

# “A Survey on Bio Adsorbent Filter by using Corn Cobs”

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**Abstract**— The present investigation centers around the utilization of Corn cob as a viable and proficient adsorbent for the removal of Ni (II) from fluid arrangement. The impact of Physico-concoction parameters, for example, Adsorbent Dosage, Contact time, pH and Initial fixation has been inspected in Batch thinks about. The initial and lingering grouping of Ni (II) was broke down utilizing UV-Double Beam assimilation spectrophotometer at 394 nm by which the rate removal can be figured. The harmony information onto the adsorption of Ni (II) was estimated utilizing Langmuir and Freundlich Isotherm demonstrate. The outcomes uncovered that Corn cob, a waste material have great potential as an adsorbent for the removal of lethal overwhelming metal like Ni (II) from Industrial waste water..

**Keywords**— Adsorption, Corn cob, Ni (II) Removal and Adsorption Isotherm.

## I. INTRODUCTION

As of late, Heavy metals are discharged into the condition because of quick Industrialization and Urbanization causing an extraordinary issue around the world [1]. The contamination jumps out at waste water is poisonous and that taints the ground water and amphibian biological community [2]. One of the imperative harmful Overwhelming metal Ni (II) discovers its own particular manner of the water assemblages of Ni (II) mining and by ventures [3, 4]. Because of the take-up of high centralization of Ni (II) from the groundwater that not just influences the sea-going life yet in addition the Human creatures causing Lung Cancer, Nose Cancer, Respiratory Failure, Unfavorably susceptible Reactions and so on [5, 6]. So it is important to evacuate the Ni (II) from the Industrial squander before being released into water streams.

There are number of procedures has been utilized for the treatment of waste water, for example, Reverse Assimilation, Chemical Reduction, Ion-Exchange, Electro dialysis and Activated Carbon adsorption Dangerous and Environmentally unacceptable synthetic substances [7, 8]. The adsorption utilizing Agro-based plant squander comprises of lignocellulosic materials Arunkumar, C, et al. 326 that are observed to be financially savvy, eco-accommodating and simple option in expelling the substantial metals [9, 10, 11]. The present investigation is gone for the adsorption on Agro modern waste Corn cob as a capacity of Adsorbent Dosage, Contact time, pH and Initial fixation then the balance information for adsorption thinks about is clarified by Langmuir and Freundlich Isotherm show.

## II. MATERIALS AND METHODS

Corn cob as an Adsorbent for Adsorption thinks about Corn cob was gathered from the nearby market of Tiruppur District, India and was washed with Refined water. The gathered example was the broiler dried at 80°C for 8 hours, at that point pounded and sieved utilizing different size sifters. At long last 250 micron measure particles were utilized for further tests. Arrangement and Analysis of Metal Ion arrangement Every one of the Chemicals were bought from Hi-Media what's more, utilized without change. Refined water is gotten from Milli-Q water framework (Millipore Enterprise) and separated to evacuate any polluting influences. The stock answer for Ni (II) was arranged by dissolving 4.48 g for Anhydrous Nickel Sulfate in one liter of refined water and the last convergence of Ni (II) arrangement was gotten as 1000 ppm from which the stock arrangement was weakened with refined water to get the distinctive convergence of Metal arrangements. Utilizing UV-Double Beam Adsorption

Spectrophotometer (LAB INDIA-UV 3092) the beginning and lingering convergence of Ni (II) was dissected at 394 nm.

Biosorption Studies Biosorption considers were performed in rotational shaker at 200 rpm utilizing 250 ml Erlenmeyer cups containing the known amount of Corn cob (Adsorbent) with 100 ml of Ni (II) arrangement. The different parameters for the adsorption of Ni (II) for example, Adsorbent Dosage, Contact time, pH and Starting focus has been inspected in Batch thinks about and the motor investigations utilizing Langmuir and Freundlich Isotherm were additionally assessed. The filtrate was expelled from the adsorbent arrangement what's more, separated utilizing Whatmann No.1 channel paper and the rate expulsion of Ni (II) was resolved by UV Spectrophotometer. The measure of Ni (II) adsorbed by the adsorbent and the rate expulsion of Ni (II) was computed utilizing the following Equations.

$$Q = (C_0 - C_e) \text{ Removal Percentage of Ni (II)} = C_0 - C_e / C_0 \times 100$$

Where, Q - Adsorption capacity of Corn cob Co-Initial concentration of Nickel Ce- Residual concentration of Nickel

### III. RESULTS AND DISCUSSION

**Impact of Adsorbent Dosage on Biosorption of Ni (II) :**The impact of Adsorbent dose on Biosorption explore was contemplated by differing the measure of adsorbent Corn cob from 1 to 7 g at pH 6 out of a 250 ml cone shaped jar and kept in orbital shaker for 120 min. The absorbance of the separated arrangement was estimated utilizing UV Spectrophotometer at 394 nm furthermore, the chart was plotted between the Adsorbent Measurements VS Percentage expulsion of Ni (II) from the arrangement as appeared in Figure 1. The rate evacuation was gotten at 70.08 % to 6 g of Corn cob and further increment in the Biosorption measurements does not cause any change is expected to the accessibility of additionally restricting locales in the surface of Biosorbent at adsorption locales [6, 12, 13].

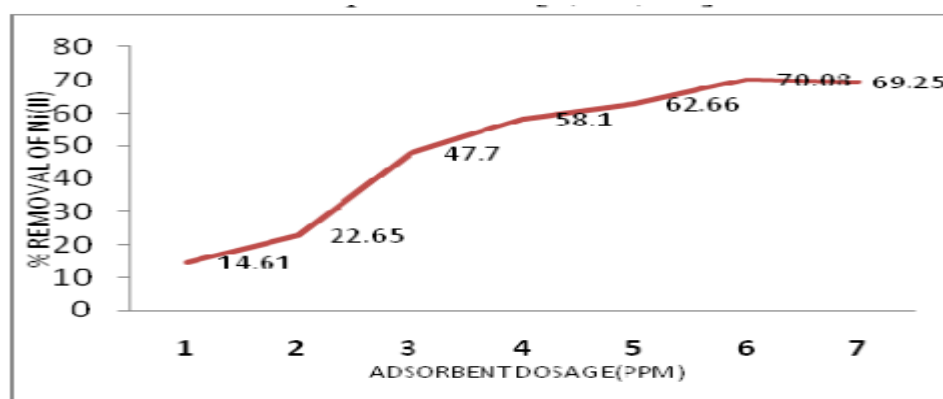


Fig.1 Effect of Adsorbent Dosage VS Percentage removal of Ni (II)

**Impact of pH on Biosorption of Ni (II) :**The impact of pH on the adsorption of Ni (II) in fluid arrangement was completed over the pH scope of 1 to 9 by keeping every one of the parameters steady with an ideal Corn cob of 6g at pH 6 what's more, 90min contact time. The chart was plotted between various convergences of pH VS Rate evacuation of Nickel as appeared in Figure 2, which demonstrates the greatest expulsion proficiency of Ni (II) at pH 6 as 71.01%. The rate expulsion increments up to pH 6 after the evacuation proportion were diminished because of H<sup>+</sup> furthermore, OH<sup>-</sup> particles present in the arrangement [14, 15, 16].

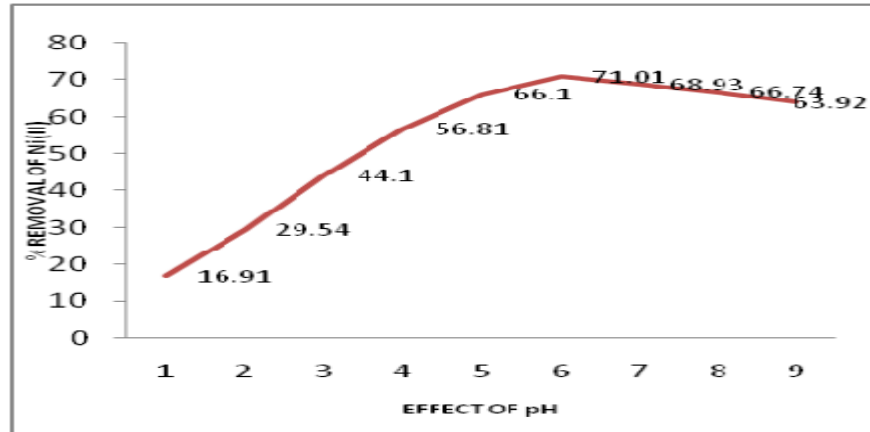


Fig.2 Effect of pH VS Percentage removal of Ni (II)

**Impact of Agitation Time on Biosorption of Ni (II):** Biosorption thinks about on the impact of Agitation time was performed for the evacuation of Ni (II) with an ideal adsorbent of 6g at pH 6 by shifting the contact time from 15 to a hour and a half. The rate evacuation of Ni (II) was 70.9 % at 90 min was watched and the diagram was plotted between Contact time VS Percentage evacuation of Ni (II) as appeared in Figure 3. The rate on the evacuation of Ni (II) was higher at the underlying stage is for the most part because of the bigger openness of dynamic destinations in the adsorbent and after 90 min it compasses to harmony because of the lesser accessibility of dynamic destinations [17, 18].

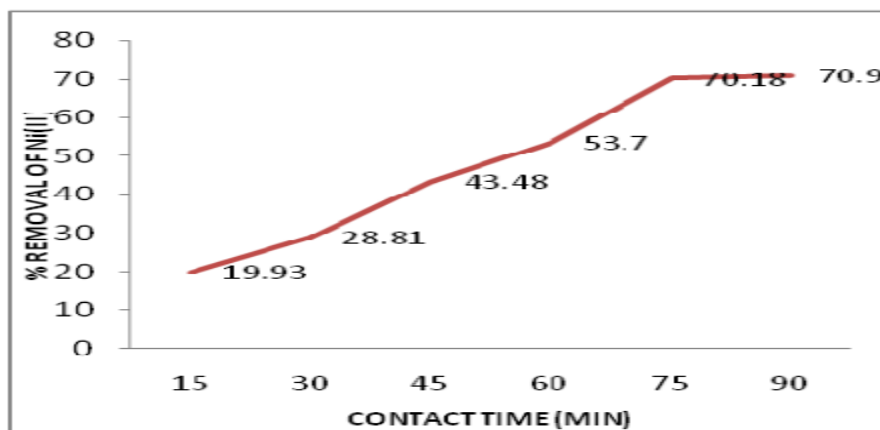


Fig.3 Effect of Contact time VS Percentage removal of Ni (II)

**Impact of Initial Concentration on Biosorption of Ni (II) :**The impact of Initial Concentration for the expulsion of Ni (II) were completed by shifting the Focus from 25 ppm to 150 ppm per 100 ml arrangement with an adsorbent of 6g at pH 6 with a contact time of 90 min and the diagram was plotted between the Initial Concentration VS Percentage evacuation as appeared in Figure 4 from that the expulsion proficiency of Ni (II) was seen as 86.08 % for 25 ppm and 67% for 150 ppm. The rate expulsion was higher with lower introductory fixation, at that point the most noteworthy focus was because of the accessibility of all the more restricting destinations at the starting phase of the Adsorbent [19, 20].

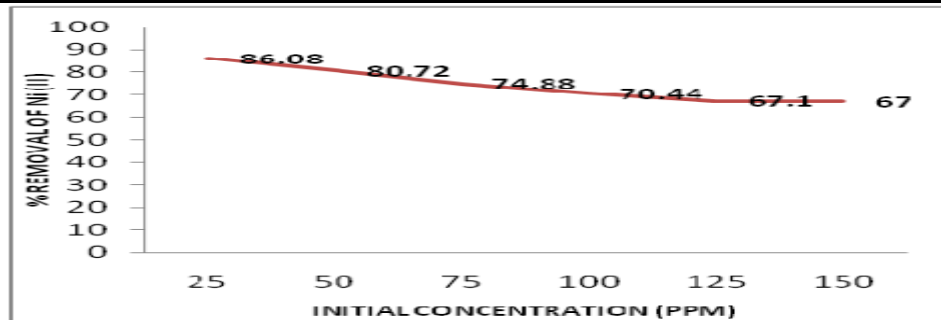


Fig.4 Effect of Initial Concentration on Biosorption of Ni (II)

**Biosorption Isotherm:** Adsorption Isotherms are the numerical models used to recognize the metal take-up per unit weight of the adsorbent to have a balance convergence of the adsorbate [21]. The aftereffects of the present investigation in the adsorption of Ni (II) on to Corn cob were broke down utilizing the known models for example, Langmuir and Freundlich that are associated with the measure of adsorbate on the adsorbent.

**Langmuir Isotherm :** Langmuir demonstrate is the hypothetical model depicts the adsorption of Adsorbate (An) onto the surface of the Adsorbent (S) for the evacuation of Ni (II) in the watery arrangement [22]. The Langmuir isotherm condition is gotten from reasonable thought and is given by,

$$1/(X/m) = 1/q_m + 1/K_A \cdot q_m (1/C_e)$$

Where,

X/m - Amount adsorbed per unit weight of adsorbent Corn cob (mg/g)

$K_A \cdot q_m$  - Constants

$K_A$  - Rate of adsorption

$q_m$  - Adsorptive capacity of Corn cob,

$C_e$  - Equilibrium concentration of the adsorbate in solution after adsorption (mg/l).

A graph was plotted between  $1/C_e$  VS  $1/(X/m)$  as shown in Figure 5 and the value of  $K_A = 0.2942$  and  $q_m = 0.0026$  was calculated. The Langmuir isotherm can be expressed in terms of a dimensionless value  $R_L$ , is defined as

$$R_L = 1 / (1 + K_A \cdot C_0)$$

Where,

$R_L$  - Indicates the Isotherm

$C_0$  - Initial concentration (mg/l).

There are four probabilities for the values of  $R_L$  as shown in Table 1. The values of  $R_L$  is 0.007 for the studied system at different dosage were found to be in between 0 to 1 which indicate favorable adsorption of Ni (II) onto the adsorbent Corn cob [13, 23, 24].

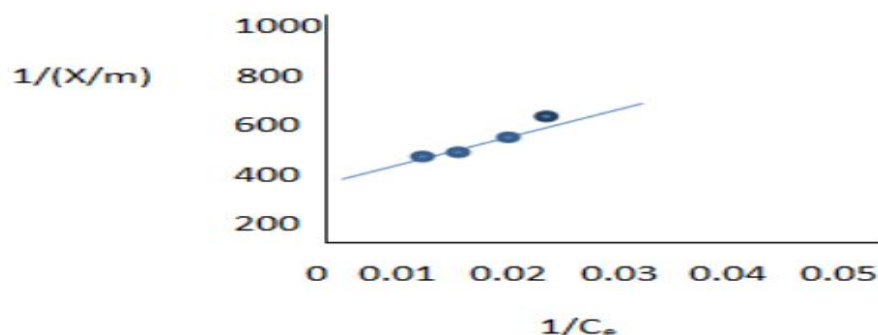


Fig. 5 Langmuir Isotherm

$R_L$	Type of Isotherm
$R_L > 1$	Unfavorable
$R_L = 1$	Linear
$0 < R_L < 1$	Favorable
$R_L = 0$	Irreversible

Table 1: Comparison Ranges of  $R_L$  Values

**Freundlich Isotherm:** For heterogeneous surfaces the Freundlich isotherm model can be applied and the linearized Freundlich model isotherm can be applied for the adsorption of Ni (II) [25] and expressed as

$$\text{Log } (X/m) = \text{Log } K_F + 1/n (\text{Log } C_e)$$

Where,

$x/m$  - Amount of Nickel adsorbed at equilibrium (mg/g)

$C_e$  - Equilibrium concentration of Nickel in solution (mg/l).

$K_F$  – Adsorption Capacity

$n$  – Adsorption Intensity.

The graph was plotted between the logarithmic plot of  $C_e$  VS  $X/m$  to evaluate the constants from which the value of the intercept  $\text{Log } K_F = 0.0289$  was calculated as shown in Figure 6. The slope of the line will give the value of  $1/n = 0.78$ . The result indicated that the adsorbent has several different types of adsorption sites and the calculated  $n$  value 1.28 indicates good adsorption of Ni (II) on Corn cob [26, 27, 28].

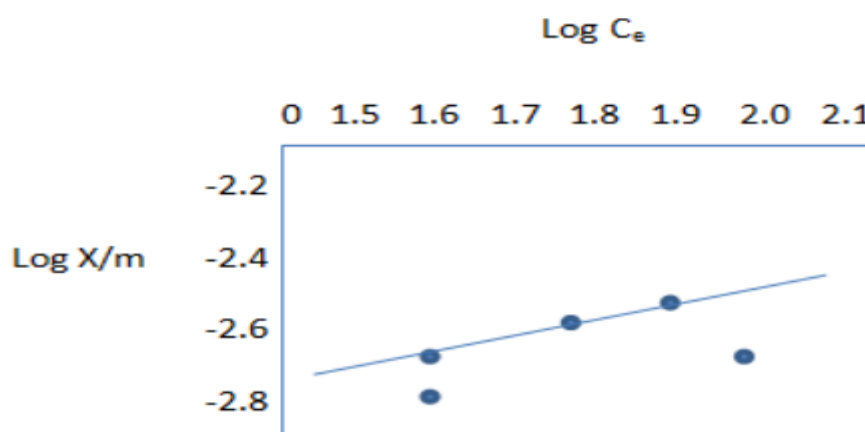


Fig.6 Freundlich Isotherm

#### IV. CONCLUSION

The present examination demonstrates that Corn cob was a viable Biosorbent for the adsorption of Ni (II) particles from the fluid arrangement. The impact of Adsorbent Dosage, Contact time, pH and Initial fixation were contemplated. From the examinations, the utilization of Ni (II) particles by the biomass was expanded with expanding metal particle fixation. The greatest evacuation rate was 70.08 % to 6 g of adsorbent and further expansion of adsorbent did not bring on any adjustment in the expulsion proficiency. The higher rate expulsion of Ni (II) at pH 6 was 71.01 % that demonstrates the expulsion productivity is limited because of  $H^+$  and  $OH^-$  particles present in the arrangement. The harmony fomentation time for the rate evacuation was 70.9 % at an

ideal time of 90 min that uncovers Ni (II) evacuation increments with an expansion in the fomentation time. On shifting the grouping of the Ni (II), the most extreme and least evacuation rate of Ni (II) on to the adsorbent was 86.08 % for 25 ppm and 67% for 150 ppm which shows up the rate evacuation is greatest at lower fixation. Adsorption Isotherms were examined utilizing Langmuir and Freundlich display for the adsorption thinks about. This sort of non-Hazardous Agro-squander materials like Corn cob gives off an impression of being minimal effort, eco-accommodating and simple option of utilizing synthetic compounds for the expulsion of Heavy metals to conquer natural contamination. Affirmation The creators thank the Principal and Department of Petrochemical Technology, Sri Ramanathan Designing College, Tiruppur, India for giving the fundamental offices.

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