REMOVAL OF COPPER FROM WASTE WATER USING PADDY HUSK

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Abstract—**Paddy husk is the adsorbent used to remove the various metal ions from waste water. Several parameters such as adsorption dosage, pH and contact time and metal ion concentrations can be used. At the optimum conditions, the Cu(II) ions removed from waste water are 29.75,9.09,87.33 and14.12 respectively. This study focus on the removal of Cu(II) from aqueous solution using Paddy husk.**

Keywords- **Cu (II), paddy husk, adsorption**

I. INTRODUCTION

Pollution has harmful effects on biological systems. Ever year industries produce 262.4 million tons of municipal waste. In developing countries small scale as well as big industries discharges untreated waste. [(1)]
Varieties of pathogenic microorganisms present in water and can cause immense danger to public health. The technique of controlling water pollution prevents water borne diseases which are in the current usage. Several elements are in polluted water zinc and copper is widely used in daily life [(1)]. Waste water contains heavy metals like Cr(II),Cd(II),Cu(II), Zn(II) etc., are very dangerous to the environment [(2)].
Many methods are used to remove metal ions from waste water such as chelating ion exchange, co-precipitation, solvent extraction and adsorption.
Adsorption is considered an applicable technique for the removal of toxic metals from waste water. The concentration of any component only on the surface of the solid or liquid is known as adsorption [(3)].
Copper is the essential element needed for human, which is required daily for the adult is 2.0mg [(1)]. Copper is a very highly toxic metal, which are carcinogenic and mutagens in nature[(4),(5),(6)].
Paddy husk is used to removal of toxic metals from wastewater in adsorption process. It is low cost material but high surface area.

The extent of adsorption depends on surface area, because adsorption is a surface phenomenon.

II. EXPERIMENTAL

A. Materials

Standard CuSO4 solution, Sodium thio sulphate, EBT, Na_2EDTA, buffer, 10% KI, Starch

B. Procedure

Paddy husk were collected and powdered. This was used as the adsorbent. To evaluate the effect of the following parameters on adsorption kinetics were done by standard procedures.

1. Adsorption dosage
2. Contact time
3. pH
4. Metal ion concentration

C. Calculation

% Removal of the metal ions from the solution= Amount of metal adsorbed/Initial Concentration X 100

III. RESULTS AND DISCUSSION

The present work deals with the adsorption of Cu(II) on paddy husk. The result is displayed in the Table1. From the results the effect of adsorbent dosage, Contact time, pH, various concentration of metal ions could be obtained.

Table 1

S.No	Adsorbent Dosage (gm)	% Removal of Cu(II)	Contact Time (min)	% Removal of Cu(II)	pH	% Removal of Cu(II)	Initial Conc.	% Removal of Cu(II)
1.	0.5	15.17	10	0.835	2	33.06	37.425	6.45
2.	1	18.18	20	1.66	3	87.47	49.9	12.25
3.	1.5	24.96	30	2.48	4	81.82	62.38	13.12
4.	2	28.1	40	4.14	5	86.78	74.85	13.70
5.	2.5	29.75	50	9.09	-	-	87.33	14.12

Effect of Adsorbent Dosage

The various adsorbent dosage of paddy husk on the removal of Cu(II) from 0.01N solutions was studied at their optimum pH and time at room temperature. It was found that, as the adsorbent dosage increased from 0.5 to 2.5gm the percentage removal of metal ions also increased continuously. Since the extent of adsorption depends on surface area, because adsorption is a surface phenomenon. When surface area of the adsorbent increased the rate of adsorption also increased [(7)].

From the Figure.1, it was observed that, the removal of Cu(II) was found to be 29.75 with the adsorbent dosage of 2.5gm of paddy husk.

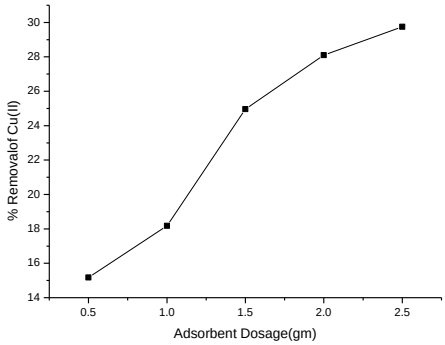

Figure 1, % Removal of Cu(II) at various adsorbent

Effect of Contact time

The effect of contact time on adsorption of Cu(II) ions from 0.01N using 1.5gm paddy husk was studied at room temperature. The percentage removal of Cu(II) ions increased from 0.83% to 9.03%. When contact time increase from 10min to 50 min. Hence it has been proved from the result that adsorption and contact time in direct proportion.

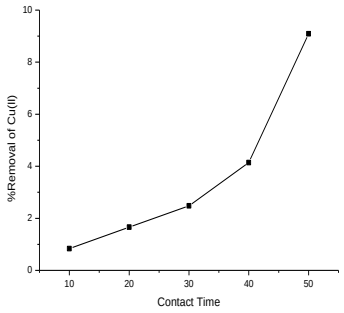

Figure.2,**% Removal of Cu(II) at various contact time**

Effect of pH

pH is an important parameter in the adsorption process [(8).]The effect of pH on the removal of Cu(II) ions from 0.01N using 1.5gm paddy husk was studied at various pH ranging from 2 to 5. Figure.3, it was observed that removal of Cu(II) ions increased from 33% to 87.78% at increase from 2 to 5.

At lower pH value , H^+ compete with metal cation for the exchange sites in the system. The heavy metal cations are completely released under circumstance of conditions. The minimum adsorption at low pH(pH=2) may due to the fact high concentration and high mobility of H^+ ions[(9)].

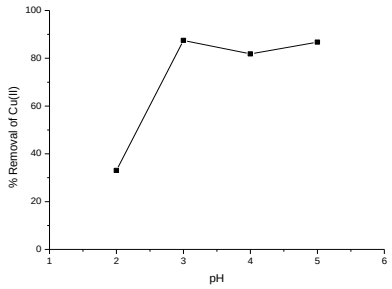

Figure.3, % Removal of Cu(II) at various pH

Effect of metal ion concentration

In adsorption, various metal ion concentrations was studied by conducting batch experiments using 1.5gm of adsorbent at room temperature. It was observed that when the metal ion concentration increases, adsorption also increases.

The percentage removal of Cu(II) ions increased from 6.4% to 14.12% with various concentrations. The increase in metal ion concentration increased the surface coverage on the biomass.

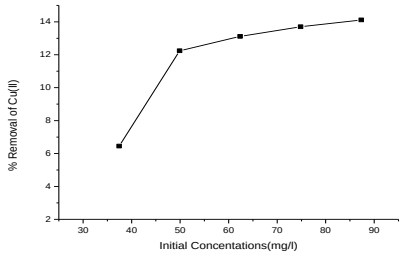

Figure.4, % Removal of Cu(II) at various concentration

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CONCLUSION

The results obtained revealed that,

The rate and the amount of removal of cu(II) from waste water increased from 15.17 % to 29.7% as the amount of adsorbent increased from 0.5 gm to 2.5 gm. The percentage reduction of metal ions increased with increase in pH. The rate of adsorption increased with respect to contact time. The initial concentration of the metal ions increased, the amount of removal of Cu(II) also increased with 1.5g of paddy husk. So, the paddy husk is very efficient adsorbent to remove the toxic metal ions of Cu(II) from waste water.

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