


Final Year Project Showcase Batch-2018 Year 2022

Department: Metallurgical Engineering	
Programme: Metallurgical Engineering	
1	Project Idea
Beneficiation of Copper Ore	
2	Process
Mineral Processing: Froth flotation, Electrometallurgy and Hydrometallurgy	
3	Outcome
High recovery of copper (approx. 97.89%) from indigenous Cu-ore at laboratory scale by Electrometallurgy. The pH and current density factors also influenced the yield of Cu from their ore.	
4	Evidence (Theoretical Basis)
<p>Three different routes have been utilized for the beneficiation of Cu i.e. Froth Flotation process, Hydrometallurgy (wet chemistry) and Electrometallurgy (direct extraction). The following are the observation of the study.</p> <ol style="list-style-type: none"> 1. In froth flotation process, tiny copper sulphide mineral constituent part is attached to lather and lifted out of a solution of water and ore. Utilizing chemicals that render the copper sulphide minerals, water-repellent (hydrophobic) while send-off the other minerals moist allows for selective flotation of the desired minerals (hydrophilic). Froth flotation process is very convenient process and this process is used to treat sulphide ore. 2. The second method for the recovery of copper from their ore is wet chemical process, the copper extracted through leaching method and the copper recovery achieved approx. 60%. 3. We also consider the electrochemical reduction method in order to extract the copper from their ore and by this method we can able to extract copper at higher percentage which is up to 97%. The pH factor and current density also effect on the yield of copper from their ore. In acidic medium the amount of copper recovery is high as the value of pH increases from 0.6 to 1.6 the deposition rate decreases. Also, current density effect on the yield of copper and the experiment showed that the current density is straight proportional to amount of deposition. So finally, it is concluded that electrochemical reduction method is very beneficial and favourable method in order to recover the higher amount of copper with minimum amount of time. 	
5	Competitive Advantage or Unique Selling Proposition (Cost Reduction, Process improvement, Attainment of any SDG (Sustainable Development Goal), increase of market share or capturing new market or having superior performance over a competitor. In summary, any striking aspect of the project that compels the industry to invest in FYP or purchase it. Some detailed description is required in terms of how, why when what. You can select one or more from the following dropdown and delete the rest of them). Please keep relevant options, delete the rest of them, and correct the sequence
a	Attainment of any SDG (e.g. How it is achieved and why it is necessary for the region)
SDG No: 1 No poverty SDG No: 9 Industry, Innovation and Infrastructure	

		<p>Pakistan is rich in the Cu ore, particularly in Balochistan and KPK region. There is need to explore these ore and try to design and develop the laboratory setup for its extraction via hydro-metallurgy and electro-metallurgy route or other feasible route. In this regard, we would like to study and develop the feasible method for the extraction of Cu from indigenous deposits available in Balochistan. Therefore, in this work, we have studied three different extraction routes with different process parameter. And after comparative analysis it is recommended that electrochemical reduction method is highly preferable because of the electrochemical nature which is less time consuming as well as economical method and can recover higher amount of copper. Moreover, small setup can be established at remote areas where the local people can extract the Cu in house and sell to the contractor/government officials.</p>
b	Any Environmental Aspect (e.g. carbon reduction, energy-efficient, etc.)	<p>Yes, we used strong acid for extraction of Cu that emits fumes, so process should be done in well ventilation environment.</p>
c	Cost Reduction of Existing Product	<p>Our aim was to develop the setup of the extraction of high purity copper from Pakistani Cu-ore at laboratory scale. The setup would be suitable to install at the local market or in the remote areas of Balochistan region to solve the poverty issues. Right now cost reduction calculation not considered in this project. We utilized all available resources and spent our amount for the purchase of chemicals and glassware.</p>
d	Process Improvement which Leads to Superior Product or Cost Reduction, Efficiency Improvement of the Whole Process (e.g. What is the issue is current process and what improvement you suggests)	<ul style="list-style-type: none"> • High cost of Chemicals used in Froth flotation process, Hydrometallurgy and Electrometallurgy processes. • Good quality of DC power supply with high rating. • Fume hood should be incorporated when working with aggressive chemicals.
e	Expanding of Market share (e.g. how it expand and what is the problem with the current market)	<p>It could be expanded according to the market demand and the higher demand for the product the higher will be the supply of a product. And the current market problems are mentioned below</p> <ul style="list-style-type: none"> • No small setup for the extraction of Cu. • Lack of machinery for mineral dressing of Cu ore, High Voltage DC power supply. • Lack of industries working on mineral dressing. • High cost of Chemicals.
f	Capture New Market (e.g. Niche market or unaddressed segment)	<p>Shortage of Cu mineral processing and refining industries in Pakistan in the main issue that give huge burden on the import of this valuable metal. This would become costly product and has a much greater influences on economy of Pakistan. Therefore, there is need to develop small industry setup that would be helpful for the completion of the demand local industries such as cable and wire industries etc that utilizes the Cu as main raw materials.</p>

g	Any Other Aspect	With the help of extraction of copper from their ore, others metals can also be extracted as a by-product by various different method and could be exports to other countries which can add strength to the economy of Pakistan.
6	Target Market (Industries, Groups, Individuals, Families, Students, etc) Please provide some detail about the end-user of the product, process, or service	Our target market could be metal working industries such as wire drying extrusion industries which can make copper wires and copper-based products for automotives and other services.
7	Team Members (Names along with email address)	Muhammad Salman (MY-50) muhdsal68@gmail.com Shahzaib Alam (MY-29) alamshahzaib998@gmail.com Shahmeer Saif (08)Saif34@gmail.com Wasiq Ali (06) wasiqali22@gamil.com
8	Supervisor Name (along with email address)	Dr. M. Ali Siddiqui (Supervisor) m.siddiqui@neduet.edu.pk Prof. Dr. Alidad Chandio (Co-Supervisor) cmy@neduet.edu.pk
10	Pictures (If any)	
11	Video (If any)	https://drive.google.com/file/d/1kExE-owBFqqUtbQmvKV3hW8QoNN7QHsa/view?usp=sharing https://drive.google.com/file/d/1hmNUzJ6m47fqOPZyTIwrimhtGmqOwiRY/view?usp=sharing