PHYSICAL CHEMISTRY 2008

Proceedings

of the 9th International Conference on Fundamental and Applied Aspects of Physical Chemistry

Volume II

The Conference is dedicated to the 200th Anniversary of the University in Belgrade

UNIVERSITY OF BELGRADE
1808 • 2008

September 24-26, 2008,
Belgrade, Serbia

PHYSICAL CHEMISTRY 2008

Proceedings

of the 9th International Conference
on Fundamental and Applied Aspects of
Physical Chemistry

Volume II

ISBN	978-86-82475-13-2
Title:	Physical Chemistry 2008. (Proceedings)
Editor:	Prof. dr A. Antić-Jovanović
Published by:	The Society of Physical Chemists of Serbia, Studentski trg 12-16, P.O.Box 137, 11001 Belgrade, Serbia
Publisher:	Society of Physical Chemists of Serbia
For publisher:	Prof. dr S. Anić, president of the Society of Physical Chemists of Serbia
Printed by:	"Jovan" Printing and Published Comp; 250 Copies; Number of Pages: x + 301 (469-770); Format B5; Printing finished in September 2008.
Text and Layout:	Aleksandar Nikolić

250 – copy printing

IMPACT OF THE GEOGRAPHIC FACTORS ON THE TRANSPORT OF LEAD AND CADMIUM IN THE AIR

S. Milovanović[1], J. Stasić[1], Lj. Matovic[1], J. Grbović-Novaković[1], B. Matović[1] and M. Ljesević[2]

[1]*Institute for Nuclear Sciences Vinča, Laboratory of Material Science, P.O.box 522, 11000 Belgrade, Serbia*

[2]*Faculty of Geography, University of Belgrade, Studentski trg 3/III, 11000 Belgrade, Serbia*

Abstract

The aim of this study is to describe the effect of geographical varieties on the transport of lead and cadmium in the air. During period between 1997-2006, the concentrations of lead in suspended in the air at 5 measuring sites in Serbia were measured. The minimal measured daily concentrations of lead ranged from 0,42 μg/m^3 (2002.) in Kraljevo. The maximal measured daily concentrations of lead to 251,8 μg/m^3 (2004.) in Belgrade. During the period between 1997-2006., the concentrations of cadmium in suspended in the air at 5 measuring sites in Serbia were measured. The minimal measured daily concentrations of cadmium ranged from 0,1 μg/m^3 (1999) in Kraljevo. The maximal measured daily concentrations of lead to 42,0 μg/m^3 (2000) in Belgrade. Results from our experiments demonstrated that when rapid infiltration conditions or a rainstorm exist, particle-facilitated transport of contaminants is likely to the dominant metal transport pathway influenced by acid rain.

Introduction

To make an accurate assessment of the ecological risk of contaminants in soil, it is necessary to be able to quantitatively estimate the mobility of contaminants. However, attempts to describe and predict contaminant transport cannot succeed if major pathways and mechanisms for transport are not defined [1]. Most predictions of contaminant transport have been based on a two-phase system in which contaminants partition between the immobile solid constituents and the mobile aqueous phase [2]. It is generally assumed that metals are adsorbed by the soil solid phase with low mobility in soil. Some particles in the soil solid phase, however, also may be mobile in soil, and these particles are relatively reactive with respect to sorption of chemical species due to their large specific surface area and high number of functional surface groups [3]. Once mobilized, these particles may bind contaminants and enhance contaminant transport in soil [1-4].

Urban aerosol is a mix of a background aerosol resulting from long distance transport and “fresh” locally emitted particles. The latter ones are mainly composed of organic compounds, elemental carbon, water, metal oxides and salts containing ammonium, sulphate or nitrate species depending on the source of emission [5]. In fact, transport sector can be considered as an important source of diffuse pollution to the environment.

Experimental

The studied sites are located in five measuring points (Belgrade, Kraljevo, Krusevac, Nis and Novi Sad). Over the past 10 years, four of the five measuring points for monitoring air quality indicated sizeable differences in pollution. The main factor which defines weather and climate of measuring points is a geographic location etc. " geografical width and length, the height above sea level, surrounding by mountains and distance from the rivers

Results

In the Fig.1 the changes in imission of lead in Serbia between 1997 and 2006 has been presented. The biggest emission of sedimental substances from 251,8 $\mu g/m^2/day$ was found to be in 2000 in Belgrade, which is located on 44°49'14" geografical width and 20°27'44" geografical length and AT 116,75 m height above sea level.

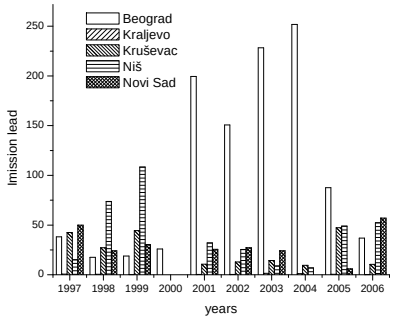

Fig.1. Changes in imission of lead between 1997 and 2006
Sources: Institute of public health of Serbia "Dr Milan Jovanovic Batut"

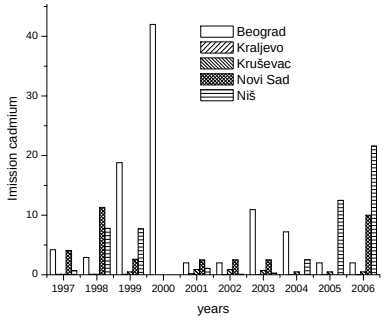

Fig 2. Changes in imission of cadmium between 1997 and 2006.
Sources: Institute of public health of Serbia "Dr Milan Jovanovic Batut"

The lowest emission has been found in 2002. in Kraljevo, which is located on $43^0$34'26" geografical width and $21^0$41'49" geografical length and on 246 m height above sea level as shown in Figure 1. As it is shown in Fig. 2 the biggest emission of sedimental substances from 42 $\mu g/m^2/day$ was found in 2000 while the lowest emission has been found in 1999. in Kraljevo.

Conclusion

The inflence of geografical factors on diffusion of pollution substances in the air is showed. During period from 1997 to 2006 the research was done on the diffrent industrial localities in Serbia: Belgrade, Kraljevo, Kruševac, Niš i Novi Sad. It was showen that there is connection between geo-systems and geographical environment from one side and physical-chemical processes from other side. As

the relief of select localities, the location of the cities, the industrial development of the cities are different the influence of meteorological parameters and diffusion of pollution substances is different too. Some characteristic shapeof topography have a clear and expressive influence to meteorological parameters and so on space distribution of concentration of pollution substances.

Acknowledgement

This work is supported by Serbian Ministry of science under project 142016.

Reference

[1] McCarthy and Zachara, 1989 J.F. McCarthy and J.M. Zachara, *Environ. Sci. Technol.* , 1989, **23**, 496–502.
[2] Puls and Powell, 1992 R.W. Puls and R.M. Powell, *Environ. Sci. Technol.* , 1992, **26,** 614–621.
[3] Grolimund et al., 1996 D. Grolimund, M. Borkovec, K. Barmettler and H. Sticher, *Environ. Sci. Technol.*, 1996, **30**, 3118–3123.
[4] Lagdsmand et al., 1999 M. Lagdsmand, K.G. Villholth, M. Ullum and K.H. Jensen, *Geoderma.*, 1999, **93,** 33–59.
[5] Ryan and Elimelech, 1996 J.N. Ryan and M. Elimelech, *Colloids Surface A*, 1996, **107,** 1–56.