Removal of chromium & copper from the wastewater by using rose petals as adsorbent

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***Abstract*—The global population is on the rise, particularly in urbanizing regions, with developing countries projected to witness a surge of over 2.1 billion people in cities by 2030. Simultaneously, industrial activities continue to contaminate surface water. Agricultural applications have repurposed waste from rose petals to boost production in the presence of heavy metal stress. In response to effluents from industries such as Tannery, Textile, Electroplating, etc., there is a growing need for a cost-efficient and efficient alternative adsorbent for chromium and copper removal from wastewater. This study investigates the utilization of rose petals as an adsorbent for the removal of chromium and copper from wastewater. Through batch experiments, we assess the adsorption efficiency of rose petals, considering factors such as pH, contact time, and initial metal concentration. The results reveal promising adsorption capacities, indicating the potential of rose petals as a cost-effective and eco-friendly alternative for heavy metal removal. Furthermore, the study explores the practical applicability of rose petals in real wastewater scenarios. The findings contribute valuable insights into sustainable water treatment methods, showcasing the viability of using natural materials like rose petals for mitigating the environmental impact of heavy metal pollution in water bodies.**

***Keywords*—Adsorption, Heavy metals, Rose Petals**

I. INTRODUCTION

The composition of wastewater is remarkably diverse, reflecting the varied origins of its sources. Domestic sewage contributes biological contaminants such as pathogens and organic matter, while industrial effluents introduce an array of chemicals, heavy metals, and synthetic compounds. This eclectic mix poses a considerable threat to aquatic ecosystems and, consequently, human health.

Toxic heavy metals present in untreated wastewater pose severe risks, contributing to the spread of severe health issues. The prevalence of such issues underscores the urgent need for robust wastewater treatment infrastructure to safeguard human health and prevent the escalation of public health crises.

Toxic heavy metals constitute a significant wastewater pollutant. Addressing this issue necessitates the adoption of advanced treatment technologies for the removal these metals. Techniques such as chemical oxidation and reduction, liquid extraction, Electrodialysis, Adsorption, Membrane filtration, and Reverse osmosis play a crucial role in resolving this problem by effectively eliminating heavy metals from wastewater.

II. MATERIALS & METHODS

A. Preparation of adsorbent

Waste rose petals collected from nearby flower markets were cleaned without the use of pesticides and visible contaminants. After cleaning, the rose petals were washed with distilled water to eliminate surface impurities. Subsequently, the petals were allowed to dry completely by spreading them on a clean surface at low temperature. After 7 days, they were completely dried. The dried petals were then ground into a fine powder using a grinder to increase the surface area for adsorption. Finally, the rose petal powder was stored in an airtight container to prevent moisture absorption.

III. RESULT & DISCUSSION

A. Initial characterization of wastewater

Wastewater analysis was conducted based on its physical and chemical characteristics, as illustrated in in Table 1 below.

Table No: 1 Initial Characteristics of Wastewater

Si. No	Parameters	Concentration(mg/L)
1.	pH	11.67
2.	Turbidity	65 NTU
3.	Total Solids	14908 mg/L
4.	Hardness	979 mg/L
5.	Alkalinity	1429 mg/L
6.	Acidity	Nil
7.	Sulphates	12844 mg/L
8.	Chlorides	945 mg/L
9.	Dissolved Oxygen	Nil
10.	Chemical Oxygen Demand	997 mg/L

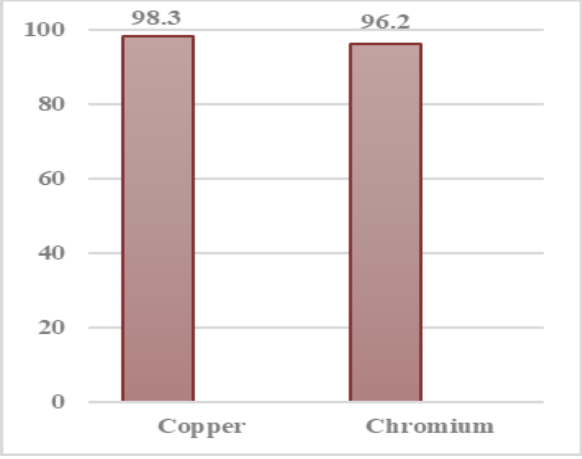
B. Dosage of adsorbent & Removal efficiency for copper and chromium using rose petals as adsorbent

Table No: 2 Absorbance levels at various dosages in chromium & copper

Copper		
Initial concentration (mg/L)	Dosage (g)	Absorbance
14.3	0.5	0.057
14.3	1	0.035
14.3	1.5	0.068
14.3	2	0.073

Chromium		
Initial concentration (mg/L)	Dosage (g)	Absorbance
6.8	0.5	0.079
6.8	1	0.061
6.8	1.5	0.034
6.8	2	0.053

Fig No: 1 Removal efficiency for chromium & copper



IV. CONCLUSION

This study explored the use of rose petals to remove copper and chromium from wastewater. The rose petals acted as an adsorbent, achieving a maximum removal efficiency of 98.3% for copper with a dosage of 1g, and 96.2% for chromium with a dosage of 1.5g.

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