In microbial processes either dissolve or solubilize metals

In managing the living part of soil, micro-organisms arepossible the most relevant consideration. Soil micro-organisms are in chargefor the highest percentage of recycling nutrients available in the soil. Thelife processes of these microbes are also controlled by these metals (eg., calcium, chromium, cobalt, iron, copper, magnesium, potassium, sodium, manganese, zinc and nickel). These metals are important source of tracenutrients and are used for oxidation and reduction processes within theseorganisms. The microbes conversion of metals serve various functions and can becategorized into two main divisions: · transformationsfrom inorganic to organic form and vice versa and· redoxtransformations of inorganic forms (Turpeinen, 2002).

Microorganisms obtain energy from the oxidation of sulphur, iron, arsenic and manganese (Santini etal., 2000). However, metals reduction can occur by dissimilatory reductionwhich involves microbes using metals as terminal electron acceptors duringanaerobic respiration (Turpeinen, 2002). For instance, in microbial anaerobic respiration, chromium oxyanions are usedas terminal electron acceptors. Microbes can also have reduction mechanismswhich are not related to respiration but are rather known to impart resistanceto metals (Turpeinen, 2002). Atypical example is the aerobic and anaerobic reduction of Cr5+ to Cr3+.

Microbial processes either dissolve or solubilize metalsincreasing their potential toxicity and bioavailability or immobilize themreducing bioavailability and toxicity of the metals. The term redox conditionsin microbial systems means the microbial terminal electron accepting processesthat usually take place in the microorganism. Thus, in the presence of oxygen, aerobic conditions dorminate and metabolism in microbes occurs with oxygen asthe terminal electron acceptor. Other species that can be used as electronacceptors to generate energy for growth and maintenance are oxides andhydroxides of manganese (IV), nitrates, carbon dioxide and sulphates. Heavymetals usually come in contact with organic contaminants in polluted sites. Underanaerobic soil conditions, redox potential show a negative correlation withmicrobial activity.

Low redox potential was measured for increased soilmoisture due to the complete or partial displacement of oxygen from soil andthe rapid utilization of oxygen by microbes. Microbial activity in aerobicsoils was mainly affected by redox potential. In arable soils, the moisturecontent indirectly reduce the redox potential by increasing the microbialactivity (Volk, 1993). In otherstudies, a link between redox potential and moisture content of the soil hasbeen established.

2. 8 Metabolic impacts ofheavy metals on animals Thereare so many different metabolic implications that heavy metals have on animals. The most important impacts are;· Immune system degradation· Enzyme inhibition· Organic specific degradation and · Neuron signal interference. The capability of somethese heavy metals to imitate other essential metals in enzymatic processes isone of the fundamental issues in cell metabolic interference. For instance, zinc or calcium in enzymatic processes is displaced often by lead which canresult in minor impacts like reduction in fitness or even deadly consequencewhen very high doses are exchanged. Hexavalent chromium for example cancause organ failure for example can cause organ failure for doses as low as 50ug/kg. The strong oxidative effect of this metal is responsible for its hightoxicity. When

hexavalent chromium is transported via the bloodstream, itimpairs important organs like the kidney, liver and blood cells by oxidation, and causing complete shutdown of liver and renal organs when in highconcentrations.

Cadmium can cause lung damage, acute liver and renal failure, cause pneumonitis and pulmonary edema in mammals.