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Study of Toxic Effects of Heavy Metals in Soil and Water

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ABSTRACT
Environmental contamination by heavy metal s is a serious problem throughout the world. Heavy metals are toxic which threaten food chain. They accumulates in soil and water due to usage of Industrial effluents ,fertilizers , Pesticides ,Municipal sewage ,vehicles .Heavy metals are elements having a density greater than 5 in their elemental form and comprise some 38 elements .However the term usually and here as well refers to 12 metals that are Cd ,Cr ,Co, Cu, Fe, Hg, Mn, Mo, Ni, Pb , Sn , and Zn. Heavy metals mostly find specific adsorption sites in the soil where they are retained very strongly either on the inorganic ,organic colloids some heavy metals are essential in trace amounts. The International Agency for Research on cancer has classified cadmium as a human carcinogen .The vegetable foods contribute more than 75 % of cadmium intake in humans. The biochemical pathway of heavy metal in the body may be carried out in two major phases. Such as kinetic phase and dynamic phase. Heavy metals are carcinogenic for human health.

INTRODUCTION

Environmental pollution is a burning topic of the day. Air, water and soil are being polluted alike. Soil being a universal sink bears the greatest burden of environmental pollution. Soil and water may get polluted by a number of ways but it is interesting that soil is still the only place where crops can be produced. Soil and water is mainly polluted by the disposal of solids and liquid waste consisting of domestic, agriculture and industrial waste. The major source of pollution are the industries like paper, sugar and power plant, chemical and fertilizer manufacturing units. Heavy metals spoil the landscape and water quality.

MATERIAL AND METHOD

Soil and water samples collected from Bhopal city. Analysis of soil and water carried out by standard method of APHA (1975) and Trivedi and Goel (1984).

ANALYSIS OF HEAVY METAL

DETERMINATION OF CADMIIUM

Spectrophotometric method - Dithiozone method
Cadmium reacts with a diazonium to form red coloured complex which is measured calorimetrically.

1. Take 100 ml of water sample.
2. Add few drops of thymal blue.
3. Neutralize the solution with NaOH.
4. Add 1 ml sodium potassium tartarate.
5. 5 ml NaOH KCN solution
6. Add 15ml dithiozone.

Measure the absorbance at 518 nm.

DETERMINATION OF CHROMIUM

Chromium is oxidized to chromate by per magnate. It is then treated with diphenyl carbazide to form the violet colored complex which is measured calorimetrically.

1. Take 100 ml of water sample in kjeldalh flask.
2. Add 2 ml conc. Sulphuric acid and 100 mg sodium sulphate.
3. Neutralize with concentrated ammonium solution
4. Add 10 ml sulphuric and 0.4 ml phosphoric acid.
5. Continue the addition of potassium permanganate solution till it becomes pink in colour.
6. Add sodium aside drop wise until the solution becomes colourless
7. Heat for one minute and cool
8. Add 4 ml diphenyl carbazide solution .
9. Compare the colour photometrically.

DETERMINATION OF MERCURY
DITHIZONE METHOD
Mercury reacts with dithizone at pH1 to form red coloured complex which is measured calorimetrically.
RESULTS AND DISCUSSION

TABLE: 1
METALS IN WATER AND SOIL

METAL	WATER µg/l	SOIL µg/l
Lead	0.12	0.008
Arsenic	0.05	0.05
Chromium	0/05	0.05
Copper	1.00	1.50
Zinc	0.26	0.04
Mercury	0.001	0.001
Cadmium	0.01	0.01

The presence of metals and metalloid in drinking water is a subject of serious concern due to toxic properties of there materials. They affect public health to a large extent, waste water treatment systems and the biological system of water India. The impact of heavy metals in drinking water containing traces of heavy metals is dangerous for health in long run. The metals Pb, Cd, Hg particularly deemed to be undesirable. Detection and quantization of such low levels of metals and metalloids require highly sensitive instrumental techniques.

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