North South University

Assignment 01

General Chemistry

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Course Instructor

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Recovery of precious metals (gold, platinum, etc) from electronic waste.

From a metallurgical standpoint, electronic scrap WEEE is a complex mixture of various metals attached to, covered with, or mixed with diverse types of plastics & ceramics. As electric circuit become more sophisticated, the proportion of precious metals in relation to other metals increases.

There are three main ~~points~~ of process of extraction of precious metals. They are:

1. Pyrometallurgy.
2. Hydrometallurgy.
3. Biohydrometallurgy.

Pyrometallurgy:

It is a traditional method to recover precious & non-ferrous metals from e-waste. It includes different treatments on high temperatures: incineration, melting etc. This process can not be considered as best available recycling techniques anymore.

Because, some PCB components, especially plastic & flame retardants, produce toxic & carcinogenic compounds. The most of the research activities on recovery of base & precious metals from waste PCBs are focused on hydro-metallurgical techniques for they are more exact, predictable & easily controlled techniques.

Hydrometallurgy:

It is concerned with process that use aqueous solutions to extract metals from ores. The most common hydro-metallurgical process is leaching which involves dissolution of the valuable metals into the aqueous solution. After the solution is separated from the ore solids, the solution is often subjected to various process of purification & concentration before the valuable metal is recovered, either in its metallic state or as a chemical compound. The solution purification

& concentration process may include precipitation, distillation, adsorption, & solvent extraction. Extraction of precious metals from PCBs, including leaching purification & recovery, is the second stage after the recovery of base metals. The most common leaching reagents for precious metal leaching include cyanide, thiourea & thiosulfate because of stable metal complex formed.

Biohydrometallurgy:

It uses a natural ability of microorganisms to transform metals present in the waste in a solid form (in the solid matrix) to a dissolved form. Apart from the possibility of bioleaching of metals in alkaline environment (involving cyanogenic bacteria), acidophilus microorganisms and conducting biological process of leaching in a acidic environment play a crucial role in the biohydrometallurgical techniques. Among major group of bacteria, the most commonly used are: acidophilus & chemolithotrophic.

microbial consortia. In addition, different fungi such as penicillium sp. & Aspegillus nigerrr are examples of some eucaryotic microorganisms used in bioleaching during metal recovery from industrial waste. The bioleaching process is cheaper & easier to conduct in ~~exp~~. comparison to conventional techniques. Its advantage is flexibility - microorganisms easily adapt to changing & extreme living conditions.

E-waste is one of the biggest problem we are facing worldwide. To overcome this we need to process the E-waste. E-wate contains ~~hund~~ hundreds of hazardous materials which cause threats to environment as well as human beings. Thus this waste should be treated properly instead of dumpind into landfills.