



**HANSRAJ COLLEGE**

**University Of Delhi**

**NAAC Grade A++ with CGPA 3.71**



## **Academic session- 2024-2025**

**Event Name:- 2<sup>nd</sup> International Seminar Session**

**Organized By:- Institution's Innovation Council**

**Date:-22<sup>nd</sup> February 2025**

**Resource person:** Dr. Srinivas Tadepalli, Assistant Professor, Imam Muhammad Bin Saud Islamic University, Department of Chemical Engineering, P.O. Box 5701, Riyadh-11432 Saudi Arabia

**Coordinators:** **Dr. Hari Mohan Meena, Dr. Ambika**

**No. of Participants:** Dr. Jnaneswari, Dr. Ridhi Khurana,

**Mode of Session Delivery (Online/Offline/Hybrid):-Online**

### **Report:-**

Institution's Innovation Council Hansraj College, Delhi organized the 2nd International Seminar Session activity under Shakti-an initiative of HRC disha under IQAC on 22<sup>nd</sup> February 2025 through online mode. The program was coordinated by Dr. Hari Mohan Meena, and Dr. Ambika, (IIC convener). The resource person of the session was Dr. Srinivas Tadepalli, Assistant Professor, Imam Muhammad Bin Saud Islamic University, Department of Chemical Engineering, P.O. Box 5701, Riyadh-11432 Saudi Arabia.

Dr. Srinivas Tadepalli presented the use of kinetics studies and isotherms in the removal of hazardous heavy metals from industrial effluent. According to him, the adsorbents and adsorption isotherms are very important for determining how the concentration of heavy metal ions in a solution (adsorbate) affects the amount of metal ions that are adsorbed onto the surface of an adsorbent at equilibrium. These isotherms show how much heavy metal can be absorbed by a certain amount of adsorbent at a certain concentration, while the adsorbent

itself provides the surface area and functional groups needed to bind and remove heavy metal ions from the solution. Together, they determine how well the heavy metal removal process works. Many times, the Langmuir, Freundlich, and Dubinin-Astakhov models are used to fit experimental data and explain how adsorption works. However, each model makes different assumptions about the adsorption sites and how they interact with each other. Isotherm model fitting gives important details for judging how well an adsorbent works, like how it adsorbs, how much it can hold, and the basic rules of the adsorption process. He also addressed that the kinetics models are very important because they tell us, how fast heavy metal ions stick to the surface of an adsorbent. This affects how quickly and effectively the metal is removed from a solution and is affected by things like contact time, temperature, and the initial concentration of the metal ions. Knowing kinetics lets you improve adsorption processes so that they remove metal as efficiently as possible in the shortest amount of time. However, he explained the best model fitting doesn't always work with equivalent methods in different heavy metal studies. He advised college students that heavy metals such as lead, mercury, arsenic, cadmium, and chromium are extremely poisonous and can lead to several health issues contingent upon the degree of exposure and the particular metal in question. A significant number of students participated in the whole session, and some had inquiries, which the speaker addressed.

**Attendance:** Total Attendees: 24

## Attendance Sheet

The screenshot shows a Zoom meeting in progress. The top part displays a presentation slide titled "CHARACTERIZATION OF MIXED ADSORBENT" with a table of properties and a graph. Below the slide, the participant list is visible, showing 21 participants. The list includes Hari Mohan Meena (me), Hansraj College (Host), Dr. Srinivas Tadepalli, Hari Mohan Meena, Jnaneswari, and ridhi khurana. The bottom of the screen shows the Zoom controls with a microphone icon, a "Start video" button, and a "Participants" button with a count of 21.

The screenshot shows a Zoom meeting in progress. The top part displays a presentation slide titled "BRIEF OUTLINE OF THE PRESENTATION" with a list of topics. Below the slide, the participant list is visible, showing 24 participants. The list includes Hari Mohan Meena (me), Hansraj College (Host), Dr. Srinivas Tadepalli, Hari Mohan Meena, ridhi khurana, and a section for "Attendees (19)". The bottom of the screen shows the Zoom controls with a microphone icon, a "Start video" button, and a "Participants" button with a count of 24.

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Attendees (21)

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Aun Hussain

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Bhumika Garg

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Himanshi Agrawal

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Ishu Tomar

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Jahnabi Goyary

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Khushal sharma

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Mohini Singh

MC

Muskan Chetry(Hansraj College)

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Attendees (20)

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Bhumika Garg

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Ishu Tomar

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Jahnabi Goyary

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Khushal sharma

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Mohini Singh

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Muskan Chetry(Hansraj College)

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Shubham

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Taniya Nagar

**BATCH STUDY PROCEDURE- ADSORPTION MECHANISM**

Fig. 1: Mechanism of Adsorption

Dr. Srinivas Tadepalli's screen

**CHARACTERIZATION OF THE MIXED ADSORBENT**

Figure 1.1: UV-Vis spectrum of the mixed adsorbent before adsorption

Figure 1.2: UV-Vis spectrum of the mixed adsorbent after adsorption for Pb(II)

Dr. Srinivas Tadepalli's screen

**ANALYSIS OF LANGMUIR ISOTHERM DATA FOR SINGLE METAL IONS (Pb(II) & Cu(II))**

Figure 4.19: Langmuir isotherm plot for Cu(II) at 5 g/L adsorbent dosage, pH 5.0, 180 rpm, 2 hrs contact time, 25 °C

Figure 4.20: Langmuir isotherm plot for Cu(II) at 3 g/L adsorbent dosage, pH 5.0, 180 rpm, 2 hrs contact time, 25 °C

Dr. Srinivas Tadepalli's screen

**KINETIC MODELING OF BATCH STUDIES: PSEUDO FIRST ORDER MODEL**

The kinetic models include the pseudo first order equation and pseudo second order equation. The pseudo first order and second order modeling has been carried out for both the metals at the optimized conditions of each parameter obtained in the batch study (pH 5,  $T = 40^\circ\text{C}$ , initial Metal ion concentration of 50 ppm and adsorbent dosage of 5 g/L).

Table 4.19: Pseudo first order model equation for Cu(II) at optimized conditions				
PPH conditions	Model equation	$R^2$	$K_{1st}$	$Q_{1st}$
$T = 40^\circ\text{C}$	$y = 0.0115x + 0.17$	0.9158	0.1101	0.17
MBC = 100 ppm	$y = 0.0113x + 0.17$	0.920	0.0964	0.166
Adsorbent dosage 5 g/L	$y = 0.0113x + 0.17$	0.9158	0.11	0.166

Table 4.20: Pseudo first order equation for Cu(II) at optimized conditions				
PPH conditions	Model equation	$R^2$	$K_{1st}$	$Q_{1st}$
$T = 40^\circ\text{C}$	$y = 0.0115x + 0.17$	0.9158	0.1101	0.17
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Dr. Srinivas Tadepalli's screen