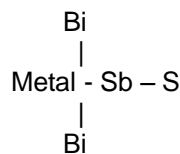


University of Zimbabwe
Geology Department
TOXICOLOGICAL EFFECTS OF HEAVY METALS

SILVER

Silver is relatively more abundant in the crust than gold. The Clarke value for silver is 0.07ppm. The major sources of silver are Ag-sulphides, sulpho-salts and electrum. Sulphosalts of antimony and bismuth are commonly associated with silver due to their general structure.



The metal site is the one that attaches to Ag, Cu, Fe or any metal available in the hydrothermal process.

The silver sulphosalts are pyrargyrite, proustite, stephanite and several others that occur in limited quantities.

Silver is also substituted in galena, and Cu-sulphides, and therefore obtained as a by product. Only 25% of the world's silver production comes from proper silver deposits, the rest of the 75% comes from by products types associated with other deposits.

Toxicological effects of heavy metals in soils and waters

Proper silver minerals, crystallize at about 200°C, such as argentite (Ag₂S). Below 200°C, you have the crystallization of sulphosalts of Ag. Ag-sulphides are very soluble and may be redeposited in zones of supergene enrichment as native silver, and as halides such as AgBr, AgCl, AgI.

Silver is a precious metal of considerable historic importance. Silver like Cu and Au all belong to group IB of the periodic table, and forms three cationic species: Ag⁺, Ag²⁺ and Ag³⁺. For environmental concerns, only the Ag⁺ is important. In this state, Ag⁺ silver is one of the most toxic heavy metals to life forms, such as fish, algae and plants. As a result of the Ag⁺ being readily reduced, its accessibility to humans is very limited in the natural environment.

Ag⁺ is dangerous to the bacteria found in human intestines Escherichia Coli (E.Coli) and the bacteria activity is easily reduced. Silver compounds have been used in medicine, as their effects on humans are limited. Silver nitrate kills the fungus Alternaria tenuis, and the only other metal more toxic to A.tenuis is osmium (Os).

From this perspective, Ag⁺ has more harmful effects in the lower life – form ecological cycles.

However, Ag is only marginally available in soils. The dangers of Ag-pollution are mainly expected in waters. This mainly due to the solubility of the metal and transportation from mine dumps, especially in Pb-Zn, Cu- and Ag- sulphide deposits where total extraction is not possible.

Ag is not yet known to be poisonous to humans.

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