1.1.1.4.5. Waste mineral and chemicals

Heaps of mineral waste or chemical waste can be leached by rain or oxidized by air to harmful solutions and air borne release. Many different chemicals have been discharged into water ways and done immense damage. Toxics may alter the biological activity of streams. Changes in pH due to releases of acids or alkalis may kill off the animal life To combat the effects, upper and lower pH limits may be set for discharges, and upper limits have been set for many toxics including heavy metals, cyanide phenols [16,17].

1.1.1.4.6. Oil

Oil pollution of the sea has steadily increase with the increased used oil . The recent major disaster, the explosion of the tanker Betelgeuse in Bantry Bay. Fire in January 1979 which resulted in the loss of 51 lives, and the wrecking of Amacocadiz on the coast of Brittany, which the loss, on a highly sensitive coasts of 220.000 tons of light arabian crude oil, have combined to bring the attention of the media of the world such vulnerable containers, while the oil well below-ant in the Golf of Mexico emphasized the problems of under sea wells[18,19].

1.1.1.4.7. Radioactive liquid waste

Radioactive waste is defined as the material that need to be disposed of from power plants, laboratories, and other places that work with radioactive materials. The various process used in the nuclear fuel

cycle and in the application of radionuclides in research, medicine and industry generate a range of low-and intermediate-level liquid waste streams [20,21].

1.2. Toxicity and Chemistry of Some Heavy Metals

1.2.1. Toxicity of heavy metals

Heavy metals such as mercury, lead, zinc, and ... etc. Play an important role in human life. Table (1) shows occurrence and significance of trace elements in natural wastes and effect him on human body [22].

1.2.2. Chemistry of some heavy metal

1.2.2.1. Copper

Copper mainly occurs in the oxidation states (I) and (II) and it an element known and used from ancient times (Bronze Age). Its minerals and compounds are widely abundant on the earth's crust as sulphides, arsenides, chlorides and carbonates, and it is still used in alloys such as brass (Cu-Zn) and bronze (Cu-Sn). The metal is oxidized in moist air forming a green coating of carbonate. It's thermal and electrical conductives are well know and utilized domestically and industrially. Copper is a constituent of O_2-transporting pigment and redox enzymes, and hence is essential to life. However, in large quantities it is toxic to plants and invertebrates but less so to mammals. Pollution by copper is centered upon areas of industrial used and agricultural applications [23].

Table (1) The occurrence and significance of trace elements in natural wastes and effect him on human bod

Element	*Source*	*Effect and significance*	*U.S.Public Health Service Limit, mg/liter[25]*	*Occurrence: % of Samples, highest and mean concentrations (µg/liter)2 [24]*
Arsenic	**Mining hy-product, pesticides, chemical waste**	**Toxic, possibly carcinogenic**	**0.05**	**5.5% (above 5 µg/L),336, 64**
Beryllium	**Coal, nuclear power and space industries**	**Acute and chronic toxicity, possihly carcinogenic**	**Not given**	**Not given**
Boron	**Coal, detergent formulation, industrial wastes**	**Toxic to some plants**	**1.0**	**98% (above 1 µg/L), 5000, 101**
Cadmium	**Industrial discharge, mining waste, metal plating, water pipes**	**Replaces zinc biochemically, causes high hlood pressure and kidney damage, destroys testicular tissue to aquatic biota**	**0.01**	**2.5%, not given, 9.5**
Chromium	**Metal plating, cooling-tower water additive (chromate), normally found as Cr(VI) in polluted water**	**Essential trace elements (glucose tolerance factor), possibly carcinogenic as Cr(VI)**	**0.05**	**2405%, 112, 9.7**

Table (1) Continuous

Copper	**Metal plating, industrial and domestic wastes, mining, mineral leaching**	**Essential trace element, not very toxic to animals, toxic to plants and algae at moderate levels**	**1.0**	**74.4%, 280, 15**
Fluorine (fluoride ion)	**Natural geological sources, industrial waste, water additive**	**Prevents tooth decay at about 1 mg/L, causes mottle teeth and bon damage at around 5 mg/L in water**	**0.8-1.7 depending on temperature**	**Not given**
Iodine (iodide)	**Industrial waste, natural brines, seawater intrusion**	**Prevents goiter**	**Not given**	**Rate in fresh water**
Iron	**Corroded metal, industrial water, acid mine drainage, with iron minerals**	**Essential nutrient (component of hemoglobin) not very toxic, damage materials (bathroom fixtures and closing)**	**0.05**	**75.6%, 4600, 52**
Lead	**Industry, mining, plumbing, coal, gasoline**	**Toxicity (anemia, kidney disease, nervous system), wildlife destruction**	**0.05**	**19.3% (above 2 µg/L), 140, 23**
Manganese	**Mining, industrial waste, acid mine drainage, microbial action on manganese minerals at low pE**	**Relatively nontoxic to animals, toxic to plants at higher levels, stains materials (bathroom fixtures and closing)**	**0.05**	**51.4% (above0.3 µg/L), 3230,58**

Table (1) Continuous

Mercury	**industrial waste, mining, pesticides coal**	**Acute and chronic toxicity**	**Not given**	**Not given**
Molybdenum	**Industrial waste, natural sources, cooling-tower water additive**	**Possibly toxic to animals, essential for plants**	**Not given**	**32.7 (above 2 µg/L), 5400, 120**
Selenium	**Natural geological sources, sulfur, coal**	**Essential at low levels, causes "alkali disease" and "blind staggers" in cattle, possibly carcinogenic**	**0.01**	**Not given**
Silver	**Natural geological sources, mining, electroplating, film-processing wastes, disinfect ion water**	**Causes blue-grey discoloration of skin, mucous membranes, eyes**	**0.05**	**6.6% (above 0.1µg/L), 38, 2.6**
Zinc	**Industrial waste, metal plating, plumbing**	**Essential element in many metalloenzymes, aids wound healing, toxic to plants at higher levels; major component of sewage sludge, limiting land disposal of sludge**	**5.0**	**76.5% (above 2 µg/L), 1180, 64**

1.2.2.2. Zinc

Zinc in the group 12 metals have an ns^2 configuration of outer electron and although they contain d and f electrons, these are not involved in bonding. Hence their chemical behavior and properties position them with the s- and p- block electrons. They all form compounds in their II oxidation state. It may be used in fertilizers for some zinc-deficient soils because some known pathological conditions are associated with dietary deficiencies in zinc [26].

1.2.2.3. Cadmium

Cadmium in the group 12 metals have an ns^2 configuration of outer electron, and, although they contain d and f electrons, these are not involved in bonding. They all form compounds in their II oxidation state. It pollution originates from smelters, incineration of plastics and its pigments, fossil, fuels, electroplating, metallurgical processes ...etc. Recently, use on land of swage sludge with a high concentration of metals, including cadmium, as fertilizers has caused concentration cadmium is generally highly available to plants although availability depends on the composition and presence of complexing agents in the soil [26].

1.2.2.4. Nickel

Nickel can be found in nature in combination with sulphur, arsenic and antimony ores (e.g. pentlandite($(Ni, Fe)_9S_8$; millerite NiS) but is