels of Suspended Particulate Matter (SPM), SO₂ and NO₂ were monitored at five different sites in and around Patiala city covering agricultural, commercial and residential areas. SPM was collected on GMF/A (Whatman) sheets for a 24 hour period during 2007 and 2008. At the same time, sampling of SO₂ and NO₂ was conducted and results obtained during crop residue burning periods were compared to the noncrop residue burning periods. During the study period 2007 and 2008, the average aerosol concentration during different seasons varied between 197±46 µgm⁻³-441±55 µgm⁻³. In 2007, average aerosol concentration recorded during wheat and rice CRB months were 359±71 µgm⁻³ (Apr-May) and 436±55 µgm⁻³ (Oct-Nov), respectively. During NCRB months (Jun-Sep, Dec. 2007) average aerosol concentration recorded was 197±46 µgm⁻³. During the study period, the average SO₂ concentration levels varied between 8±4 μgm⁻³-20±7 μgm⁻³. In 2007, average SO₂ concentration recorded during wheat and rice CRB months were 20±7 µgm⁻³ (Apr-May) and 18±14 µgm⁻³ (Oct-Nov), respectively. During NCRB months (Jun-Sep, Dec, 2007) average SO_2 concentration recorded was $8\pm4 \ \mu gm^{-3}$.

Results clearly showed significant increase in SPM levels during crop residue burning periods indicating the impact of these crop residue burning practices on the air quality. Increase in the concentration of SO₂ and NO₂ were observed during crop residue burning periods incorporated with the impact of vehicular exhaust. CRB activities performed after the wheat and rice crop harvesting deteriorated the quality of ambient air in Patiala in 2007 and 2008 by increasing the concentration of aerosols, SO₂ and NO₂ in the province. Although levels of SO₂ and NO₂ were fluctuating at different monitoring sites, high concentrations were obtained during wheat CRB months (Apr-May) as well as rice CRB months (October and November). Levels of these pollutants were high during both burning periods (wheat and rice stubble burning periods), while high concentration levels of monitoring pollutants were obtained during the rice CRB period (October-November). Most of the time local aerosol concentration obtained at all sites during NCRB months was already higher than the NAAQS (India) of 200 μ gm⁻³ and World Health Organization standards for most of the sampling times, during CRB months, a remarkably high increment was observed in aerosol level at all the sites. The monthly average concentration of SO₂ and NO₂ remained below the NAAQS standards (80 μ gm⁻³). Higher concentration was obtained during the stubble burning period at all the sampling locations. It can be concluded that crop residue burning contributes to raising the level of aerosol and gaseous pollution in the ambient air, as there is no other point source such as industry or power plants in the vicinity of the city. This increase was observed at all the monitoring sites.

Keywords: Residue burning, Air Quality, Agricultural burning, SPM, SO₂, NO₂

EFFECTS OF FOLIAR APPLICATION WITH COMPOST TEA AND FILTRATE BIOGAS – SLURRY LIQUID ON YIELD AND FRUIT QUALITY OF NAVEL ORANGE (CITRUS SANENESS OSBECK) TREES

Alaa El-Din Kh. Omar^{1,2} Elsayed B. Belal³ and Abd El-Naiem A. El-Abd⁴

¹ Plant Production Dept., College of Food and Agric. Sci., King Soud Univ., P.O. Box 2460, Riyadh 11451, Saudi Arabia

²Hort., Dept.,(Pomolgy) Fac., Agric., Kafrelsheikh Uni., Kafr El-Sheikh 33516, Egypt
 ³ Agric., Botany, Dept.,(Agric., microbiology) Fac., Agric., Kafrelsheikh Uni., Kafr El-Sheikh 33516, Egypt
 ⁴Citrus, Dept., Hort.,Res., Ins., A.R.C., Giza, Egypt

Sixteen years old Navel orange trees at a private orchard located in Kafr El-Sheikh Governorate, Egypt were used in this study. Four foliar applications of compost tea (CT) and filtrate biogas – slurry liquid (FLB) at 50 and 100% beside control trees (sprayed with water). Foliar application of CT at 100% gave a higher yield and fruit weight, vitamin C and lowest content of acidity. As well as FLB (100%) gave the highest values in fruit set percentage, SSC%, reducing and total sugars. Concentrations at 50% for both foliar application (CT and FLB) improved yield and its compounds than control treatment. Generally, the recommendation is the using a foliar application of compost tea and filtrate biogas – slurry liquid at (100%) treatments as food nutrients are viable options for improve the yield and fruit quality of navel orange fruits.

Keywords: Compost tea, biogas- slurry liquid, navel orange, foliar application, fruit quality.

PASSIVE SAMPLING UNDER INVESTIGATION: IS ACCURACY IN AMBIENT WEEKLY VOC CONCENTRATIONS SEVERLY AFFECTED BY USING EXPERIMENTAL UPTAKE RATES?

Sümeyra Bayır¹, Naciye Öztürk¹, Pınar Ergenekon², Gaye Özdemir ², 'Gökhan Bilsel³, Mine Bilsel³,

¹Chemistry Department/ Gebze Institute of Technology ²Environmental Engineering Department / Gebze Institute of Technology ³National Institue of Metrology / TUBITAK

Passive sampling for VOCs is a preferred option for monitoring ambient or indoor air quality since it is easy and low cost. Being a widely used method. however, the accuracy of the passive sampling mainly depends on the uptake rates which are essential for the calculation of the VOC concentrations. These experimental uptake rates are determined at certain concentration, temperature, and humidity levels for different time intervals. However in the field, all of these parameters show fluctuations and therefore use of experimentally determined uptake rates bring significant source of error. On the scope of our project our main aim is to monitor the air quality in terms of VOC in Dilovası which is also known as Cancer Valley in Turkey. Before starting the monitoring study, we wanted to know the accuracy of the passive sampling method for the VOC species mostly observed in the town. For this purpose, 1 week of intense measurement campaign was conducted using automatic sequential active sampler and passive tubes for, 24 h, and weekly periods. Tenax TA as adsorbent material are used in all samplings and VOCs were desorbed with a Thermal Desorber unit and speciated and quanitified by GC/MS system. Real-time uptake rates for 1 day 24h were determined for toluene, p-isopropyl toluene, 1,3,5-trimethylbenzene, m,p-xylene, and oxylene. It was shown that uptake rates were strongly effected by concentration and decreased while concentration increases. The study is currently on going to obtain real-time uptake rates for 1 week and compare them with ideal calculated uptake rates of axial type passive tube with different adsorbents.

Keywords: VOC, passive sampling, active sampling, back diffusion.

DISTRIBUTION CHARACTERISTICS OF PLATINUM GROUP ELEMENT IN AIRBORNE PM10 AT THE ROADSIDE AREA

J. M. Lim¹, J. H. Jeong², J. H. Lee², J. H. Moon¹, Y. S. Chung¹

¹ Department of Nuclear Basic Science, Korea Atomic Energy Research Institute, Daejeon 305-353, Republic of Korea

² Department of Environmental Engineering, Chungnam National University, Daejeon 305-764, Republic of Korea

Vehicle is one of main contributors to PM10 pollution in urban air. The objective of this study is to improve accuracy and precision in determining of PGE(platinum group element) for airborne PM10, which can be a useful indicator for vehicle pollution sources. Thus, we developed an analytical standard method of PGE, which exists at sub-ppb level in background environment, using CCT-ICP-MS, and validated the method by testing its precision, accuracy, and uncertainty for establishing a standard operating procedure. In addition, the PM-bound concentration of PGE, metal elements, and ions at roadside were determined by CCT-ICP-MS and IC. Certified reference material (NIST SRM 2557) was used for the method validation purpose of metal analysis by CCT-ICP-MS. It was found that relative biases of Pt and Rh (against SRM values) fell below 10%. Repetitive analyzes of a given element yielded the relative standard deviations below 10% for all cases. For airborne PGE, the concentrations of Pt, Pd, and Rh in PM10 averaged as 4.20 \pm 2.88, 32.6 \pm 38.0, and 4.63 \pm 3.35 pgm⁻³, respectively. Thus, one may conclude that the distributions of PGE concentration were strongly affected by automobile sources. The results of factor analysis further indicated that there are five factors with statistical significance, which appeared to play roles in regulating the elemental concentration levels in the study area. Five factors that consist of soil dust, vehicle exhaust, road dust, secondary aerosol, and fossil fuel combustion can cover as much as 88.7% of total variance. The road dust source is judged to be road dust (from payed or non-payed roads) which was resuspended by mobile transportation; this resolved factor was represented by marker elements such as Pt, Rh, Ba, Cl, Fe, In, Mn, and Na. This result indicates the capability of PGE as an indicator to vehicle pollution sources.

OPTIMIZATION OF SOLID PHASE MICRO-EXTRACTION METHOD FOR THE ANALYSIS OF PAHS IN RAINWATER

İsmail Anıl^{1, 3}, Naciye Öztürk², Ömer AĞA^{3, 4}, Gaye Özdemir¹, and Pınar Ergenekon¹

¹Muallimköy, Gebze, Kocaeli, 41400, Turkey / Environmental Eng. Dept. / Gebze Institute of Technology
²Muallimköy, Gebze, Kocaeli, 41400, Turkey / Chemistry Dept. / Gebze Institute of Technology
³Büyükçekmece, İstanbul, 34500, Turkey / Environmental Eng. Dept. / FatihUniversity

⁴Dammam, 31451, Saudi Arabia / Environmental Eng. Dept. / University of Dammam

Polycyclic aromatic hydrocarbons (PAHs) are immanent semivolatile organic pollutants (SVOC) and their major sources are residential heating, coke production, incineration and combustion of fossil fuels. Monitoring and investigation of 16 high priority PAHs has become very significant public health concern due to the fact that their carcinogenic and mutagenic health impacts have been verified by many researches. This study aims to develop a robust SPME method to assess 16 PAHs in rainwater using Taguchi experimental design method. Five control factors, including sample temperature, extraction time, stirring rate, salt concentration, and sample pH in three levels were considered in Taguchi technique. The selection of Taguchi L27 orthogonal array drastically decreased the number of experiments with respect to full factorial experimental design. Analysis of variance (ANOVA) was used to determine the optimum conditions and most important SPME parameters affecting the response characteristics. Analysis of the experiments using Taguchi method indicated that extraction time has the highest contribution in the extraction efficiency of PAHs by SPME technique. Based on the primary results, optimum levels of the significant parameters will be determined and a verification test will be performed to check the optimum conditions. In the final step of this study, the newly developed SPME-GC-MS method will be used for the analysis of PAHs in rainwater samples.

Keywords: Solid-phase micro-extraction (SPME), polycyclic aromatic hydrocarbons (PAHs), Taguchi design, gas chromatography-mass spectrometry (GC-MS), rainwater.

EVALUATION OF THE UM-CMAQ MODELLING SYSTEM FOR URBAN AIR QUALITY

Elizabeth Somervell

The forecasting model of the U.K. Meteorological Office (UKMO), known as the Unified Model (UM) has been developed to support a wide variety of global and mesoscale applications and increased resolution now allows the exploration of issues on smaller scales. Urban air quality is one such application that requires valid high resolution meteorological input and can benefit from a multi-scale approach. With this in mind, the UM has, for the first time, been coupled to a chemistry transport model (CMAQ) in order to simulate a high pollution episode over the London area. The offline coupling is enabled by the newly developed UM-MCIP meteorological pre-processor, based on the Meteorology-Models 3 Chemistry Interface Processor (MCIP) for CMAQ.

The system has been used to simulate a summer period in August 2003, when extreme high temperatures and ozone concentrations were experienced over Western Europe, including the UK. Comparisons are made with ground based measurements for meteorological factors (surface temperature and wind speed) and air pollutant concentrations (ozone, NOx).

A detailed analysis of the UM temperature and windspeed fields is presented in relation to the urban surface and diurnal cycle. This indicates improvements might be made to the UM surface scheme in order to better simulate meteorological processes that affect air quality in urban areas. Of particular interest are the early hours of the morning, when the urban surface is under-going a critical cooling, and areas downwind of the urban centre.

A sensitivity analysis of the surface exchange scheme, concentrating on the effects of modifying the values used in the urban parametrisation is also presented, illustrating the influence of the urban surface on both urban and rural meteorology and air quality.

GREENHOUSE GAS EMISSIONS FROM A LANDFILL

Halil Arı

Harran University, Dept. of Environmental Engineering, Osmanbey Kampüsü, Sanliurfa, Turkey

An average of 855 tons of solid waste is being disposed in Sanliurfa everyday without being subjected to a recycling process. Currently, the Sanliurfa Municipality stores the solid waste 7 km in the southeast of Sanliurfa, in the Ikizce village in the west of the Sanliurfa-Akcakale road controlled by Sanliurfa Municipality. In this study, the daily analyses of the greenhouse gases CH₄, CO₂, and N₂O will be made of the simulation of present situation in a laboratory scale. There are three different type of cover material used in this simulation. Also; the meteorological data will be followed during the course of the analyses. In light of these analyses, the gas amounts will be recorded with the closed chamber method daily. Average greenhouse gas emissions of CH₄, CO₂, and N₂O without cover were measured as 1.4 ± 0.1 μ g/m²/hr, 325.8 ± 249.7 μ g/m²/hr, and 2.3 ± 2.0 μ g/m²/hr, respectively.

Keywords: greenhouse gas emissions, CH₄ emission, CO₂ emission, N₂O.

ASSOCIATION OF OZONE WITH NO₂, BTEX AND METEOROLOGICAL PARAMETERS

Özlem Özden, Ethem Cem Keskin, Tuncay Döğeroğlu

Environmental Engineering Department, Faculty of Engineering & Architecture, Anadolu University, İki Eylül Campus, 26555 Eskişehir, Turkey

Tropospheric air pollution has important impacts on scales ranging from local to global. In urban atmospheres, one of the major problems originating from air pollution is the pollution caused by the photochemical oxidants such as ozone (O_3). Tropospheric ozone is formed by a series of complex photochemical reactions among nitrogen oxides (NO_x) and volatile organic compounds (VOCs) in the presence of heat and sunlight. So, decrease of ozone can be obtained by controlling its precursors which are NO_x and VOCs. The relationship between ozone, NO_x and VOCs is complex, nonlinear and also controlling factors of this process is important for understanding regional photochemistry and for application of control strategies.

Ozone concentrations are also affected by meteorological parameters in many ways. Many studies have shown that ozone concentrations increase with increase in the intensity of radiation and temperature.

In this study, association of ozone with NO₂, BTEX and some meteorological parameters were investigated in Eskişehir, Turkey. For this purpose, daily simultaneous measurements were carried out by using passive sampling method. Sampling studies started in the beginning of January 2011 and have been going on. Because the main source of ozone precursors is traffic, two sampling sites were selected in a way to have different traffic densities in accordance with the results of an emission inventory study carried out for the city. One of the sampling sites (S1) is located on a street with the traffic density of approximately 12,000 vehicles per day and the other site (S2) is located in the university campus in the north of the city that is nearly 8 km far away from the city center. S2 is not located directly on a road but it is close to the car park of a faculty.

The results of this study showed that ozone formation was influenced by both NO₂ and BTEX concentrations. There was an inverse relationship between ozone and NO₂ and also ozone and BTEX. In S1, higher NO₂ and BTEX levels were determined due to the higher traffic density while the ozone concentrations were lower compared to S2. In S1, daily ozone and NO₂ concentrations varied between 40-86 μ g/m³ and 40-98 μ g/m³, respectively while daily concentrations varied between 55-90 μ g/m³ for ozone and 11-49 μ g/m³ for NO₂ in S2. In both sampling sites, the most dominant VOC among the BTEX was toluene with the highest concentration of 5.50 μ g/m³ in S1. In S2, the highest toluene concentration was obtained as 4.00 μ g/m³. velocity and humidity were obtained from the meteorology station located in S2. So, the investigation of the relationship between pollutant concentrations and meteorology was carried out only in this sampling site. The most influencing meteorological parameters for ozone formation were solar radiation and ambient temperature. During the days with higher temperature and more intense solar radiation, ozone concentrations reached to higher levels.

To be able to describe the association between ozone and its precursors and also meteorology in detail, this ongoing research is proceeding toward collecting more data by considering spatial and temporal variations.

Keywords: Ozone, NO₂, BTEX, passive sampling, meteorology

MERCURY SPECIATION IN ON-LINE MONITORING OF AIR QUALITY – THE PRELIMINARY RESULTS OF MEASUREMENTS IN ZABRZE, SOUTHERN POLAND

Halina Pyta¹, Marek Pawlowski²

¹Institute of Environmental Engineering of the Polish Academy of Sciences, ul. Sklodowskiej-Curie 34, 41-819 Zabrze, Poland ²TSI Sp. z o.o., ul. Maronia 44, 41-506 Chorzow, Poland

The study presents the initial results of the measurements of atmospheric mercury speciation (Hg⁰, Hg²⁺ and particle mercury Hg_p bound with PM2.5) in Zabrze obtained in winter season 2010/2011. Zabrze is a city (190,000 inhabitants) within Upper Silesia Agglomeration, the most urbanised and industrialized part of Poland. Ambient air was sampled from the roof of the two-story building of Institute of Environmental Engineering of the Polish Academy of Sciences (residential area). The measurements were performed using a Tekran 2537B mercury analyzer together with a 1130 Speciation Unit and a 1135 Hg_p Unit. Hg²⁺ is captured in the unit 1130 (KCl-coated denuder), while Hg_p is trapped onto a regenerable filter inside the module 1135. Hg^0 remaining in the air stream is then directed into the 2537B mercury analyzer and detected using cold vapour atomic fluorescence spectrometry. The concentration of Hg⁰ (5-minutes data) was from 1 to 22 ng m⁻³, with 3.2 ng m⁻ ³ as a mean value. Hg²⁺ concentration (1-hour data) varied from 0.7 to 700 pg m^{-3} , at arithmetic mean of 31 pg m^{-3} . The concentration of Hg_p (1-hour data) ranged from about 6 pg m⁻³ to 1.6 ng m⁻³, on average 90 pg m⁻³. While the concentration of Hg⁰ did not diverge generally from the levels observed in urban areas of Western Europe and Northern America, the concentrations of two remaining Hg forms, mainly emitted from hard coal combustion, were higher.

Keywords: air pollution, mercury speciation, urban background.

DETERMINATION OF ORGANOCHLORINE PESTICIDES CONCENTRATIONS IN DEPOSITION SAMPLES COLLECTED SEQUENTIALLY

Hatice Karadeniz¹, İlker Köprü¹, Serpil Yenisoy- Karakaş¹, Duran Karakaş²

¹Department of Chemistry, Faculty of Art and Science, Abant Izzet Baysal University, 14280 Gölköy/ BOLU

²Department of Environmental Engineering, Faculty of Enginering and Architecture Abant Izzet Baysal University, 14280, Gölköy/BOLU

In this study, organochlorine pesticides were determined in rain water samples by the using a sequential rain sampler placed on the roof of the presindency building of Abant Izzet Baysal University. Sampling period was ranged from April 2010 to January 2011. Solid Phase Extraction method was applied for extraction, preconcentration and clean-up. Gas Chromatography – Electron Capture Detector (GC-ECD) was used for the determination of OCP concentrations. In method validation studies, the standard containing 16 kinds of OCPs was used and the recovery results were found in the range of 56% and 118%. The most observed organochlorine pesticides were HCH isomers in the samples. The highest values were belonged to the alpha-HCH, delta-HCH and endrin, respectively. Endosulfan I was the least observed pesticides. The banned pesticides DDT's isomers were also observed in some of the rain samples. Methoxychlor was below the limit of detection. The lowest observed value was belonged to the dieldrin (1.66 ng m⁻²).

Keywords: organochlorine pesticide, solid phase extraction, GC-ECD, rain water, sequential collection

COULD MYCOTOXINS IN THE AIR BE A PUBLIC HEALTH PROBLEM IN PORTUGAL?

Carla Viegas¹, Cristina Veríssimo², Raquel Sabino², Marina Almeida-Silva³, Susana Viegas¹

¹Nations Park, Lisbon/ ESTeSL / IPL ²Lumiar, Lisbon/ Mycology Laboratory / INSA ³Instituto Tecnológico e Nuclear, Estrada Nacional 10, Sacavém, Portugal

Descriptive studies were developed to monitor air fungal contamination in different Portuguese settings to identify fungal species able to produce important mycotoxins. The selected settings were 10 gymnasiums with swimming pools, two elementary schools, one haematological unit, one maternity, 10 hospitals food units, two companies' food units and one poultry. Air samples were collected through impaction method and also swab samples that were collected using a 10 by 10 cm square stencil. Air and surfaces of six different types of settings were analyzed in order to detect fungal species potential producers of mycotoxins. Concerning gymnasiums with swimming pools, the two most commonly isolated filamentous fungi in air were *Cladosporium* sp. (36.6%) and *Penicillium* sp. (19.0%). Regarding elementary schools, only air was sampled and the two most commonly isolated were *Cladosporium* sp. (52.2%) and *Penicillium* sp. (27.5%). When analyzing the hospital hematological ward, *Penicillium* sp. (44.6%) and Aspergillus sp.(28,2%) were the most frequent fungal genus found. Concerning maternity and hospitals food units the two most commonly isolated genus were *Penicillium* sp. (41.5% - 43.6%) and *Cladosporium* sp. (28.4% - 23.2%). Regarding two food companies, *Cladosporium* sp. was the most frequent genus (71.2%) followed by *Penicillium* sp. (13.0%). In poultry case, Cladosporium sp. (40.5%) and Alternaria sp. (10.8%) were the most frequent isolated. Nevertheless, in all the analyzed settings Aspergillus sp. were isolated in air. Concerning the sampled surfaces, *Penicillium* sp. was the most frequent isolated genus in almost all settings, with an exception to gimnasiums and swimming pools where Fusarium sp. was the most frequent genus detected.

Keywords: Fungi, air, surfaces, mycotoxins, fungal contamination, Aspergillus.

EFFECT OF SO₂ CONCENTRATION AT THE FLUE GAS DESULPHURIZATION WITH CALCINED PHOSPHATE ROCK

Jale Naktiyok¹, Hatice Bayrakçeken¹, A.Kadir Özer¹, M.Şahin Gülaboğlu¹

¹ Department of Chemical Engineering, Atatürk University, 25240 Erzurum, Turkey

Fully calcined samples were sulphated by using a synthetic flue gas composition containing 0.1-0.6% SO₂, 4% O₂, 15% CO₂ and the rest being N₂ in fluidized bed. An increase in the SO₂ concentration caused a clear increase in the sulfation rate. It can be seen that the sulfation conversion is rapid in the initial period at all concentrations of SO₂ but slows down after 4 min. BET surface area and mercury porosimeter analysis were used to see the changes in pore structure and surface area of the sulphated phosphate samples. The specific surface area of sulfated samples decreased with the increasing SO₂ concentrations. It was plugged the pore mouths with SO₂. The majority of pores have the larger diameters, when the rock is calcined. But the pore size declined with the increasing of the sulfation time.

Keywords: Phosphate rock, Calcination, Desulfurization, Effect of SO₂

Science highlights from the Cape Verde Atmospheric Observatory (CVAO)

Read, K.A.^a, Lee, J.D.^a, Carpenter, L.J.^b, Lewis, A.C.^a, Moller, S.J.^b, Neves, L.M.^c, Fleming Z.F.^d, Evans, M.J.^e

 ^a National Centre for Atmospheric Science (NCAS), Department of Chemistry, University of York, York, UK, YO10 5DD
 ^b University of York, UK; ^c INMG, Mindelo, Cape Verde; ^d University of Leicester, UK; ^e

University of Leeds, UK

Into its fifth year the global GAW international monitoring facility in Cape Verde is now well established. Measurements of the trace gases O_3 , CO, NO_{xy} and VOCs continue to be made regularly and will be presented here. Other data from the CVAO, for example of greenhouse gases, aerosol (physical and chemical parameters), halocarbons, halogen oxides, are also available over various timescales (see http://ncasweb.leeds.ac.uk/capeverde/ for more details). Through the newly EU funded Global Mercury Observation System (GMOS) project, atmospheric measurements of mercury will be started this year. The observatory has hosted a number of field campaigns including RHaMBLe in 2007 which focused on halogen chemistry and SOS in 2009 which looked at how the oxidation chemistry varied seasonally. The CVAO continues to be scientifically relevant and an appealing location for both short and long term atmospheric research.

Ozone depletion is observed almost every day in this region, and this is due to low NO concentrations and a low but significant presence of halogen oxides such as BrO and IO(< 2.5 and 1.5 pptv respectively). Generally NO levels continue to be low (typical 11:00 – 15:00 average < 10pptv) but days with higher NO_x are observed more often in 2008 and 2009 than in previously published data. Box model simulations predict (even with the contribution of halogen oxides), that the transition from O₃ destruction to production may occur at NO mixing ratios as low as 17 pptv at certain times of year. Net O₃ production is still rarely seen (although more often during the periods of higher NO_x) but finding the sources responsible for the periods of higher NO_x is important to understand the durability of the O₃ destroying regime. Comparison of measurements with the output of the GEOS-CHEM global chemistry transport model show good agreement for O₃, but much more varied agreement with NO and NO₂. Possible reasons for this apparent discrepancy are discussed.

Comparisons of the seasonal cycles of various NMHC, and OVOC with CO indicate that although primary continental sources contribute to the concentrations in this region, the impact of secondary chemistry on the remote tropical marine environment is thought to be highly significant both in terms of year-round OVOC production and in the production of CO during summer. This may not be fully understood in global models such as that of
GEOSCHEM because of previously sparse measurements of VOC in the remote marine environment.

Aged air masses from North America, Europe, and Africa influence the measurements at the observatory, but fresh emissions from coastal Africa and the ocean may also play a major role. Through the use of the UK Met office's NAME model (http://www.metoffice.gov.uk/research/modelling-systems/dispersion-model) it has recently been possible to classify the air received by the site and this has since been employed in further interpretation of the datasets. Ongoing analysis of the trace gases using these classifications will also be presented here including the potential influence of dust on NO_{xy} levels and the impact of different air masses on the primary and secondary sources of OVOC such as acetone and methanol.

BIOMONITORING WITH TRADESCANTA PALLIDA USED AS COMPLEMENTARY TOOL TO THE SURVEILLANCE PROGRAM IN ENVIRONMENTAL HEALTH-RELATED AIR QUALITY IN AREA WITH BIOMASS BURNING AT BRAZIL

Wagner Luiz Peres^{1, 5}, Cláudia Lúcia Pinto^{2, 5}, Poliana Cristina Alves da Silva^{3, 5}, Rodrigo Pereira de Souza^{3, 5}, Felipe Duarte Coelho de Sousa^{4, 5}, Oberdan Ferreira Coutinho Lira^{1, 5}, Paulo Hilário do Nascimento Saldiva^{4, 5}, Regiani Carvalho de Oliveira^{4, 5}

^{1.}Secretaria de Estado de Saúde de Mato Grosso - SES/MT; ^{2.}Universidade do Estado de Mato Grosso – UNEMAT/MT, ^{3.}Universidade de Cuiabá – UNIC; ^{4.}National Institute for Integrated Analysis of Environmental Risk (INAIRA), Brazil; ^{5.}Experimental Air Pollution Laboratory, Department of Pathology, Sao Paulo University Medical School, Sao Paulo Brazil.

Introduction: In Mirassol D'Oeste, city located in central-western of Brazil, the biomonitoring with *Tradescantia pallida (Rose)* Hunt var. *purpurea* is a complementary tool to the Surveillance Program in Environmental Health-related Air Quality - (VIGIAR/MS). This region is characterized by the biomass burning. In winter, in a natural event of this biome, occurs the burning of the vegetation of cerrado. During the period between the months of April to November sugar-cane plantations are burned, for harvesting and for processing of ethanol and sugar.

Objective: The aim of this study was apply alternative approaches to identifying and defining the participation of the pollution sources, estimating the risk to human health.

Methods: The study was conducted at April 2009 to December 2010 in five sites in Mirassol D'Oeste, and one in rural area. The genotoxicity effects was tested monthly performed the bioassay of micronuclei in *Tradescantia pallida* (Trad-MCN).The bioaccumulation of air pollution-related elements was determined in *Tradescantia pallida* leaves using energy dispersive X-ray fluorescence (EDXRF) spectrometry at two moments, March of 2010 and July of 2010. Total daily records of respiratory diseases hospital admissions (ICD 10 – Capítulo J: J00 a J99) were obtained from Health Information System Governmental Agency of Mato Grosso State.

Results: Trad-MCN values of biomass burning period were higher than values of the period non-burning for all monitoring sites. Similarly, respiratory diseases hospital admissions varied substantially between the two periods, biomass burning and non-burning with observation on increasing of number of records in the age groups 0-4 years old and > 65 years old, mainly during April-September (period of biomass burning). EDXRF results demonstrate

that Mirassol D'Oeste show different characteristics of bioaccumulation of elements that correlate with adverse health effects, as found for Iron, Aluminum, Zinc and Sulfur. Increases in Trad-MCN and in hospital admissions for respiratory diseases in biomass burning demonstrate that the burning of biomass, as of the sugar cane plantation, results in negative impact in health of population at Mirassol D'Oeste. It was concluded by the results that monitoring with Tradescantia pallida proved to be effective as complementary tool at Surveillance Program in Environmental Healthrelated to Air Quality-VIGIAR/MS.

Keywords: biomonitoring, Air Quality, Tradescantia pallida

This work was made possible by the financial support of CNPq (National Council for Scientific and Technological Development), FAPESP (Research Support Foundation of São Paulo) and SES / State Secretariat of Health of Mato Grosso.

SECTORAL VARIATION IN THE CONCENTRATION OF BTEX AT DIFFERENT SELECTED SITES IN DELHI

Pallavi Saxena* and Chirashree Ghosh

Environmental Pollution Laboratory, Department of Environmental Biology, University of Delhi, Delhi-110007, India

In a city like Delhi the problem of air pollution is due to increase in vehicle number, industrialization, not setting-up the proper norms for some important pollutants like VOCs especially BTEX and still some buses and public transport vehicles have not been converted into natural gas. Moreover, permissible limits are set for almost all primary and secondary pollutants but among VOCs only benzene has got the threshold value set-up by National Ambient Air Quality Standards (NAAOS), Central Pollution Control Board (CPCB), India. Therefore, after taking these points into consideration, our present has set the objectives as, to monitor and understand the atmospheric chemistry of BTEX at two different sectors in Delhi viz. traffic intersection sector (at emission source with less vegetation) and residential sector (away from emission source with dense vegetation) during winter season (Nov-Feb'11) and also the analyze among BTEX, which compound was highly responsible for the production of tropospheric ozone pollution by taking MIR scale as a parameter. The results however, do not indicate an all round improvement in ambient air quality in Delhi and showed highest concentration of BTEX at traffic intersection sector as emission and idling of vehicles increase the concentration of BTEX than at residential sector due to very less traffic volume. The study ends up with suggesting that government should take immediate action to control the concentration of these pollutants in Delhi city as high traffic volume is highly responsible for the production of these type of pollutants.

Keywords: BTEX, emission source, vegetation, MIR and Delhi

ELEMENTAL CHARACTERIZATION OF PM_{2.5} IN THE DENSE TRAFFIC AREA IN ISTANBUL

Burcu ONAT¹, Ülkü ALVER ŞAHİN¹, Tanıl AKYÜZ²

¹ Department of Environmental Engineering, Istanbul University, Istanbul 34320, Turkey ² Department of Physics, Istanbul Kultur University, İstanbul 34156, Turkey

An aerosol monitoring study was established to measure fine particulate matter ($PM_{2.5}$) concentration and composition in the urban area of Istanbul, the most populated city in the north-west of Turkey. The sampling station was located near the D-100 highway. The PARTISOL particulate matter sampler was used during the campaign and operated from 24 April 2009 to 24 May 2009. The glass fiber filters were weighed before and after sampling to obtain mass concentration, then X-ray fluorescence analysis were used to measure the concentration of 23 elements (Na, Mg, Al, Si, P, S, Cl, K, Ca, Ti, V, Cr, Mn, Fe, Co, Cu, Zn, As, Rb, Sr, Y, Mo, Ba). PM_{2.5} concentration ranges were between 23.8 μ g/m³and 81.5 μ g/m³. As a result of the principal components analysis (PCA), PM_{2.5} metal emission was dominated by anthropogenic sources significantly, as expressed by high factor loadings in S, Cr, Zn, Cu and K. Crustal elements was likely related to first component (high loadings in Mg, Al, Ba and Si). Factor 1 is possibly associated with re-suspended of road dust and exhaust emission.

*Keywords: PM*_{2.5}, *XRF*, *Heavy metals*, *traffic*

BIOMONITORING OF TRACE ELEMENTS IN ASUNCION PARAGUAY BY TILLANDSIAS AND XRF TECHNIQUES

F.A.Doncel¹; Z.Villanueva¹.; Riquelme¹.; Insaurralde A²

¹Comisión Nacional de Energía Atómica-DGICyT-UNA, Postal Address 3023; ²Instituto en Investigaciones en Ciencias de la Salud-IICS

In the present work we show the results of a study of the distribution of heavy metals in the area of Asuncion city in Paraguay, using species of biomonitors, such as Tillandsia recurvata spp, and analyzed by energy dispersive x-ray fluorescence EDFRX. Statistical analysis was performed using the SPSS software. Through the analysis of factors, cluster analysis and calculations of enrichment factors were identified potential sources of contamination

Keywords: biomonitors, tillandsia

DETERMINATION OF UPTAKE RATES FOR BTEX COMPOUNDS DURING PASSIVE SAMPLING ONTO SORBENT TUBES

Arslan SARAL, Selami DEMİR

Yildiz Technical University, Department of Environmental Engineering. YTU Davutpasa Campus, 34220, Esenler Istanbul Turkey.

Benzene, toluene, ethylbenzene and xylenes are the most abundant species of all ambient ozone precursor volatiles. Therefore, monitoring of these ambient species is an important task to all air pollutant engineers. Any monitoring campaign for BTEX compounds involves two stages as sampling and measurement. Measurement stage is accomplished via gas chromatographic techniques, however, there are a number of methods for the sampling of BTEX compounds from ambient air. These techniques are classified under two main title as active and passive sampling. Active sampling may be accomplished by focusing these volatilese onto sorbent tubes or pressurized canisters. Both methods are compatible with gas chromatographic measurement, and ambient air was forced into the canister or through the sorbent tube by means of an air pump. In passive sampling, a sorbent tube is employed to collect ambient volatiles. The difference from the active method is that no air pumps are required. The volatiles are allowed to diffuse through the sorbent tube, and are adsorbed onto the sorbent in the tube for subsequent desorption and quantification. Since no pumps are involved in the method, a new methodology is required to correlate the collected amount of analytes in the tube with the ambient concentration. One way to do so is the use of compound-specific uptake rates. With these uptake rates, it is possible to find a satisfying correlation between the ambient concentrations and volatile amounts collected onto the sorbent material. In fact, the uptake rates for each specific compound changes depending on the ambient concentration, temperature, relative humidity and even the saturation level of the sorbent material. In this study, the authors will investigate the rates of uptake for BTEX compounds by collecting simulatenous samples via both active and passive sampling procedures under differing environmental conditions and different sampling periods. The amounts collected in active and passive samples will be compared to extract uptake rates for BTEX compounds. The results of this study will provide a foundation for future monitoring studies.

MEASUREMENTS OF THE LIGHT SCATTERING PROPERTIES OF BLACK CARBON AND GRAPHITE PARTICLES BY USING A DETECTOR ARRAY INCORPORATED LIGHT SCATTERING SETUP

Ankur Gogoi, Amarjyoti Choudhury and Gazi Ameen Ahmed

Optoelectronics and Photonics Laboratory, Department of Physics Tezpur University, Tezpur – 784028, Assam, India

The light scattering behavior of ultrafine black carbon (BC) and graphite particles is a subject of intensive research at the present time because of their high relevance in the fields of air quality monitoring, climate modeling, remote atmospheric sensing (lidar), interstellar extinction and other astrophysical issues such as the exploration and characterization of different planetary atmospheres. Graphite is one of the major constituents of cometary dust, asteroidal surfaces and interplanetary dust clouds. Black carbon (BC) particles are generated due to fuel combustion (soot, diesel exhaust particles), in forest, grass, or other types of fires and normally found as an aerosol in the lower part of Earth's atmosphere. The light scattering properties of such spherical, nonspherical or aggregated particles depends on the angle between the incident wave, size, shape, optical properties of particles (refractive index, permittivity, absorption), particle orientation, the incident wavelength, polarization of the incident and scattered waves, density, structure of aggregates (fluffy, fractal, dense, etc.), and quality of particle surfaces (roughness, buffing, etc.). It is very important to study the angular scattering dependency of black carbon and graphite particles as such results help for better understanding of radiation transfer through a medium containing the scatterers.

In this contribution we report the measurement of optical scattering properties (phase function and degree of linear polarization) of ultra-fine graphite and carbon black particles at 543.5 nm, 594.5 nm and 632.8 nm laser wavelengths by using a light scattering setup. The particles were sprayed into the laser beam by using an indigenously developed aerosol nebulizer. The setup incorporates an array of sixteen highly sensitive static Si detectors that measured scattered light signals from 10° to 170° in steps of 1°. The calibration of the experimental setup was done by conducting experiments on perfectly spherical polystyrene particles and comparing the experimental data with Mie calculations. The whole experimental results were compared with theoretically generated T-matrix plots for graphite and carbon black particles of same shape and size to yield more fruitful conclusions. Significant variation of the light scattering behavior of both the samples was observed for the three different incident laser wavelengths.

DETERMINATION OF PAHS IN RAIN WATER

İlker Köprü^a, Duran Karakaş^b, Serpil Yenisoy-Karakaş^a

^aUniversity of Abant Izzet Baysa, I Faculty of Science, Department of Chemistry ^bUniversity of Abant Izzet Baysal, Faculty of Architecture and Engineering, Department of Environmental Engineering

Polycyclic aromatic hydrocarbons (PAHs) were identified to be one of the major toxic air pollutants in atmosphere. They contain two to eight benzene rings that are mainly derived from the incomplete combustion of fossil fuels and wood and volatilization of unburned petroleum. Forest fires and volcanoes also contribute to the PAH burden, but by far, anthropogenic sources are responsible for the majority of the PAH input to the atmosphere. Due to their well-known carcinogenic and mutagenic properties, polycyclic aromatic hydrocarbons (PAHs) were widely studied regarding to their environmental effects.

Sequential samples of rain water were collected between April 2010 and January 2011 in Golkoy Campus of Abant Izzet Baysal University. Each sample bottle has 130 mL capacity. Sequential samples were collected by event base. They were extracted by using SPE system and they were analyzed with HPLC. Validation of method was performed for 16 compounds and the recovery values were varied between %62 (Fluorene) and %96 (Indeno(1,2,3,cd) pyrene).

It was seen that 2-4 rings PAH compounds were abundant. The highest average deposition flux was belong to Chrysene (2.00 μ g /m²) and the lowest one was obtained for Benzo(a)pyrene (0.0081 μ g / m²). The deposition flux values in winter were 2 to 6 times greater than that in summer.

ANALYSIS AND INTERPRETATION OF HEAVY METALS ATMOSPHERE CONCENTRATION OBTAINED BY NUCLEAR TECHNIQUES IN ALGIERS URBAN SITE

K.Baddari, M.Djeddi, Gh.Brahmi

Laboratory of Physics of the Earth, M'Hamed Bougara University of Boumerdes Algeria

The low part of the atmosphere, troposphere, is characterized by a strong human activity accompanied by a serious deterioration of the quality of air in this layer due to the rejection of pollutants.

Among these pollutants one finds heavy metals (Fe,Mg,Pb,Zn,Sc...) contained in the suspended matters. The nuclear techniques such as, the XRF (X-rays fluorescence) and the NAA (Neutron Analysis Activation) constitute effective tools to identify and quantify heavy metals in air. X-ray fluorescence (XRF) analysis is a fast, non-destructive and environmentally friendly analysis method with very high accuracy and reproducibility. All elements of the periodic table from beryllium to californium can be measured qualitatively and quantitatively by study of X rays response emitted by samples after irradiation.

In the NAA process, a nucleus absorbs a neutron. The nucleus becomes excited, and immediately releases a gamma ray and decays to a lower energy level, although it still is in an excited state. Then after a period of time (dependent on the nucleus) the excited nucleus emits and a gamma ray. Analysis of the spectrum of gamma rays emitted allows determination of the elemental composition of the air samples collected in high KASBAH.

Analysis of matrix correlation put in an obvious existing relation between different elements, and meteorological parameters.

Keywords: Heavy metals, X-rays fluorescence, Neutron activation, correlation.

GREENHOUSE GASES AND EMISSION INVENTORY

Sevda Ocak

Yuzuncu Yıl University Engineering-Architecture Faculty, Environmental Engineering Department, 65080, Van.

The greenhouse effect in a natural phenomen linked to the absorption of solar energy by the earth's atmosphere. Part of the long-wave infrared radiation emitted by the sun is not reflected back into space by the Earth's surface but is absorbed by greenhouse gases (GHGs) naturally occuring in the atmosphere. This radiation is transformed into heat, resulting in a stable average temperature of 15° C in the Earth's atmosphere. The current trend of climate change is warming the planet towards its highest temperatures in the last 1–40 million years. The Intergovernmental Panel on Climate Change (IPCC) projects a minimum temperature increase of 1.4° C and projected sea level increase of 0.2m by 2100 resulting from anthropogenic climate change.

The main contributors regarding GHGs are fossil fuels (such as oil, coal and natural gas) burning for electricity production and its utilisation in industry, deforestation, transportation systems, waste burning as well as evolved gases from sanitary landfill. In order to help overcoming these arising problems and to define the required reduction measures, it is necessary to perform emission inventories, not only at national level, but also on regional scales. Emission inventories are important for studying anthropogenic influence on the atmosphere. As well as providing input for numerical models and helping to interpret field observations, emission inventories also aid policymakers in designing mitigation strategies. Emission inventories such as EDGAR, IPCC-AR4 and RETRO have been used in global modelling studies. In this study, emission inventory researchs about GHGs will be reviewed both on regional and local scales.

Keywords: greenhouse gases, emission inventory, global heating.

HYDROGEN – THE FUTURE ENERGY SOURCE AND ITS ENVIRONMENTAL IMPACT

Violeta Niculescu, Mihai Anghel, Ioan Stefanescu

National Research and Development Institute for Cryogenics and Isotopic Technologies – ICIT, 4th Uzinei Street, 240050 Ramnicu Valcea, Romania

Today the world is facing three critical problems: (1) high fuel prices, (2) climatic changes, and (3) air pollution. Petroleum based fuels are wellestablished products that have served industry and consumers for more than one hundred years. For the foreseeable future automotive fuels will still be largely based on liquid biorenewables and gaseous biohydrogen. As the amount of available petroleum decreases, the need increases for alternate technologies to produce liquid biorenewables and gaseous biohydrogen fuels that could potentially help prolong the liquid fuels culture and mitigate the forthcoming effects of the shortage of transportation fuels. Environmental concerns have been raised in recent years dealing with greenhouse gases produced from the transportation industry. A contributing cause of these emissions is the combustion of fossil fuels such as diesel, gasoline and oil. Hydrogen is an important, though little studied, trace component of the atmosphere. It exists at the mixing ratio of about 510 ppb. Hydrogen is an indirect greenhouse gas with a global warming potential of 5.8 over a 100year time horizon. Hydrogen offers the prospect of plentiful supplies of clean transportation energy. Our study focuses on hydrogen production and distribution, on-board storage technology, refuelling, the environmental impact of hydrogen use, and life-cycle costs. The environmental impact analysis focuses on NO, emissions from vehicles, the environmental impact of making hydrogen from coal, and the contribution to the Greenhouse effect of CO2 emissions from the use of coal-based hydrogen.

Keywords: energy, environment, hydrogen.

BIOHYDROGEN – THE ENVIRONMENTALLY FRIENDLY ALTERNATIVE AUTOMOTIVE FUEL

Mihai Anghel, Violeta Niculescu, Ioan Stefanescu

National Research and Development Institute for Cryogenics and Isotopic Technologies – ICIT, 4th Uzinei Street, 240050 Ramnicu Valcea, Romania

At the start of the twenty-first century, we are facing significant energy challenges. The world's energy requirements are currently satisfied by fossil fuels, which serve as the primary energy source. Consequently, overwhelming scientific evidence concludes that this unfettered use of fossil fuels has caused the world's climate to change, with potentially disastrous effect. Hydrogen is seen as the energy carrier of the future. Biohydrogen is a replacement for fossil and biorenewable liquid fuels. Biomass conversion technologies are important for obtaining biofuels such as bioethanol, biodiesel, bio-oil, and biohydrogen. Biohydrogen is an environmentally friendly alternative automotive fuel that can be used in an internal combustion engine. Hydrogen can be produced from biorenewable feedstock via thermochemical conversion processes such as pyrolysis, gasification, steam gasification, steam reforming of bio-oils, and supercritical water gasification (SWG) of biomass. The hydrogen economy is a vision for a future in which hydrogen replaces fossil fuels. The transition to a hydrogen economy would require a huge investment in new infrastructure to produce, store and deliver hydrogen to end-users, to establish hydrogen stationary systems, as well as to develop and manufacture fuel cells. This study demonstrates that hydrogen can be produced economically from biomass. The pyrolysis-based technology, in particular, because its coproduct opportunities, has the most favourable economics.

Keywords: biohydrogen, biomass, environment, fuel.

LINKAGES AMONG GLOBALISATION, INDUSTRIALIZATION, AND CLIMATE CHANGE

Raza Mohsin

It is now clearly known that globalisation is something more than a purely economic phenomenon. It manifests itself in international movement of goods, people, financial capital, and information. In addition there are technological developments, changes in political landscape, international tourism, and ecological consequences facilitated by the free trade. While we have learned a great deal about the processes of globalisation, the research on the linkage between globalisation and climate change is only beginning to be explored. This study contributes in this area by linking industrialization with globalisation on the one hand and climate change on the other. The findings suggest that more globalised countries are those which are more industrialized. At the same, they are also the ones which affect the climate the most through industrial emissions. There are indications that while total global emissions are on the rise, industrial emissions of industrialized countries have decreased relative to past while those of industrializing countries increased. This study explores whether industrial emissions of industrialized countries have in fact decreased or it is due to possible migration of some industrial activity from the former to the latter group.

IMPACTS OF CLIMATE CHANCE AND ETHICAL SOCIAL ENVIRONMENTAL RESPONSIBILITIES IN TURKEY

Ali Raza Hassan

This research paper is divided into two parts first part of the paper considered the potential effects of climate variability and change on the population health in Turkey. Is the Climate of turkey having complex diseases? is our primary concern. Analysis of the association between climate variances and diseases patterns highlights current vulnerability to climate variability. Here I would like to explain current adaptations, including the application of climate predations to prevent the diseases. On the other hand present the potential economic costs associated with future impact due to climate change. Which kinds of tool are required for useful for development of appropriate and effective change in climate?

In the last paper will discuss the natural resources and the social responsibilities. Responsibilities are referring to accountability, as in being responsible for action taken. A deeper meaning of the responsibility to pursuits and achievement of the valued ends.

AN EVALUATION OF THE 2000S' AIR POLLUTION PANORAMA IN TERMS OF HEALTH IMPACTS AND COSTS IN SÃO PAULO, BRAZIL

Miraglia Simone Georges El Khouri¹, Rodrigues-Silva Fernando², Amato-Lourenço Luís Fernando², Saldiva Paulo Hilário Nascimento²

> ¹Universidade Federal de São Paulo, Diadema, Brazil ²Faculty of Medicine of University of São Paulo, São Paulo, Brazil

Environmental impacts are an important source of health expenses in developing countries. Costs associated to hospital admissions, medicines expenses and most significantly premature lives lost consist a major burden to urban societies. Environmental and health ministries have a challenge to establish policies in order to protect the population. In this sense, the priorities of actions for prevention and health management can be based on a time series evaluation of health burden and prejudice.

The evaluation of air pollution impacts in terms of health costs has been carried out, but the scenario performed for São Paulo was conducted for a short time period in the nineties. Pollution scenario has changed significantly and a larger data series became available, which could provide new and upto-date information for the decision makers evaluation.

In order to achieve a standard indicator, we applied the Disability-Adjusted Life Years (DALY) method to estimate the health burden and cost estimate due to air pollution in São Paulo, Brazil. This analysis comprehended the 2000's decade and considered male and female deaths due to respiratory and cardiovascular diseases in different age ranges. DALY attributable to air pollution in São Paulo added up to 154,880.56 years in the past decade, which converting to monetary terms resulted in US\$ 1,095,135,639.81 or US\$ 109,513,563.98 per year. Comparing to the first evaluation, the average annual cost increased in 8.4%. These results give a dimension of the value of the burden of diseases promoted by air pollution in São Paulo.

THE EFFECTS OF FINE (PM_{2.5}) AND ULTRA-FINE (PM_{1.0} & 0.1) PARTICULATES TOWARDS HUMAN HEALTH

Shamzani Affendy Mohd Din¹ and Frederick D. Pooley²

¹Department of Building Technology & Engineering, Kulliyyah of Architecture & Environmental Design, International Islamic University Malaysia

> ²Medical Microscopy Sciences School Of Medicine Cardiff University Wales, United Kingdom

Malaysia considered as one of the countries moving towards Vision 2020 aiming to become as one of developing countries concentrating as industrialise country in the world. Hence, air quality has been changing steadily as a result of the increase in world population. Many more human activities such as rapid development of rural and urban areas, with development of transportation, increased number of factories, and greater consumption of fossil fuel are the main sources of anthropogenic pollution. Many sources of natural pollution such as wind erosion, and natural forest fires have also been exacerbated by human activity. These natural sources have created pollution which consists of additional gases, particulates, and also vapours. An increase in airborne particulate material of an unnatural nature is one of the major atmospheric pollution problems facing the world. It has been the subject of many studies conducted in the UK since the smog tragedy of London in 1952. Researchers has developed a great interests in particulates with an emphasis being directed towards total suspended particulates (TSP), coarse particulates (PM_{10}) and now is concentrated on fine (PM_{2.5}) and ultra-fine particulates (PM_{1.0}& PM_{0.1}). In Malaysia, with the sources of man-made airborne particulates comes from material handling and industrial related process i.e. from combustion, manufacturing, industrial, chemical and agricultural operations has increased the generation of primary and secondary particulates. Most significant findings that fine particulates has been generated most from secondary particulates, abundance in the atmosphere and has increased tremendously by looking at perhaps the increased hospital admission cases recorded or unrecorded throughout the country. Health and environmental effects of airborne particulates materials are more closely linked to particle size rather than airborne mass concentration. Therefore, monitoring and characterizing such materials is of great importance in understanding their subsequent environmental impact especially towards human health.

Keywords:*Atmosphere, Airborne Particulates, Anthropogenic Sources, Fine* (*PM*_{2.5})& *Ultra-Fine Particulates* (*PM*_{1.0}& *PM*_{0.1}), *Human Health*

INDOOR RADON CONCENTRATION MEASUREMENT IN BASHIKA DISTRICT

A.K.Mheemeed, H.I.Hasan, Y.Y.Kasim

Department of Physics ,College of Education, University of Mosul Mosul, Iraq

In view of the fact that radon ²²²Rn and its daughter product are a major source of natural radiation exposure, the measurement of radon concentration in dwelling is assuming even increasing importance. It is known from recent surveys in many countries that radon and its progeny contributes significantly to total inhalation dose and its fairly established that radon when inhaled in large quantity causes lung disorder. Soil, building materials, natural gas and underground-derived water supply are considered the major sources of indoor radon and its daughter. In this work, the indoor radon concentration level and lung cancer risks have been measured in Bashika district during the summer season by using time integrated passive radon dosimeters containing CR-39 plastic track detectors. These measurements were carried out in the sitting-room(on the top about 2m above the floor) of ten dwelling for an exposure time of 60 day during 2007. The detectors were then collected and a chemical process of etching was applied to the films. At this stage, the tracks left by alpha particles on the films exposed to radon gas were visible and counted with a microscope (400x magnification) to estimate the corresponding indoor radon concentration. The radon concentration in these dwelling ranges from (18.32-54.87) Bq.m⁻³ with an average of 33.45 Bq.m⁻³, which lies below the acceptable radon levels (50-150) Bg.m⁻³ recommended by the International Commission on Radiological Protection (ICRP). The average absorption effective dose equivalent for a person living in homes for which the investigation were done was found to be 0.795 mSv.y⁻¹. In the recent report (ICRP), The recommended action levels of radon in dwelling should be act within a range of 3-10 mSv. On the basis of these ICRP recommendation it has been observed that all the dwelling monitored for indoor radon concentration show values below the action level. It is observed that the average lung cancer per year per 10⁶ person was found to be 14.31. The people who live in these dwelling are subject to a relatively low risk factor for radon induced lung cancer.

DETERMINATION OF N-NITROSAMINES, NICOTINE AND TOBACCO-SPECIFIC NITROSAMINES IN HOUSE DUST BY PRESSURISED LIQUID EXTRACTION AND COMPREHENSIVE GAS CHROMATOGRAPHY – NITROGEN CHEMILUMINESCENCE DETECTION

Mustafa Z. Özel¹, Noelia Ramírez², Jacqueline F. Hamilton¹, Rosa Maria Marcé², Francesc Borrull², Alastair C. Lewis³

 ¹ Department of Chemistry, University of York, York, YO10 5DD, UK
² Department of Analytical Chemistry and Organic Chemistry, Universitat Rovira i Virgili, Marcel·lí Domingo s/n, Sescelades Campus, Tarragona 43007, Spain
³ National Centre for Atmospheric Science, Department of Chemistry, University of York, York, YO10 5DD, UK

House dust is a heterogeneous complex matrix that contains a large number of toxic pollutants, such as metals, polycyclic aromatic hydrocarbons, polychlorinated biphenyls and endocrine-disrupting agents among other persistent pollutants. Several studies have identified house dust as an important route of toxicant exposure mainly by inhalation and through the skin. This exposure is of particular importance in younger children. Indeed the ingestion of house dust is estimated to be the major route of exposure to some persistent pollutants for infants and toddlers.

One of the most important sources of indoor pollution is tobacco smoke. Among the carcinogen compounds identified in tobacco smoke, tobaccospecific nitrosamines (TSNAs) are one of the most abundant. TSNAs, which are formed by nitrosation of nicotine during tobacco burning, are potent carcinogens that have been related to acute leukemia and lung cancer . Moreover, N- nitrosamines are genotoxic and carcinogenic compounds. The main route of human exposure is through ingestion of food or drinking water. Several works have focused on the determination of N-nitrosamines in different environmental matrices and TSNAs in tobacco and second hand smoke. However, there is not much information about the incidence of these pollutants in house dust.

The aim of this study is the development of an analytical method for the determination of TSNAs, nicotine and 9 N-nitrosamines in house dust based on pressurised liquid extraction (PLE) and comprehensive gas chromatography with a nitrogen chemiluminiscence detector system (GCxGC-NCD). The developed method showed good recoveries for the target compounds, high selectivity and sensitivity (limits of detection at pg g⁻¹).

The method was applied for the determination of the target compounds in house dust samples from smokers and non-smokers. All the target compounds were identified in the samples, the average concentration in smokers' house dust being 3-fold higher than in non-smokers' samples.

EVALUATION OF DUST CONCENTRATIONS IN AN IRANIAN PORTLAND CEMENT INDUSTRY

Rahimzadeh Soheila¹, Hazrati Sadegh²

¹Ardabil provincial health center, Ardabil University of Medical Sciences, Daneshgah St., Ardabil, Iran

² Department of environmental Health, School of Public Health, Ardabil University of Medical Sciences, Daneshgah St., Ardabil, Iran

Long term exposure to high levels of cement dust is one of the most important environmental risk factor in cement industries that adversely affect employees' respiratory system. Provided that achieving sustainable development mainly relies on healthy work forth, this study aimed at assessing cement dust concentration and its free SiO_2 content in an Iranian Portland Cement Industry.

In a cross sectional study, airborne dust levels was investigated by collecting 64 personal and 35 environmental samples at both inhalable and respirable dust sizes. Dust concentrations were determined by deploying personal samplers in the breathing zone of workers. SiO_2 fractions were also measured in 4 samples collected from different part of the factory.

Results: Arithmetic average concentrations of inhalable and respirable dust in personal sampling campaign were 58 and 13 mg m⁻³, respectively. Respective values for inhalable and respirable dust in environmental sampling campaign were 154 and 27 mg m⁻³. Dust concentrations in 90% of environmental samples and 80% of personal samples exceeded those occupational exposure limit values set for inert dusts i.e. Portland Cement. The average free SiO₂ fraction in analyzed samples was 2.86% varying from 2.33% in "packing and loading" area to 3.67% in "raw mill" section. Free SiO₂ fraction as well as the concentrations of cement dust in this study is much higher than those of occupational exposure limit proposed by Iranian Technical Committee of Occupational Health.

Keywords: Portland Cement, Free Silica, Dust, Air Pollution, Ardabil

CLEAN COOKSTOVE IMPROVES INDOOR AIR QUALITY AND REDUCES RISK OF CHILDHOOD RESPIRATORY DISEASES IN RURAL BANGLADESH

G H Rabbani, MD, PhD, Mohammad Alauddin, PhD, Atiqul Haque, MD, MPH

ICDDR,B: International Centre for Diarrhoeal Diseases Research, Dhaka 1000, Bangladesh. Department of Chemistry, Wagner College, Staten Island, New York. Department of Public Health and Informatics, Bangabandhu Sheikh Mujib Medical University, Dhaka 1000, Bangladesh.

Background: Indoor air pollution due to toxic emissions from burning of biomass during cooking is a recognized risk factor for childhood pneumonia and lower respiratory infections (ALRI). To reduce the hazards of toxic exposure we have developed an improved, smokeless cookstove and tested its health effects in children <5 years old.

Methods: In a community-based, cluster-randomized, prospective, controlled trial involving 439 children <5 years residing in households with (n=203) and without (n=236) an improved chimney stove, we determined 24 hour concentrations of particulate matter ($PM_{2.5}$) and carbon monoxide (CO) inside and outside the kitchen air and identified the numbers of children with pneumonia/ALRI for 10 months.

The improved stove is a brick and mud block (2x3 feet) at knee high level with 1 or 2 combustion chambers with separate front/side gates for loading firewood. The chambers are connected to a wide bore concrete chimney for escaping fumes. Models are designed for 1 or 2 cooking pots costing about Taka 1000 (US\$ 14.3) per unit. Households in the intervention area were provided with improved stoves while in control area traditional open fire stoves were used.

Results: An improvement in air quality and a significant reduction (mean±sd) of $PM_{2.5}$ and CO levels were observed during cooking in the cooking area (stove vs. control: $PM_{2.5}$, $\mu g/m^3$ 489±132 vs. 95±74, p<0.00) and non-cooking area (178±38 vs. 65±32, p<0.01) and non cooking periods: CO (30%-40%, p<0.05) and $PM_{2.5}$ (65%-85%, p<0.01). A decline in the incidence of probable pneumonia/ALRI cases among the intervention group (compared to controls) were observed (46.3% vs. 60.6%: odds ratio 1.78; 95% CI, 1.20-2.66, p<0.004). Numbers of confirmed pneumonia cases were low in the intervention group (11.8% vs. 18.2%; odds ratio 1.66; 95% CI, 0.94-2.45; p=0.08). Among children with stoves, significant (p<0.01) reductions were observed in the instances of cough (32% vs. 57%), difficult breathing (13% vs. 35%), running nose (43% vs. 65%), lethargy (4% vs. 8%), and numbers of clinic visits (16% vs. 30%). Respiratory, nasopharyngeal, and ocular symptoms in adult women (cooks) were also significantly (p<0.05) reduced

by the improved stove. Biofuel cost and cooking time using improved stoves were significantly less (29% and 34% respectively, p<0.05). Dry cattle dung was the most frequently used biofuel (78%) which emitted the highest concentrations of CO (28.9 ppm) and PM_{2.5} (806 μ g/m³) among others (crop residue, wood, charcoal etc). These are far above the reference values published by the USEPA.

VOCs measured in a few kitchens with improved stove had lower emissions $(322 \pm 40 \ \mu\text{g/m}^3)$ compared with traditional stoves $(4018 \pm 225 \ \mu\text{g/m}^3)$, more than 10 times reduction. The level of exposure for the household members correlated with the kitchen ventilation and type of biofuel used. The improved stoves were culturally acceptable, fuel efficient, and easy for self installation and maintenance.

Conclusions: The improved stove may be useful in reducing indoor air pollution and burden of respiratory illnesses in children and adult women exposed to hazardous emissions of biomass fuel during cooking.

THE MAIN INDICATORS FOR INDOOR AIR QUALITY IN NON-INDUSTRIAL OCCUPATIONAL ENVIRONMENT

Zanna Martinsone, Marite-Arija Bake, Dagmara Sprudza, Svetlana Lakisa, Anita Seile, Pavels Sudmalis, Jurijs Svedovs, Mairita Zellane

Dzirciema street 16, Riga, Latvia, LV 1007, Rigas Stradins University, Institute of Occupational Safety and Environmental Health, Laboratory of Hygiene and Occupational Health

The complex description of indoor air quality (IAQ) in non-occupational workplaces (microclimate, organic and non-organic pollutants, particles etc.) is new approach in Latvia. There are still many uncertainties of occupation risk factors and specific indicators, what must be examined, especially particles and volatile organic compounds, in non-industrial workplaces. The aim of study was to evaluate the indoor air quality in the non-industrial workplaces and make out the most important IAQ indicators in Latvia. The measurements were done in 24 premises/workplaces of 10 different nonindustrial enterprises (it is offices). The microclimate (air humidity, temperature, velocity), CO₂, NO₂, SO₂, O₃, particles' surface area and count, volatile organic compounds (VOC's), including aldehydes, were detected in selected premises during study. The results of study show that microclimate parameters such as air velocity is too low, but air temperature is near to highest acceptable limit the almost all cases. The CO_2 was measured in premises during work shift and most of them the level of CO₂ was detected higher as 1000 ppm. The SO₂ and NO₂ were detected in acceptable levels, but O_3 concentrations in all cases were higher as acceptable levels. The volatile organic compounds (VOC) in some cases were at high levels. The particles' surface area and count concentrations show that highest concentrations were in premises with high printing/copying process, also in enterprises location status (near the intensive traffic roads).

Keywords: indoor air quality, main indicators, non-industrial workplaces.

AIR POLLUTION FROM TAILINGS AND MASS TRANSPORT OF DEPOSITED AEROSOL IN MITROVICA AIR

Afrim Syla

University of Prishtina- Republic of Kosova

The present environmental situation in Mitrovica, put as in front of the responsibility to act more rationally towards nature and to be more responsible towards the protection of the environment for future generations. The protection lack of environment during the last ten years, as well as the conflict in Kosova os the origin of huge problems regarding present environmental situation in Mitrovica (Kosova). The city of Mitrovica, approcimately 40 km north of Prishtina, was the site of one the largest lead smelters in Europe. known as the Mitrovica Industrial Park), three concentrators (Leposavic, Tuneli i pare and Garcanica), and 8 mines. These facilities are located in this area south of Prishtina, also know as the southern chain the area in the vicinity of Mitrovica, the central chain, and the facilities in northern Kosovo The Trepca mining complex includes two refineries (the Zvecan lead smelter and the zink refinery, also or the northern chain.

The Tailing piles from the three concentrators (Leposavic, Tuneli I Pare and Gracanica) need to be further evaluated for stability, erosion, leaching of acid water, and reclamation. This must include the current channelization of tailings and water originating from the concentrators in order to prevent further deterioration of the tailings. As mentioned for the Tuneli i Parë concentrator, the tailings dams need to be evaluated for stability, erosion, leaching of acid water, and reclamation. This must include the current channelization of tailing and water originating from the concentrators in order to prevent further deterioration of the tailings. Deposition of windblown contaminated dust, resulting in secondary contamination of nearby soils, crops and residential property represents a potentially significant exposure pathway. The WHO Air Quality Guidelines (WHO, 2000) indicate that blood-lead levels begin to increase if the lead deposition rate is greater than $250\mu g/m^2$ -day. Dust deposition gauges were deployed to measure deposition at various location near potential wind erosion sources and in heavily populated areas. Wind erosion from tailings and other waste bodies, and traffic-generated fugitive dust from roadways can contribute to both direct inhalation and deposition exposure pathways. Wind erosion was assessed using USEPA emission factor analysis method for Industrial Wind Erosion

EXTERNAL COSTS OF ELECTRICITY GENERATION IN TURKEY

Aslı Fırat

University of Stuttgart, Energy Institute

The main objective of this paper is to calculate external costs of electricity generation in Turkey. For this purpose a database is formed which includes emissions caused by thermal power plants. Air pollutants and their impacts and damages in Turkey have been quantified with EcoSenseWeb computer tool. External costs caused by greenhouse gas emissions, biodiversity losses, local and regional damages have been calculated. When emission limits of regulations for fossil fuelled power plants are achieved in 2015, there will be a significant external cost reduction. For refurbishment of existing thermal power plants and for construction of new thermal power plants, there will be an investment. In the near future in order to supply increasing energy demand many investments will be managed. With this paper, environmental, social and economic aspects of thermal power plants can be realized. It is required to install new emission reduction systems and upgrade existing systems in order to comply with the regulations.

Keywords: external costs, electricity, Turkey, emissions, thermal power plants

SIMULATION OF CO EMISSIONS FROM PETROLEUM INDUSTRY IN IRAN

Majid Neyestani¹, Hasti Hasheminejad²

¹Department of Civil Engineering, Isfahan University of Technology, Isfahan, Iran ²Department of Civil Engineering, Isfahan University of Technology, Isfahan, Iran

Emission gases from stacks and types of dispersion of these gases always have been considered by scientists and researchers as a favorable topic. The main reason of this consideration is that these gases usually have harmful effects on human and environment. Several factors affect on dispersion including weather conditions, stack physical characteristics, gas emission velocity, emission rate etc. The aim of this paper is determination of maximum downwind ground level concentration of CO and the distance at which it occurs. A stack of coke and petroleum industry that is located in Salafchegan Special Economic Zone (QSSEZ) is selected for this simulation. These items are evaluated in two cases, first with building downwash effect and second with no building downwash effect. Comparison between two cases has interesting consequences. When the model is ran downwash phenomenon has made significant effect. It be concluded that it is not logical to calculation the optimum height even with considering downwash effect completely. Significant decrease in maximum downwind concentration as downwash effect is ignored this idea came to mind that it is possible to reduce this effect with physical instrument and design the optimum stack height with reduced effect. For this simulation screen3 software recommended by United States environmental protection agency has been used.

Keywords: Downwash, Stimulation, modeling, Screen3.

STUDENTS' AND PROSPECTIVE TEACHERS' UNDERSTANDINGS ABOUT AIR POLLUTION

Çetin Doğar¹, Ahmet Gürses², Metin Açikyildiz², Mehtap Ejder Korucu²

 ¹Erzincan University, Eğitim Fakültesi, Department of Science Education, 24030, Erzincan, TURKEY
²Atatürk University, K. K. Eğitim Fakültesi, Department of Chemistry Education, 25240, Erzurum, TURKEY

The aim of the study is to investigate both Turkish primary and secondary students' and science student-teachers' understanding of air pollution. We administrated to subjects a questionnaire related the air pollution. Data analysis was done by using both interpretive analysis and descriptive analysis. The results depicted that the students' successes are less than that of science student-teachers and have many misconceptions. In addition, there is a difference among the groups statistically (p<.05), especially about clean air and Greenhouse Effect. Furthermore, it was determined that there was a difference on the knowledge of acid rains in terms of gender. Many participants' anxieties were fixed to the health. It is suggested that both the all groups can be instructed in an appropriate learning environment using contemporary teaching methods in order to remedy their misconceptions about the air pollution. Non-Informal information sources such as the mass media can be effectively used in order to provide positive attitude towards air pollution.

Keywords: air pollution, science student teachers, students, misconceptions.

DEVELOPMENT IN KONYA AIR QUALITY CHANGE FOR LAST 20 YEARS

Fatma Kunt, Sükrü Dursun

Selcuk University, Engineering and Architecture Faculty, Environmental Engineering Department, 42003 Konya-Turkey

In recent years, environmental pollution problems have begun to gain importance as a result of growing industrialization and industrial development in parallel with the increase of urban population growth and unplanned urbanization. In our country, air pollution prevention is in important level especially increased using cheap coal with high sulphur contented but low-calorie with for the supply of heating energy in socioeconomic situation, also rapid increase in the number of motor vehicles and occurring during the effect of the bad meteorological conditions. In addition, a lot of industrial production of chemical substances by separation, evaporation and similar operations as a result of organic and inorganic toxic substances, including soot, dust, smoke particles, such as suspended solids, and carcinogenic compounds rise to cause air pollution giving through the atmosphere. Air pollution is one of the most important problems of modern life and it is the main source of combustion events. A small amount of the world's energy was produced from the hydraulic sources, and remaining portion of the energy was obtained from fossil fuels sources such as coal, oil, gas or nuclear power substances. Major air pollution events were occurred in the province of Konya in the past years. Air pollution has been up to very higher dimensions with undesirable meteorological factors especially the low level horizontal and vertical air movement during some days and/or hours. Especially during the winter months, visibility events have dropped a few meters with occurring air pollution conditions. Some measures to mitigate the air pollution have been taken by central and local government in the province of Konya as seen in many cities of Turkey. Every year, City Local Environment Committee (MCK) interviewed measures led to significant benefits for reducing air pollution in following year. First in Konya city, some studies were done about the fuel quality increase (low sulphur and highcalorie) and application. An important part of air pollution occurs form the use of fossil fuels for the combustion systems heating systems, so arrangement of starting time period of the heating system was provided with taking into account meteorological conditions. Arrival of natural gas to Konya Province has played a very important role for reducing air pollution in the last four or five years. In addition, reducing traffic lights in the city centre has been reduced the air pollutants from traffic origin.

Keywords: Konya, air pollution, sulphur dioxide, particulate matter, topography, traffic, fossil fuel, meteorology

SECONDARY PROCESSING OF MULTILAYERED FOOD PACKINGS AS THE WAY OFPROTECTION OF SURROUNDING ATMOSPHERE

Yu.A. Grigoriev¹, M.A. Meshchaninov², S.B. Strashnova³

¹Institute of Synthetic Polymeric Materials RAS, Moscow, Russia ²LLC «ORION» ³Peoples Friendship University of Russia, Moscow Russia

Multilayered food packings (MFP) for storage and transportation of liquid foodstuff are made all over the world in the quantity exceeding 150 billion pieces a year. As a rule the share of two-layer cardboard in them is 75-77 %, of low density polyethylene (LDPE) - about 20 % and of aluminium foil – up to 5 %. Recycling of such packings occurs usually by burning with allocation of a considerable quantity of carbonic gas. The plants of usual burning of MFP use a large quantity of atmospheric oxygen that harms to surrounding atmosphere at work. MFP secondary processing with the subsequent use of its products will allow not only to keep wood resources but also to preserve ecology in towns and cities. The plants separating paper-cardboard fractions by flotation with its secondary use are known. An additional metallic layer in MFP does not make these plants effective.

A new experimental plant mounted in the Moscow Region is based on oxygen-free pyrolysis of MFP without preliminary separation of raw materials on fractions. The plant scheme consistently includes a drying chamber supplied with water steams tapping, a pyrolysis reactor of uninterrupted action and a system of pyrolysis products tapping, equipped with condensers and a separator. Useful products for the full cycle are: gas, water, aluminum and coal fractions as well as the main product of pyrolysis – liquid fast hardening fraction – the so-called «artificial solar oil». The obvious advantage of the plant is accurate fractiousness of products, i.e. aluminum and coal fractions can be delivered at once for secondary processing without additional clearing.

To optimize the process, thermogravimetric analysis from 50 to 700°C with speed of heating 10 degrees/minute has been carried out. The samples were 1) two-layer packings (cardboard + LDPE); 2) three-layer packings (cardboard+ LDPE +Al) and 3) their mixture. On all the thermograms two bright peaks of weight loss between 200 and 500°C (after loss of residual water at 110-115°C) are observed. It is shown that the cellulose layer is analyzed at lower temperature than polyethylene. The first peak DTG is between 210 and 370°C with the maximum peak temperature 340°C, showing sharp reduction of weight in 45,3 %. The second peak lies in an interval 360-510°C, loss of weight is 39,47 %. The first peak is a result of decomposition of the cardboard layer, while the second - of polyethylene

decomposition. Presence or absence of aluminium in the samples had no effect on MFP decomposition. Results TG–DTG have shown that MFP decomposition ends at 550°C.

The structure of pyrolysis products has been investigated. The gas fraction consists of carbonic gas, hydrogen and combustible hydrocarbons C1-C5 with advantage (more than 50%) of carbonic gas. It testifies that the gas fraction is formed mainly at the temperature of cellulose decomposition and is in good conformity with the literary data. To increase the share of combustible gases (for their subsequent use for heating) it is necessary to raise the temperature in the gas tapping compartment. Fast hardening fractions include mainly paraffins and some quantity of aromatic hydrocarbons. The plant updating, in particular variation of temperature modes, should reduce power consumption of the plant and improve its parameters.

THERMAL BEHAVIOUR OF PHOSPHATE ROCK IN CALCINATION/CARBONATION CYCLES FOR CO₂ CAPTURE

Hatice Bayrakçeken, Jale Naktiyok, A.Kadir Özer, M.Şahin Gülaboğlu

Department of Chemical Engineering, Atatürk University, 25240 Erzurum, Turkey

Carbon dioxide (CO₂) is a contributor to greenhouse effect that causes global warming. The use of carbonation/calcination cycles of $CaO/CaCO_3$ is emerging as a viable technique for the capture of CO₂ generated in the combustion of coals for power generation. In this study, the change in the CO₂ capture capacity of calcareous Mazidagi phosphate rock was investigated thermogravimetrically by using calcination/carbonation cycles. For this purpose, firstly, the effects of particle size and heating rate on the calcination of Mazidagi phosphate rock were studied via thermogravimetric analysis. It was seen that the calcination in N₂ atmosphere was started at approximately 600°C and completed at 800°C for four different particle sizes. It was observed that increase in heating rate resulted in a shift of decomposition temperature range to the higher values and a decrease in weight loss. The increase in the particle size also raised the decomposition temperature range. The behaviour of CO_2 capture capacity of the phosphate rock during the cvcling processes investigated by the repetition was of the calcination/carbonation cycles for four times. Generally, it was seen that, in the studies where four different heating rates (5, 10, 20, 40°C/min) and four different particle sizes were investigated, the activity was decreased via the repetitive cycle numbers.

*Keywords: CO*² *capture, calcination, carbonation, phosphate rock.*

ABATEMENT OF VOCS WITH CATALYTIC INCINERATION

Tuğba Gürmen Özçelik

Ege University, Faculty of Engineering, Department of Chemical Engineering 35100 Izmir-Turkiye

Catalytic incineration of the most used VOCs in the chemical industries such as benzene, toluene, ethyl benzene, ethyl acetate and isopropanol have been investigated by using monolith supported metal oxide catalysts. CeO₂, Co₃O₄, Mn_2O_3 , Cr_2O_3 and $Cr_2O_3 - Co_3O_4$ catalysts were prepared on ceramic monolith support and they were tested. The experimental studies were carried out at atmospheric pressure in a fixed-bed catalytic reactor with 500 to 850 % excess air. The prepared metal oxide catalysts showed excellent catalytic activity in the incineration of VOCs which were experienced. According to the experimental results, CeO₂ coated monolith catalysts was found to be suitable since it gave reproducible results, showed the highest mechanical stability and closely conversions for all experienced VOCs.

Keywords: air pollution, VOC abatement, incineration, monolith catalyst.

STUDY OF CATALYTIC COMBUSTION OF PROPANE IN A CONVERTER

Sanchita Chauhan^a and V. K. Srivastava^b

^aUniversity Institute of Chemical Engineering and Technology, Panjab University, Chandigarh-160014, India. ^bA CCURATE Institute of Management & Technology, Greater Noida (UP) India

Industrialization and urbanization have resulted in a profound deterioration of air quality standards and vehicular emissions are a particular cause of concern as these are released from ground level sources and thus have the maximum impact on the general population. Monolithic catalytic converter have proved to be very successful as the main pollution control devices. In them catalytic combustion reactions are carried out at low temperatures compared to homogenous reactions. LPG contains a high concentration of propane and butane. The combustion process of propane is slower than butane in the internal combustion engine. Therefore, the major hydrocarbon released in the exhaust of a LPG fuelled vehicle is propane. In order to control the hydrocarbon emissions from the LPG-fuelled automobiles, an efficient catalyst for the complete combustion of propane at low concentration is required. Reliable and efficient simulations help in reducing the number of experiments and allow interpreting in detail the effect of some parameters otherwise neglected. In this paper different models for propane oxidation in a converter are analysed.

EFFECT OF COAL MOISTURE ON CARBONMONOXIDE AND PARTICULATE EMISSIONS IN FIXED BED COMBUSTION SYSTEMS

Nalan Erdöl Aydın, Hasancan Okutan, Ekrem Ekinci

Istanbul Technical University, Faculty of Chemical and Metallurgical Engineering Chemical Engineering Department, Maslak, 34469, Istanbul-TURKEY

Moisture is one of the most basic and important parameter defining coal structure but the data reported on its effect on combustion efficiency and emissions is rather limited. In this study we report effect of coal moisture on carbonmonoxide and particulate emissions in two boilers and a stove combustions. Due to chanty town development around major cities of Turkey domestic heating is heavy dependent on low efficiency stoves utilising low grade solid fuels.

In this study, effects of moisture on particulate emissions of %37-38 moisture orijinal Yeniköy Ağaçlı (Y.A.), %24, %21, %17, %15 ve %10 moisture Yeniköy Ağaçlı, %6 moisture South African coal, %22 misture mixture coal (S.African ve Y.Ağaçlı) ve %13 moisture Soma are investigated in three combustion systems. These systems are hand-loaded boiler, automatic-loaded boiler and a TS 90/41-42 type stove.

Combustion tests were performed according to Turkish Standards (TS) 4040, 4041 and 4900 which are equivalent to respective ISO standards. Two boilers had a thermal capacity of 93 kW. Sampling of the particulates, moisture in the flue gas, flue gas velocity, chimney temperature were all measured using the Andersen Universal Sampling System approved by EPA (US). To check measurements of the concentration of combustion gases, a German-made MRU 95/3CD model instrument and was used. Individual particulate emission profiles and cumulative particulate emissions values are determined. From the experimental results it is found that the medium moisture resulted in highest particulate emissions. Emission results are parellel in three of combustion systems. The results are explained in terms of the moisture types, porosity formation and heat and mass transfer operations taking place during a fixed bed combustion.

Keywords: emissions, combustion, moisture, boiler, stove

IMPACTS OF AIR POLLUTION ON HUMAN HEALTH

Sevda Ocak

Yuzuncu Yıl University Engineering-Architecture Faculty, Environmental Eng.Department, 65080, Van

Air pollutants reveals to environment by a number of natural and/or antropogenic activities and may cause effects on human health and environment. Increased combustion of fossil fuels in the last century is responsible for the progressive change in the atmospheric composition. Air pollutants, such as carbon monoxide (CO), sulfur dioxide (SO₂), nitrogen oxides (NOx), volatile organic compounds (VOCs), ozone (O₃), heavy metals, and respirable particulate matter ($PM_{2.5}$ and PM_{10}), differ in their chemical composition, emission, time of disintegration and ability to diffuse in long or short distances. Air pollution has both acute and chronic effects on human health, affecting a number of different systems and organs. It ranges from minor upper respiratory irritation to chronic respiratory and heart disease. lung cancer, acute respiratory infections in children and chronic bronchitis in adults, aggravating pre-existing heart and lung disease or asthmatic attacks. In addition, short- and long-term exposures have also been linked with premature mortality and reduced life expectancy. These impacts of air pollutants on human health are briefly discussed.

Keywords: Air pollution, human health

DETERMINATION OF POLYCYCLIC AROMATIC HYDROCARBONS AT ATMOSPHERE OF BALIKESIR CITY AND İKIZCETEPELER DAM LAKE

Emin Taylan, Semra G. Tuncel

Chemistry Department, Middle East Technical University, Ankara, Turkey

In this project, the concentrations of 16 polycyclic aromatic hydrocarbons (PAHs) were determined at Balikesir City atmosphere and İkizcetepeler Dam Lake atmosphere near Balikesir. Sampling was done daily during one year period for particulate phase and gas phase of PAHs. The total concentration of the PAHs at the City atmosphere was found as 631ng/m3 and at the Dam Lake atmosphere as 188ng/m3. Concentrations of PAHs in gas phase both at city and dam lake atmosphere were found higher than the concentrations in particulate phase. However, the PAH concentration difference between gas and particulate phases for dam lake is more obvious than the difference of the phases for city atmosphere. Among 16 PAHs Phenanthrene was found as the most abundant pollutant at both City and Dam Lake atmosphere. Additionally, Naphthalene and Fluorene concentrations were found high compared to the other aromatic hydrocarbons in the city atmosphere. Seasonal variations of PAHs at both sites were evaluated. Summer-winter difference for city was huge on the other hand the Dam Lake atmosphere concentrations didn't vary as much as city. Soxhlet extraction is used for gas phase extraction and ultrasonic bath extraction is used for particulate phase. Analyses performed with GC-MS system.
2nd International Conference on Air Pollution and Control (CAPAC-II) September 19-23, 2011 Antalya, Turkey

SPONSORS

- The Scientific and Technological Research Council of Turkey
- Air Waste Management Association
- Turkish National Committee of Air Pollution and Research
- SEM Laboratory Instruments
- Dokay Group
- Turkey Cement Manufacturers' Association
- TÜPRAG Metal Mining





AIR & WASTE MANAGEMENT A 5 5 0 C I A T I O N

```
SINCE 1907
```









