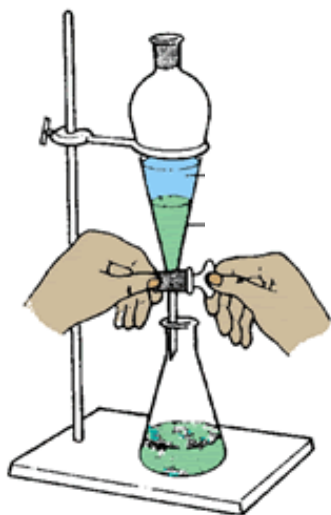
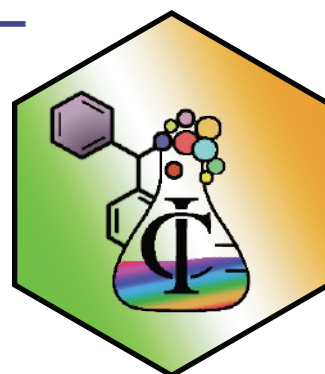


# THE FINAL WORD



The official e-newsletter  
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**JANUARY- 2022**

**M. Sc. Industrial Chemistry**

**Industrial Chemistry Department**

## MoU with ZCL Chemicals Ltd., Ankleshwer



On 10th January, MoU was signed between department of Industrial Chemistry and ZCL Chemicals Ltd for institute-industry joint Ph.D program.

**Industrial Chemistry Department**

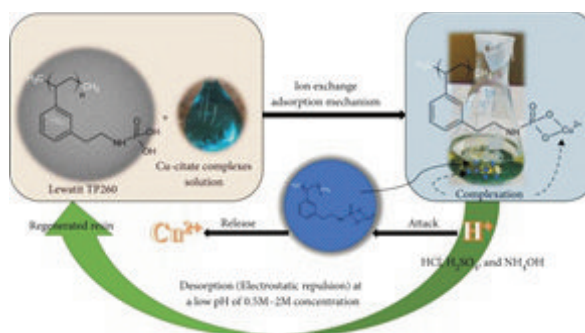
# ARTICLE

## Selective chelating resin for removal and recovery of Copper from bioleaching of E-waste

Copper (Cu) is a metal with significant usages forming an essential part of materials and products but with advancement of products the e-waste generation has also increased. Therefore, recycling of Cu is an essential and beneficial supplement to primary metal production.

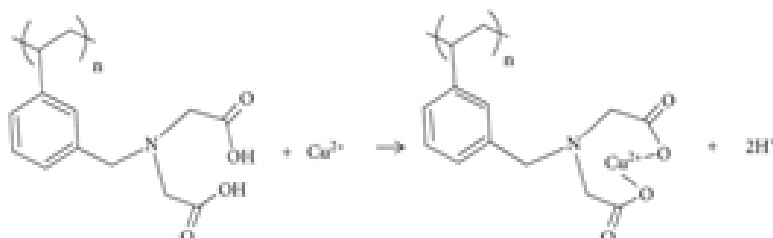
Bioleaching process is one such simple and effective technique used for leaching of valuable Cu from e-waste. It is like natural biological cycles based on the use of microorganisms. Using microorganisms from different e-wastes such as *Aspergillus niger* for leaching metals like Al, Cu, Pb, Ni, Sn, and Zn from e-waste. Based on the sorption ability and selectivity, adsorption processes by ion exchange are more effective for the recovery of metal ions from bioleaching solutions. A chelating resin sorbent basically comprises of two components, the chelate forming the functional group and a polymeric matrix that can be applied or used for the adsorption of metal ions in aqueous solutions, wastewater, and metal-organic complexes that originate from bioleaching processing.

In recent years, researchers had studied the adsorption of Cu using a new novel chelating resin called Chelex 100 and found that the chelating iminodiacetic acid functional group is able to select Cu and divalent metal from wastewater produced from the manufacture of semiconductors and printed circuit boards containing Cu (II) ions, Ni (II) ions, and Cu-citrate complexes. In addition, the pH of the solution originating from bioleaching had been studied, and it was found that Chelex also had potential for Cu (II) ions and Zn (II) ions at pH 1-5. In addition, alternative choices of chelating resin such as the bispicolylamine functional group (Dowex m4195) have been effectively used for the adsorption of Cu from strong acid media with pH lower than 2. One other option of chelating resin is the methyl phosphonic acid functional group (Lewatit) which is selective for the removal and recovery of Cu from bioleaching solutions from sulfide and Cu oxide ores at acidic pH.

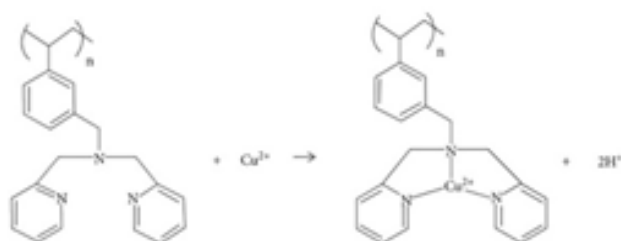


**FIGURE:1** Schematic mechanism for adsorption and desorption of copper ions using Lewatit TP260 chelating resin.

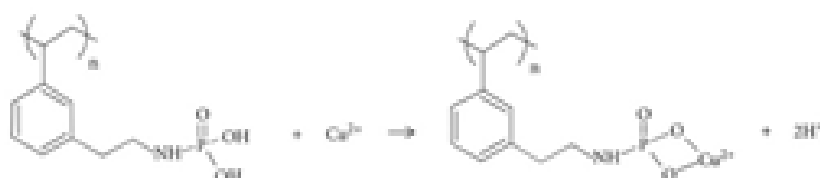
The possible sorption process reaction of copper ion removal onto iminodiacetic acid, bispicolylamine and aminomethyl groups in the acidic solution occurs as shown below



**Reaction-1** Reaction of copper ion with iminodiacetic acid group



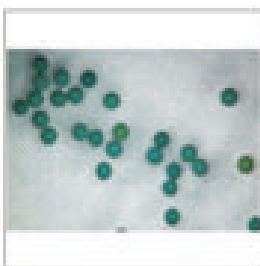
**Reaction-2** Reaction of copper ion with bispicolylamine group



**Reaction-3** Reaction of copper ion with aminomethyl group



**FIGURE:2**Microscope image before adsorption of copper (II) ion removal onto Dowex m4195.



**FIGURE:3**Microscope image after adsorption of copper (II) ion removal onto Dowex m4195.

It can be concluded from these results that selective chelating resins could be used as an alternative for the treatment of copper (II) ions contained in e-waste or application to other divalent metals in wastewater for sustainable water and adsorbent reuse as circular economy.

- Saloni Ghodasara  
(21IC80)

## Sweets words from family

We called IC family. IC department also mean it that word.

Culture of study is best and improves day by day. This department is helped us in all aspects education, personal support, future goal, our culture, festival, Sport etc.c



Ajeet Kumar Rai (2015-17)  
Production Department  
Executive ZydusCadila Healthcare Ltd.  
Dabhasa, Vadodara

## Integrated M.Sc IC (Industrial Chemistry)

Department of Industrial Chemistry of ISTAR will be introducing new program Integrated M.Sc IC (Industrial Chemistry). New program will begin from June 2022. It is a five year course which can be done after 12th science.

For further information contact : Dr. Jigar V. Patel  
(+91 98982 61951)

**Industrial Chemistry Department**