Evaluation and measurement of CO, SO2, NO2 and particles in parking area of Imam Reze Shrine

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1. Introduction

Air pollution is described as existence of undesirable material in air that it concludes destructive effects on human health. Although the most considerable issue is human health while researching air pollution, it is also damaging to the plants, structural materials, global environment and destruction of natural feel due to creation of odors and fog.

2. Methodology

Study area

The Shrine's parking area is included of four sub-areas that nine evaluation stations are installed in them and one station is installed in the outside air to determine the quality differences of inner and outer air.

Sampling Method

Sampling is accomplished for two times from December 3 to December 13 in 2015 and from May 5 to May 15 in 2016. In each station the pollutants would be analyzed three times in fall and three times in spring

3. Results

Concentration of the pollutants is illustrated in fig 1-6.

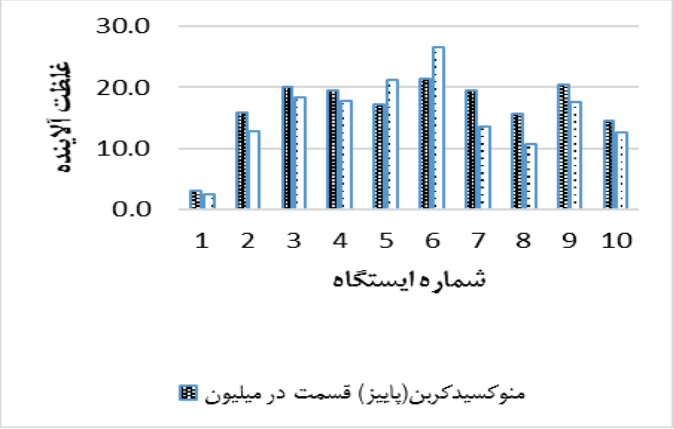

Fig.1. compared to the average concentration of Carbon monoxide in the fall of 1394 and spring 95

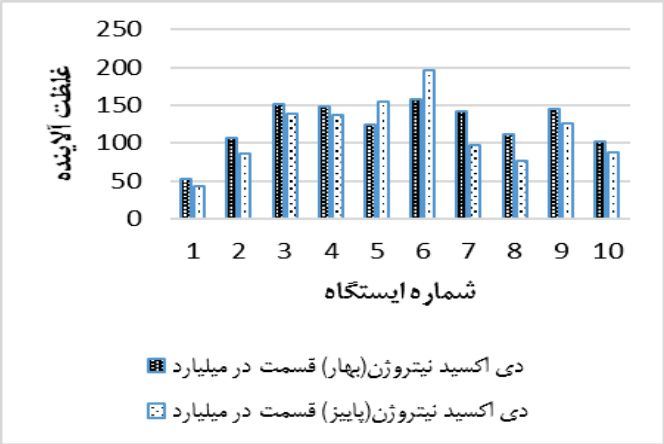

Fig.2. compared to the average concentration of Nitrogen dioxide in the fall of 1394 and spring **95**

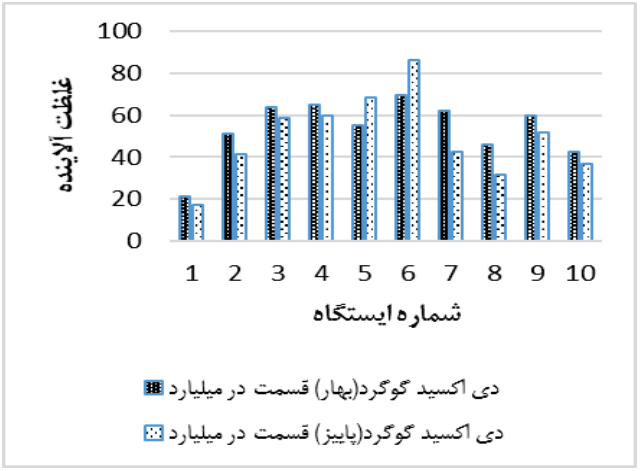

Fig.3. compared to the average concentration of SO 2 in the fall of 1394 and spring 95

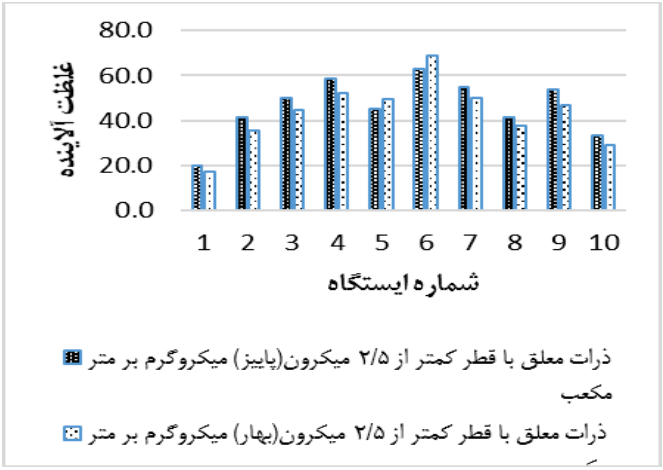

Fig.4. compared to the average concentration of PM 2.5 in the fall of 1394 and spring 95

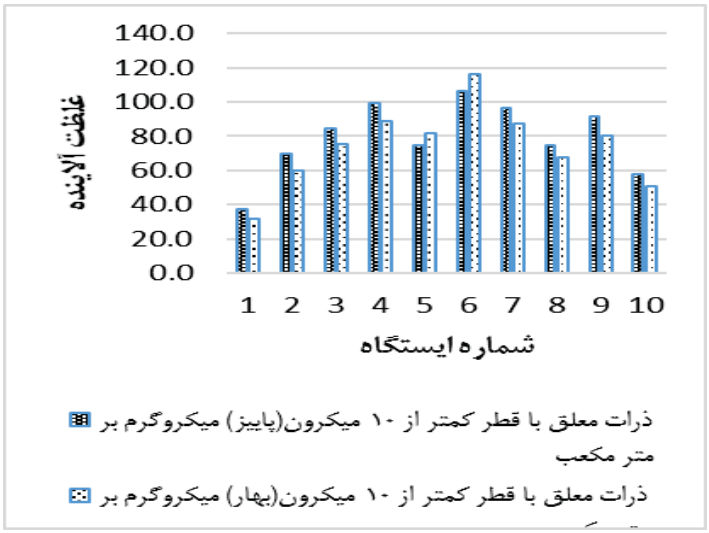

Fig.5. compared to the average concentration of PM 10 in the fall of 1394 and spring 95

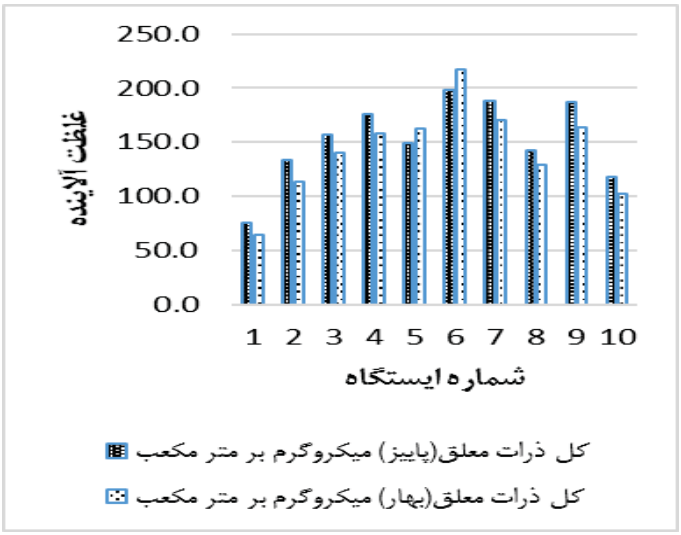

Fig.6. compared to the total of average concentration in the fall of 1394 and spring 95

4. Conclusion

Concentration of CO, SO2 and NO2 inside the parking area is greater than the outside. In all stations concentration of pollutants in fall is higher than spring.

According to USHA Standard CO should be 50 ppm and according to Iran's Department of Environment Standard it should be 9 ppm. Thus based on USHA in all stations CO concentration is lower than critical limit while based on Iran's Department of Environment Standard just the air of station one could be assumed appropriate.

According to USHA Standard NO2 should be 3 ppm and according to Iran's Department of Environment Standard it should be 0.1 ppm. Thus based on USHA in all stations CO concentration is lower than critical limit but based on Iran's Department of Environment Standard the surrounding air of stations one, two, seven and eight in spring and just surrounding air of station one in fall is healthy air.

The maximum SO2 should be 5 ppm based on USHA and 0.5 ppm based on Iran's Department of Environment Standard. So concentration of SO2 is not over limited value in all stations according to both standard Criteria.

Concentration of total particles according to USHA shouldn't be greater than 5 gram per cubic meter air. Thus air around all of the stations is in range of USHA standard limitation.

5. Key words

Particles Matter, Carbon monoxide, Nitrogen dioxide, sulfur dioxide, measurement

waste management and the challenges of its implementation as public policy

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1. Introduction

Urbanization development, the spread of culture of consumerism, population growth, and the most complex human life will be endangered the human and natural environment in the new century. One of the most prominent problems in human societies was the more production of substances that has endangered the health, safety and security of its residents and thus the legislators are considered the "rules" to solve this problem throughout the world and then regulated the issues related to the production, gathering and recycling. Some people by forming the "no waste" movement emphasize to use the certain legal provisions in the field. Today, the organizing, management and proper disposal of waste is considered one of the most important environmental concerns in Iran, and nearly eighteen million tons of waste are produced annually which represents high per capita of waste generation in the country compared with the global average. One of the most important management tools for proper and sanitary disposal of waste is to use the relevant laws and regulations. The approval of waste management law in 2014 is the big step to use this tool in order to exploit the waste.

Idiomatic definition of waste and the waste management

Waste is the result of the inefficient use of natural resources. Since human life is concentrated in the modern societies, and in general the waste is said to the solids, liquids and gases (except sewage) that is directly or indirectly caused by human activity and also it is considered superfluous by the producer. The functional elements and in the charge of waste management include the production, storage, gathering, transportation, transfer, recycling and disposal.

Waste management is a term which refers to all activities related to the waste management in a community.

Based on the experiences of different countries, we can say that the following items will be the greatest impact for development of waste management:

- culture-building, advertising and training
- monitor and review the existing rules and add new rules and programs
- transparency of costs and revenues in waste management
- encourage the private sector and outsourcing the waste management in this section
- provide the incentive plans in direction of separation and conversion, as well as deterrent crime.

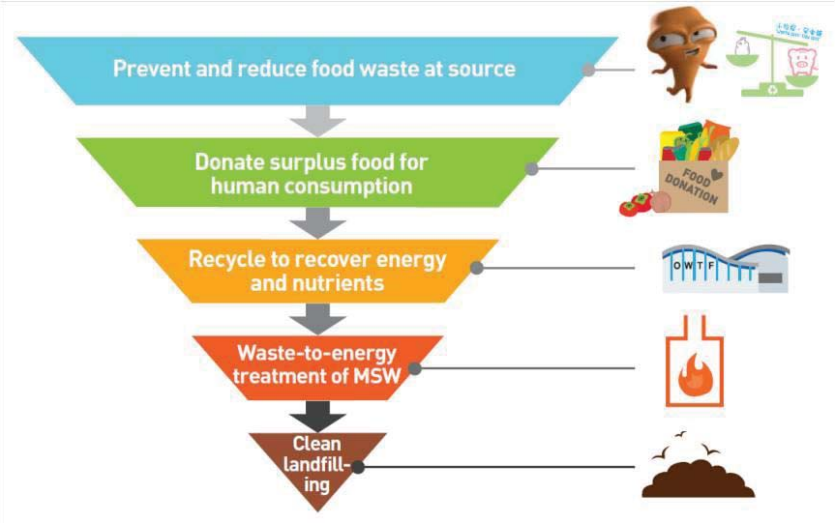

Fig.1.waste management hierarchy

2.Methodology:

In this article, we have tried to study the law of waste management in Iran and the comparative study of the law in some countries and also briefly explained some of executive challenges of implementing the law. The underlying assumption of this article is that the reliance on legal instruments was not sufficient to fight against the problem and the necessity to use and coordinate other policies, fields and illegal instruments and aggregation of all community facilities beside "legislative policy" is also felt as accurate and realistic.

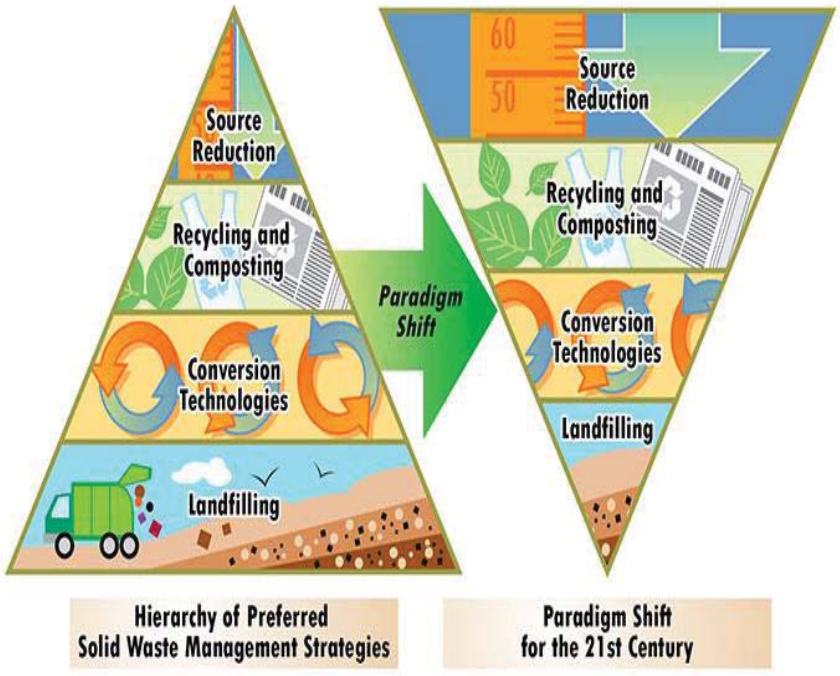

Fig.2.waste management paradigm shift

3. Results:

According to the comments of waste management organization, some of the barriers to implement the law of waste management are as follows:

1. Management
   A. undetermined some sectors of waste management
   B. Interfere in some of tasks of waste management
2. Supervision
   A. introducing the multiple monitoring devices
   B. Impossibility or difficulty for applying the adopted measures by the supervisory systems
3. cost income
   A. Wholesale supply of costs by the municipalities from other sources
   B. Inefficiency for the defined tariff system under Article 8 of the Law
4. investigate the offenses
   A. The obligation to investigate in the judicial bodies
   B. Inefficiency for the fines costs to deterrence the offenses
5. legal problems
   A. the law was approved over the past 10 years and it should be reviewed and modified due to the scientific and technical progresses.
   B. There are some ambiguities in the terms and definitions
6. lack of obligation for the custodian and executive institutions of law

4. Conclusion:

Waste management is the most important issues in the field of environment which the experts has increasingly attention it in recent years and the necessary legislation is obvious for all. Briefly, the legal system governing the waste management in Iran has shown that the legislation is a new event and these rules needed to adopt with the modern requirements of society

According to the results of researches and investigations that briefly mentioned above, it can be explained that in general the barriers of policy implementation and in special the law of waste management are as follow:

1- factors related to the codifiers of law or policy
A. Assess the implementation and unforeseen function
B. connections
2- factors related to the performers of law or policy
A. Behavioral characteristics
B. Expertise and skill
C. users
3- factors related to the nature of law or policy
A.aiming
B. Legal
C. Inflexibility
4- executive agency
A. Bureaucracy
B. Resources and tools
5- kinds of actions
A. actions of administrative and political system
B. Action of administration system and communit
C. Pressure groups

Keywords: waste management, barriers, public policy

Molecular simulation of CO_2 Adsorption, Separation, and Permeability of MFI and FAU zeolites, and Cu-BTC in the presence of CH_4, N_2

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1. Introduction

For gas adsorption and separation, different methods have been used which using porous materials is one. Chu et al. examined zeolite with JSR structure by Monte-Carlo method and used PCFF force field. Rahmati and Modarress also used PCFF force field and Monte-Carlo method for investigating Methane and Carbon dioxide adsorption in zeolites with SIV, IWV, IHW, MSE, and UFI structures. They also applied Lennard-Jones (L-J) potential function for modeling non-linked interaction in their simulation. Yang et al also used unbalanced molecular dynamic and CBMC method and L-J potential function to simulate non-linked interactions and the effects of pressure. Yu et al investigated MFI structure by molecular dynamic and Monte-Carlo method and also applied L-J potential and Colon function to model non-linked interactions. Skoulidas et al were studied permeability and transfer of Methane, Nitrogen, Carbon dioxide, and Hydrogen by molecular dynamic method in MOF-5 and IRMOF-6. They used Universal force field. Kara et al employed Universal force field with DREIDING in simulation. Yang et al studied the adsorption of the mixture of Carbon dioxide, Methane and Hydrogen by Monte-Carlo method in Cu0BTC and MOF-5. The used OPLSS and TraPPe force field. Martin-Calvo et al investigated the separation of Cu-BTC and IFMOF-1 by using Monte-Carlo method and used Universal and DREIDING force field. Therefore, bye searching among previous literatures, using Universal force field for calculation of gas-gas interactions and gas-MOF interactions for adsorption simulation in MOF structures will have good results. In this study, we are analyzing adsorption and separation of FAU and MFI zeolites and also Cu-BTC by Monte-Carlo and molecular dynamic method and comparing their findings.

2. Methodology

We learned from previous study that L-J potential function is appropriate for interactions of gas molecules and atoms in nanotube. We set PCFF force field for inter-molecular interactions and consider that zeolites have rigid and nonflexible structure. We used periodic boundary layer for creating a limitless system. In simulation by Monte-Carlo method we used metropolis algorithm. We also applied GCMC condition. Chemical potential is a function of gas fugacity. We assumed Ideal gas assumption instead of fugacity in all gases simulated. By using metropolis algorithm and according to generation, elimination, movement, rotation, and angular bending of molecules, alterations are applied to system and rejected and accepted by accepting terms of that transformation.

3. Results

First of all we need to investigate the accuracy of simulation's results which include: 1. the results of gas adsorption in zeolites and Cu-BTC, 2. Adsorption of pure gas, 3. Adsorption of the mixture of two gasses, 4. Selectivity, and 5. Permeability.

1. Figure 1 shows constant temperature adsorption of Methane in zeolite with MFI structure. We compare our result with other studies to illustrate that our method in acceptable and better

simulate the behavior of adsorption in zeolite. We set temperature and pressure on 298K and 0-1000KPA respectively. We also applied PCFF force field.

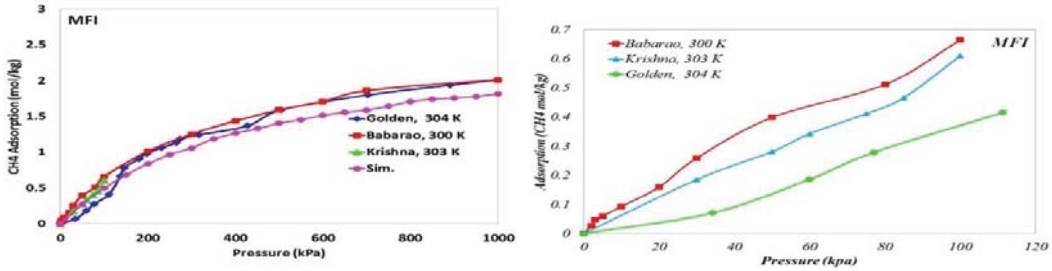

Figure 1: constant temperature adsorption of methane in MFI

2. Adsorption isotherms of nitrogen for all three structures are shown in figure 2. Findings shows that these isotherms are affected by molecular structure of adsorbents. With the increasing of pressure, adsorption of MFI does not change significantly, while adsorptions of Cu-BTC and FAU are increased. This growth in Cu-BTC is almost double more than FAU.

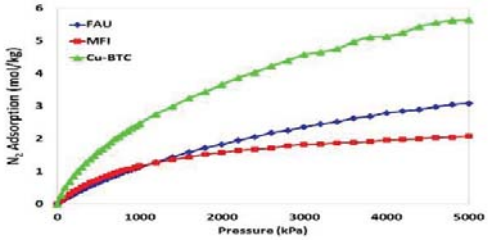

Figure 2: comparison between FAU, MFI, and Cu-BTC in terms of nitrogen adsorption

3. In the temperature of 298K, pressure of 100, 1000, and 5000 KPa, and different feed concentration of 10 to 90 percent, competitive adsorption of CO_2 with N_2 and also CO_2 with CH_4 are investigated by Monte-Carlo method. The results are shown in figure 3. Dash lines stand for CO_2 and solid lines account for N_2 and CH_4.

Figure 3 illustrated the following findings: first, the amount of CO_2 adsorption is high. Second, increasing the total pressure of feeding has little impact on CO_2 adsorption. Moreover, Cu-BTC has a high tendency towards CO_2 relative to Methane and Nitrogen.

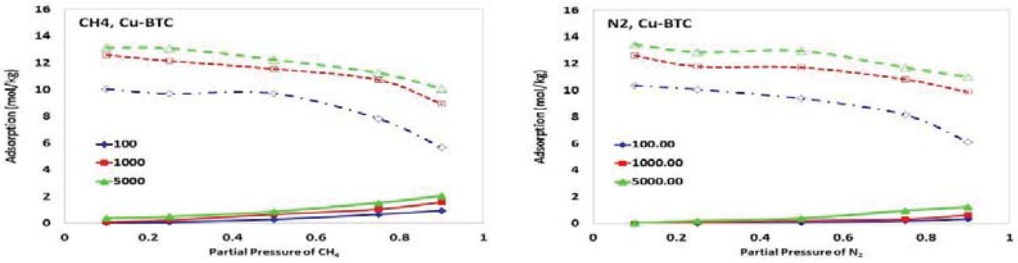

Figure 3: Cu-BTC's competitive adsorption of CO_2 with N_2 and CH_4 at the temperature of 298K

4. Selectivity is an important parameter which is shown by S and calculated as below:

$$S_{ij} = \left(\frac{y_i}{y_j}\right)\left(\frac{x_j}{x_i}\right)$$

Where y_i is the adsorption amount of part i and x_i is the concentration of part i in feed.

Figure 4 illustrates that with increasing the total pressure of feeding, selectivity is reduced. As we expected, FAU adsorbs N_2 less than CH_4. Therefore, selectivity of carbon dioxide versus N_2 is more than versus CH_4

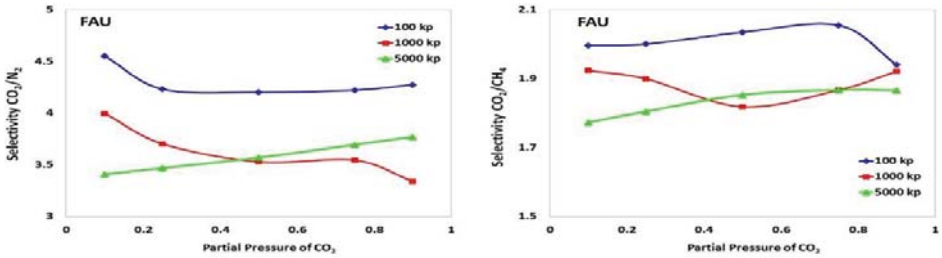

Figure 4: selectivity of CO_2 versus N_2 and CH_4 in FAU at the temperature of 298K

5. Figure 5 demonstrated that, when CO_2 is adjacent to N_2 and CH_4, with the increasing of pressure, permeability coefficient of CO_2 is reduced in Cu-BTC. With increasing the CO_2 concentration of feed, CO_2 adsorption is reduced when it is adjacent to N_2. Nevertheless, this behavior changes slightly when CO_2 is mixed with CH_4. With increasing the CO_2 concentration of feed, adsorption is increased at first, then we observe decreasing in adsorption.

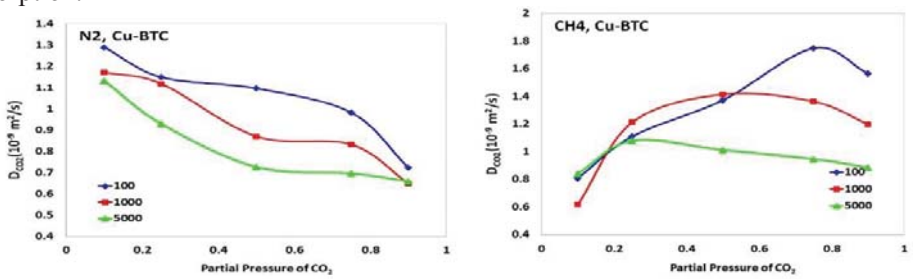

Figure 5: permeability of CO_2 when it is adjacent to CH_4 and N_2 in Cu-BTC

4. Conclusion

The results of this study demonstrate that with increasing temperature and reducing pressure, adsorption is decreased. This trend is a consequence of adsorbent's molecular structure. Analyzing the outcomes of selectivity of CO_2 relative to CH_4 and N_2 in zeolites and Cu-BTC shows that selectivity of CO_2 is dependent of molecular structure in addition to pressure and feed concentration. Finally, the results of permeability coefficient of CO_2 in 2 structures shows that permeability coefficient in MFI is the biggest and Cu-BTC is the smallest one.

5. Keywords

Gases adsorption, zeolite, Monte-Carlo simulation, separation of CO_2, Metal organic framework.

STUDY ON ENVIRONMENTAL GEOCHEMISTRY OF TOXIC ELEMENTS IN THE WEST AREA OF KHOY CITY TO THE RAZI BORDER

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Introduction

This study aimed to investigate the geochemistry of toxic metals in soil and sediments of the west area of Khoy city to the Razi border, in Western Azerbaijan province. Evaluation of environmental geochemistry of heavy metals in soils and sediments of Iran are not much. As can be seen in addition to the geology and tectonic and constructive factors of the area, human factors and industrial activities also can cause the presence of heavy metals in soil and sediments in areas around that area.

Cluster analysis showed significant correlation between almost all elements (with the exception of cadmium, copper) in this study. It seems that there is a good agreement between the two used indicators Igeo and EF pollution intensity. Both used indicators showed severity pollution for cadmium, cobalt, copper, manganese, nickel, lead, vanadium, zinc and iron. And for the rest of the elements can not be matched due to the use of different basic environment (such as amounts of shale, shell values and background values).

Machender et al (2012) have studied metal pollution in soils around the Chinnaeru river basin, Nalgonda district in India. Soil pollution was checked by indicators (I_{geo}) and (EF). Data show that the soil in the study area, was significantly polluted. High concentrations of metals is due to excessive use of fertilizers and pesticides used for agriculture or originated from geogenic natural processes in the region.

Methods

In this study, concentrations of elements (toxic metals) in the surface soils at 10 stations (sample) in the west area of Khoy city to the Razi border, Western Azerbaijan province were measured. Sampling was done by systematic method. For the purposes of the study that is the study of the level of pollution, in order to localize the sampling stations at first we used the geological map at a scale of 1: 250,000 (geological map of Azerbaijan, 1379). Then the stations were finalized on maps in ArcGIS software (Figure 1).

Samples of the surface soil layer (zero to 15 cm) were prepared and sent to the laboratory. The total concentration of metals in the sampling stations were determined by using devicessuch as Inductively Coupled Plasma (ICP-OES) and X-ray fluorescence spectrometry (XRF).

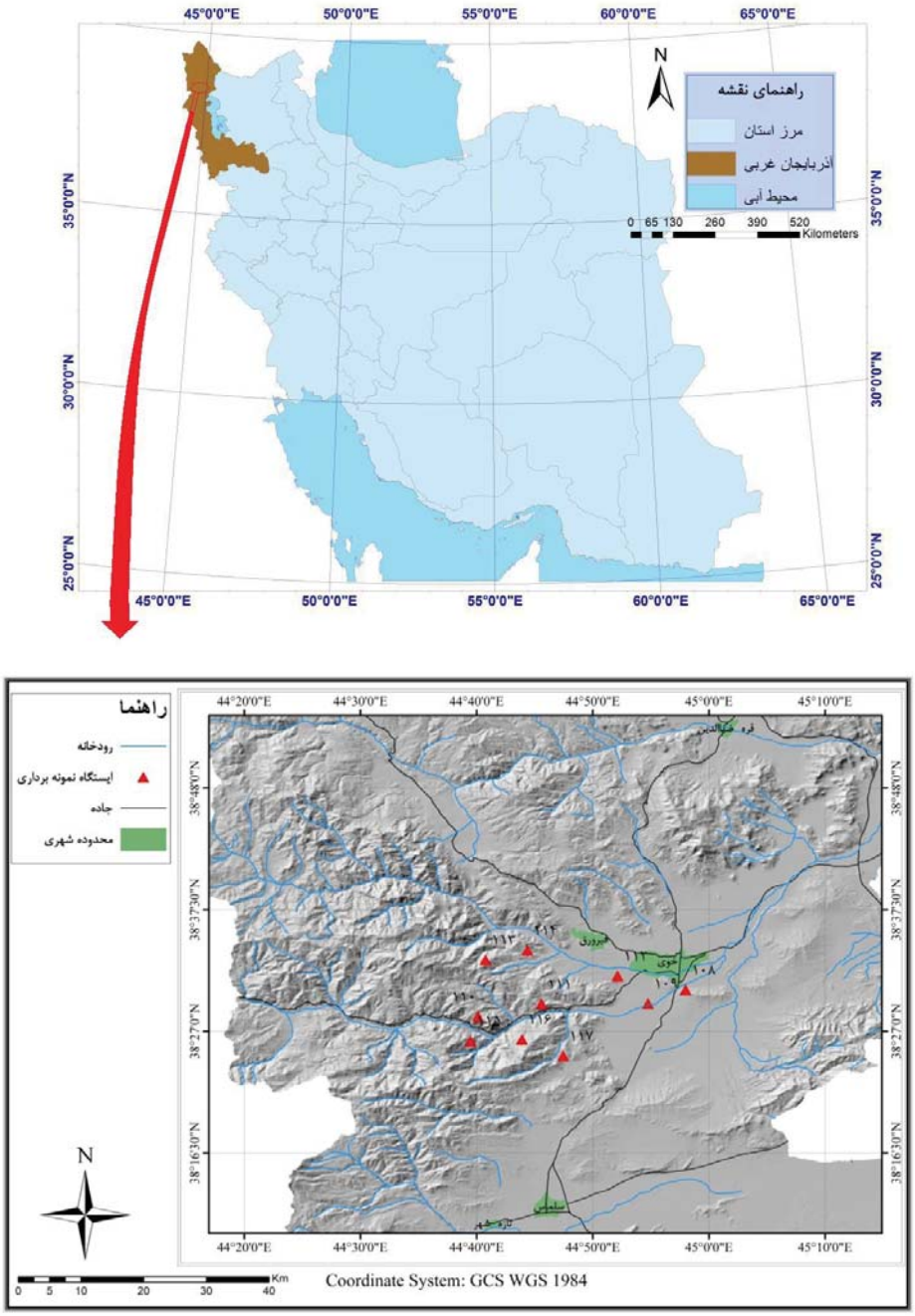

Figure 1. The location of sampling stations at west area of Khoy city to the Razi border, Western Azerbaijan province

Results

Table 1- concentrtion of toxic metals in the soil of west area of Khoy city to the Razi border, Western Azerbaijan province

شماره ایستگاه	mg/kg										%		
	Ag	Cd	Co	Cr	Cu	Mn	Ni	Pb	V	Zn	Fe	Ca	LOI
108	0.5	0.78	29	303	63	1477	85	6	202	165	9.5	8.5	10.2
109	0.5	0.4	38	362	69	1214	197	6	204	155	9.5	8.5	9.5
110	0.5	0.41	36	537	56	1275	231	9	254	196	11.3	4.1	7.8
111	0.5	0.62	17	152	62	902	83	39	96	146	3.5	15.8	22
112	0.5	0.32	42	378	82	1367	314	11	197	155	8.4	5.4	11.1
113	0.5	0.55	43	366	72	1275	267	12	192	127	8.3	6.2	16.5
114	0.5	0.26	44	308	78	1389	234	10	259	169	11.1	4	7.5
115	0.5	0.36	15	153	43	931	94	33	59	122	2.8	24.2	29.5
116	0.5	0.07	28	189	73	1215	71	4	243	105	7.4	3.9	5.9
117	0.5	0.8	19	159	68	1160	86	14	108	142	4.6	11.9	19.5
Min	0.5	0.07	15	152	43	902	71	4	59	105	2.8	3.9	5.9
Max	0.5	0.8	44	537	82	1477	314	39	259	196	11.3	24.2	29.5
Mean	0.5	0.46	31.1	290.7	66.6	1220.5	166.2	14.4	181.4	148.2	7.64	9.25	13.95
STD ±	0	0.23	11.14	127.09	11.30	185.76	91.88	11.86	69.95	26.11	3.04	6.51	7.67
Mean Crust	0.07	0.3	19	90	45	850	80	12	130	95	4.72	3.3	ND
Shale	0.07	0.3	19	90	45	850	68	16	130	95	47200	22100	ND
Martin & Meybeck Surficial Rock	ND	0.2	13	71	32	720	49	16	97	127	35900	45000	ND

Conclusion

Cluster analysis of data is shown in Figure 2. As can be seen, copper and cadmium have no significant relationship with any of biogenic, organic, lithogenic and oil indices. Lead, calcium and LOI are in a directory that calcium is biogenic index and LOI is organic index. If calcium is associated with the LOI can be said that calcium has organic source. calcium is both organic and inorganic, organic material was then the greater part of calcium. Lead also has an organic origin. Elements such as cobalt, nickel, chromium, manganese, vanadium, iron and zinc are present in a branch that Iron is the lithogenic index. Thus, nickel and vanadium also have the origin of the lithogenic.

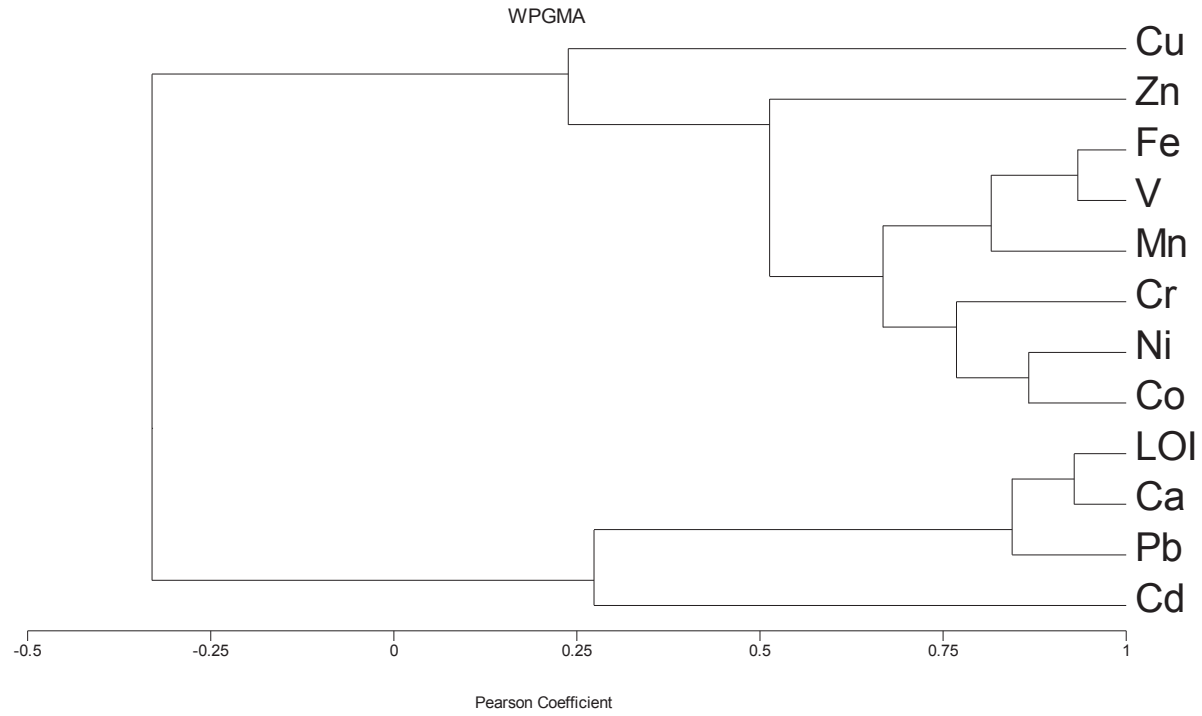

Figure 2. The cluster analysis of metals in surface soils at west area of Khoy city to the Razi border, Western Azerbaijan province

Table 2. The average severity of contamination in soil and sediment samples of ten stations

		Ag	Cd	Co	Cr	Cu	Mn	Ni	Pb	V	Zn	Fe	Ca
Mean of 10	I_{geo}	0.68	0	0.01	0.29	0	0	0.15	0	0	0.01	0	0
Station	EF	5.48	1.22	1.06	2.06	1.07	1.02	1.34	1.27	0.87	1.14	1	2.89

Cluster analysis showed significant correlation between almost all elements (with the exception of cadmium, copper) in this study. It seems that there is a good agreement between thce e two used indicators I_{geo} and EF pollution intensity. Both used indicators showed severity pollution for cadmium, cobalt, copper, manganese, nickel, lead, vanadium, zinc and iron. And for the rest of the elements can not be matched due to the use of different basic environment (such as amounts of shale, shell values and background values).

References

Geological map of Western Azerbaijan (1: 250,000) by the Geological and Mineral Exploration organization of country in 1379.

Machender, G., et al. (2012). "Assessment of trace element contamination in soils around Chinnaeru River Basin, Nalgonda District, India." Environmental Earth Sciences **70**(3): 1021-1037.

Key words: soil, sediment, pollution, metal, pollution index

Investigation of Lead and cadmium contamination in some of agricultural crops

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1. Introduction

The importance of the health of agricultural and food products is the most important indicator of the health of communities. The health of agricultural crops in recent decades is threated due to the overuse of herbicides, insecticides, pesticides, hormones witch leads to intensify of mortality and reducing the life expectancy human population of the world with the incidence of diseases and environmental pollution. Therefore, standardization of the production process to consumption to ensure the health quality of products for consumers is challenging for many governments. Heavy metals are the most important sources of contamination of natural resources. Each year, thousands of these elements enter into the soil on a global scale. Since agricultural products contaminated with heavy metals lead to reducing of quality of agricultural products and on the other hand it is a serious threat to human health, So they are very important in terms of environmental aspects. Contamination of agricultural products with metals, Pb and Cd, due to the use of urban and industrial wastewaters as well as the use of chemical and livestock fertilizers, is considered as a serious threat to the quality of these products and human health.

2. Methodology

Selecting Sampling Points

The present study was carried out on products such as Lettuce, Cucumber, Tomato and Carrot that were purchased from the central vegetable market in Tehran - Nawab that is a supplier of fruit and vegetables in the whole of Tehran.

Chemical Analysis

In this phase, in order to determine the concentration of heavy metals (Cd and Pb), samples were digested and analyzed in two different seasons (Summer and Winter). The concentrations of Cd and Pb in Samples were determined by AAS after digestion. The entire process was performed According to ISIRI 9266.

3. Results

The results of analyzing heavy metals in Lettuce, Cucumber, Tomato and Carrot are presented and discussed. In figures 1 and 2, variations of the mean concentrations of the mentioned metals are provided in the form of charts.

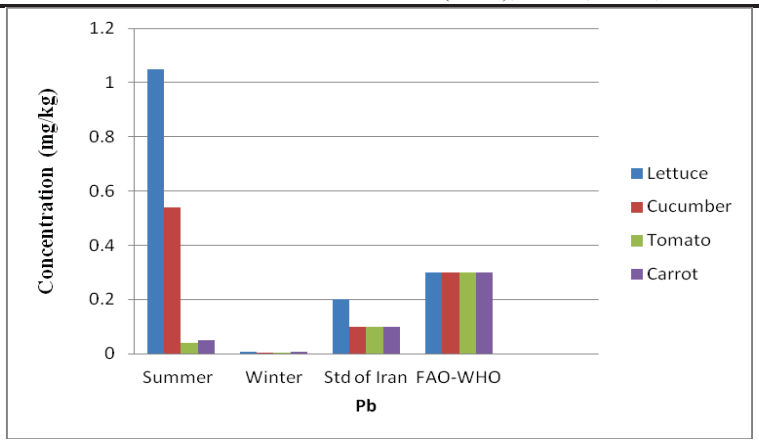

Fig.1. Comparation of Lead concentration in Agricultural products with Iran and FAO-WHO standards

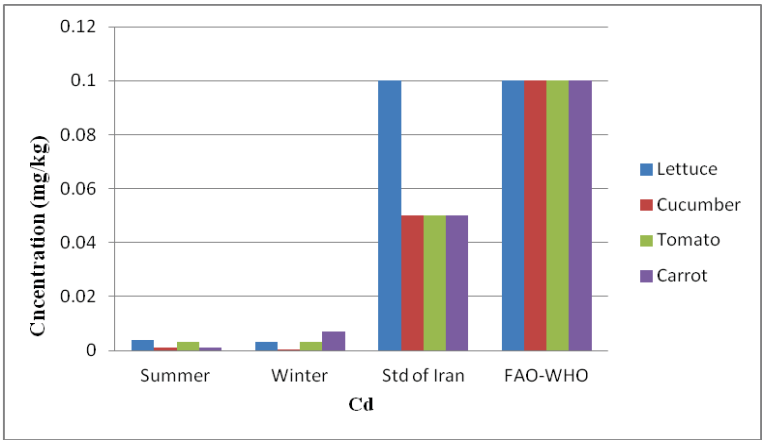

Fig.2. Comparation of Cadmium concentration in Agricultural products with Iran and FAO-WHO standards

4. Conclusion

In this study, the levels of Cd in all the analyzed products as well as the amount of Pb in products Tomato and Carrot were below the standard level provided by Iran and the FAO-WHO. But the amount of Pb in the Lettuce and Cucumber were higher than standard Presented by Iran and the FAO-WHO in the summer. So There was significant difference in levels of Pb ($P<0.05$) in among vegetables lettuce and cucumber with tomatoes and carrots and the Maximum limit of Pb in lettuce and cucumber ($P<0.05$) as well in this season. But the difference was not significant between the concentration of Cd in these products ($p>0.05$).

The results of this research show that however level of Pb in lettuce and cucumber was high, absorption estimated value of each element (EDI) in these products was less than the intake level of tolerable daily temporary (PTDI) that are reported by the Standard Institution.

Considering the possible health outcomes due to the consumption of contaminated vegetables, it is required to take proper actions for avoiding people's chronic exposure.

5. Key words

Heavy metals, Cadmium, Lead, Agricultural products, Tehran