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CHEMICAL PROBLEMS OF HEAVY METAL POLLUTION

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1. INTRODUCTION

The infrastructure of our civilization from the Iron age till now has been based on the predominant use of metals [1]. Most of them are unstable in a habitable environment and, in the result of corrosion, are dispersed in surroundings as a mobile products hazardous for life. We lose a lot of metals in our technological processes producing materials and energy as well. The life cycle of metals begins in mining industry and metallurgy, and ends with waste deposition in the Earth crust. Our knowledge about the life cycle stages and about the circulation of metals in technosphere and environment is incomplete. Alternatively, our scientific and legal term definitions are inexact and erroneous in many cases.

I try to point out in my report some problems of environmental chemistry for environmental management of heavy metal impact.

2. ENVIRONMENT POLLUTION BY HEAVY METALS

2.1. Metals as chemical elements are eternal and, it is impossible to destroy or annihilate them. Their quantity in our nearest surroundings, i.e. within the planet of Earth is constant. Geological, biological and social processes may change only their displacement, mobility and chemical activity.

2.2. The concentration of metal in environment must be within narrow limits of optimal concentrations: $[Me]_{opt. min} < Me < [Me]_{opt. max}$, favorable for homeostasis of our organisms which are a part of environment [2]. This interval is different for each metal species for different biological species. We must know this limits for all 80 metals and for all million strong living beings to regulate optimal conditions properly the life of biosphere.

2.3. Concentration of metal in environment determines the dose, which is considered as an amount of matter to be taken at one time. The SI unit for quantity of matter is mole which is well defined and measurable. But dose involves undetermined "at one time" when substance is taken in and it goes out too in the same interval of time and even more the substance must take appropriate time to spread within an organism and reach its vital points. Therefore, the concept of dose must be improved for a proper use in environmental management.

2.4. The control of metals in environment manages the same general methods which are same commonly applied for all substances: dilution/concentration, mobilization/immobilization, modification, but it has some peculiarities for metals, viz. very few volatile compounds, a lot of soluble water compounds, and an unstable state of most elemental metals in our environment [3, 4].

2.5. Our internal environment of organism may be protected from intrusion of metals or cleaned out of them only on sound basis of reliable knowledge of toxic action of metals [5-8].

3. ACCOUNT OF HEAVY METAL CIRCULATION

3.1. Environmental monitoring of metals is not efficient for the control metal environment as the main source of pollution by metals is technosphere based on the exceptionally wide use of metals [9-11].

3.2. Ordinary book-keepers double account do not fit for metal circulation account in technosphere which is under our control as far as the metals as all chemical elements have many apostasies.

3.3. An eightfold account of products, materials, substances and chemical elements must be used for accurate and precise account of metal circulation in technosphere, which is under control of society [12]. Such an account may be applied for all subjects of interest: organizations, regions, countries continents or other ecological or geographical entities.

3.4. A proper account of metals must help to keep homeostasis and homeorhesis oh metal circulation within the technosphere and biosphere [11].

4. SAFE DISPOSAL OF HEAVY METALS

4.1. The best way for safe disposal of metals till now is the process of ore formation invented by Nature. But there have been only some obscure theories of ore genesis as far as geologists take more interest in the discovery of ores than in the making ones [13-15]. Geotechnology is on its very beginning.

4.2. Bioaccumulation [16-18] is the most promising way for concentration of diluted [19] metals in soil or water. It may be controlled by many external to organism factors and it can do the work which is economically inefficient for chemical technology means.

4.3. Special industry for anti-mining is necessary for a proper control of metal circulation from Earth crust to technosphere and from technosphere to the Earth crust.

5. CONCLUSIONS

- Environmental monitoring system must be supplemented by monitoring of technosphere in which a proper eightfold account of heavy metals must be kept.
- A system of metal deposition in the Earth crust as an ore must be developed symmetrically to mining and metallurgy industries for the safe storage of metal waste.
- Environmental chemistry problems are associated with all phases of metal life cycle and their circulation ways in the technosphere.
- Mechanism of toxic action of metals is a basis of suitable knowledge for safe protection of our inner environment from overflow of metals.

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