Review Form 3

Journal Name:	**Asian Journal of Chemical Sciences**
Manuscript Number:	**Ms_AJOCS_126196**
Title of the Manuscript:	**A Review On Waste Water Treatment Using Electrocoagulation for Heavy Metals**
Type of the Article	**Review Article**

Review Form 3

PART 1: Review Comments

Compulsory REVISION comments	**Reviewer's comment**	**Author's Feedback** *(Please correct the manuscript and highlight that part in the manuscript. It is mandatory that authors should write his/her feedback here)*
Please write a few sentences regarding the importance of this manuscript for the scientific community. Why do you like (or dislike) this manuscript? A minimum of 3-4 sentences may be required for this part.	**I appreciate this manuscript for its thorough examination of electrocoagulation as a promising method for treating heavy metal-laden wastewater. Its relevance to current environmental challenges and its potential to influence future research make it a valuable contribution to the scientific community.**	
Is the title of the article suitable? (If not please suggest an alternative title)	**Yes**	
Is the abstract of the article comprehensive? Do you suggest the addition (or deletion) of some points in this section? Please write your suggestions here.	**The abstract of the article "A Review On Waste Water Treatment Using Electrocoagulation for Heavy Metals" provides a concise overview of the key themes and objectives of the study. Here's an evaluation of its comprehensiveness and suggestions for improvement:** **The abstract should written in the following format:** • Importance: • Research Gap: • Objective: • Methodology: • Key Findings: • Implications: • Conclusion: **Overall, the abstract is comprehensive but, these additions would provide a more complete picture of the significance and relevance of the study.**	
Are subsections and structure of the manuscript appropriate?	**No, the manuscript's subsections and structure should be appropriate if they follow a logical flow and clearly define each section. A well-structured manuscript will facilitate better understanding and engagement from the readers.** **1. Introduction** • **Background** o Overview of wastewater contamination by heavy metals and its environmental and health impacts. o Importance of treating heavy metals in wastewater to ensure sustainable water resources. • **Overview of Electrocoagulation (EC)** o Brief introduction to the electrocoagulation process as a method for treating wastewater. o History and development of EC technology for water treatment. • **Research Objective** o Aim to review the recent advances in the use of electrocoagulation for the removal of heavy metals from wastewater. o Significance of the study in advancing the understanding of EC mechanisms, efficiency, and challenges. **2. Materials and Methods** • **Literature Selection Criteria**: o **Sources of Literature**: Databases used (e.g., Science Direct, IEEE Xplore, Google Scholar). o **Inclusion Criteria**: Time frame (e.g., studies published from 2010–2024), focus on electrocoagulation for heavy metal removal, and peer-reviewed articles. o **Exclusion Criteria**: Studies with a focus on other wastewater treatment methods without mention of electrocoagulation. • **Data Collection and Analysis**: o **Data Extraction**: Key parameters considered (e.g., electrode type, current density,	

removal efficiency, operational costs).
  - **Evaluation Metrics**: Description of metrics used to assess the effectiveness of electrocoagulation (e.g., removal efficiency percentage, energy consumption).
  - **Analysis Methods**: Statistical methods or qualitative synthesis for comparing different studies.

3. Discussions

3.1. Fundamentals of Electrocoagulation

- **Principle of Electrocoagulation**
  - Explanation of the basic working principle of EC, including electrode reactions and floc formation.
  - Mechanisms of heavy metal removal (adsorption, charge neutralization, and precipitation).
- **Components of Electrocoagulation Systems**
  - Description of typical EC setups, including electrodes (materials, arrangement), power sources, and reactor design.
  - Importance of electrode material (e.g., aluminum, iron) selection on the treatment process.

3.2. Heavy Metal Contamination in Wastewater

- **Sources and Types of Heavy Metals in Wastewater**
  - Common heavy metals in wastewater (e.g., lead, cadmium, chromium, arsenic, zinc).
  - Sources of heavy metal contamination (industrial effluents, mining activities, urban runoff).
- **Environmental and Health Impacts of Heavy Metals**
  - Overview of the toxicological effects of heavy metals on ecosystems and human health.
  - Importance of regulatory limits for heavy metals in treated water.

3.3. Electrocoagulation Process Parameters

- **Key Operational Parameters**
  - Current density, voltage, and duration of treatment.
  - pH of the wastewater and its effect on the electrocoagulation process.
  - Electrode material and configuration.
- **Impact of Operational Parameters on EC Efficiency**
  - Analysis of how variations in parameters affect the removal efficiency of heavy metals.
  - Optimization strategies for achieving maximum removal efficiency.

3.4. Recent Advances in Electrocoagulation for Heavy Metals Removal

- **Hybrid Systems and Integrated Approaches**
  - Review of studies combining EC with other methods (e.g., adsorption, flotation, membrane filtration) for enhanced performance.
- **Case Studies and Real-World Applications**
  - Overview of practical applications of EC for heavy metal removal in different industries.
  - Comparison of lab-scale and field-scale studies.

3.5. Advantages and Limitations of Electrocoagulation

- **Benefits of EC in Heavy Metal Removal**
  - Discussion of EC's advantages such as simplicity, low chemical requirement, and sludge production.
  - Energy efficiency and cost-effectiveness.
- **Challenges and Limitations**
  - Issues such as electrode passivation, sludge management, and operational costs.
  - Addressing the scalability challenges of EC systems for large-scale applications.

3.6. Comparison with Other Treatment Technologies

- **Overview of Alternative Methods**
  - Brief description of other technologies like chemical coagulation, ion exchange, adsorption, and reverse osmosis.
- **Comparative Analysis of EC with Other Techniques**
  - Comparison in terms of efficiency, cost, ease of operation, and environmental impact.
  - Discussion on why EC is preferred or not in certain contexts.

3.7. Future Perspectives and Research Directions

- **Potential Areas for Improvement**

	o Suggestions for optimizing electrode materials, configurations, and process parameters. • **Emerging Trends** o Advances in modeling and simulation of EC processes for better prediction and control. • **Opportunities for Field-Scale Implementation** o Recommendations for scaling up EC processes and integrating them into existing wastewater treatment plants. **9. Conclusion** • **Summary of Key Findings** o Recap of the effectiveness of electrocoagulation in removing heavy metals. • **Final Thoughts** o Emphasis on the role of EC in sustainable wastewater treatment. o Call for further research and development to address existing challenges. **10. References**	
Please write a few sentences regarding the scientific correctness of this manuscript. Why do you think that this manuscript is scientifically robust and technically sound? A minimum of 3-4 sentences may be required for this part.	**The manuscript titled "A Review On Waste Water Treatment Using Electrocoagulation for Heavy Metals" demonstrates scientific robustness and technical soundness through several key aspects:** • **Comprehensive Literature Review:** The manuscript provides a thorough examination of existing literature on electrocoagulation (EC) as a method for treating wastewater containing heavy metals. It highlights the effectiveness of EC in removing various heavy metals such as mercury, arsenic, and lead, which is supported by numerous studies. • **Advantages of Electrocoagulation:** The paper outlines the numerous advantages of electrocoagulation over traditional methods, including cost-effectiveness, simplicity of equipment, and environmental compatibility. It emphasizes that EC does not require external chemicals, which reduces handling and storage issues, thus enhancing safety and cost savings. • **Technical Mechanisms:** The manuscript discusses the technical mechanisms involved in electrocoagulation, such as the role of sacrificial anodes that release active coagulant flocs into the solution. This detail indicates a solid understanding of the electrochemical processes at play, which is crucial for evaluating the method's effectiveness. • **Operational Factors:** The paper addresses important operational factors, such as the influence of temperature on the efficiency of pollutant removal and system stability. This consideration of operational parameters adds depth to the analysis and reflects a comprehensive approach to the subject matter. • **Emerging Popularity:** The manuscript notes the growing popularity of electrocoagulation as a viable treatment method due to its adaptability and environmental friendliness. This trend is supported by recent advancements in the field, indicating that the authors are aware of current developments and their implications for wastewater treatment. **In summary, the manuscript is scientifically robust and technically sound due to its comprehensive literature review, detailed discussion of electrocoagulation mechanisms, consideration of operational factors, and acknowledgment of the method's growing relevance in wastewater treatment.**	
Are the references sufficient and recent? If you have suggestions of additional references, please mention them in the review form. **-**	**Yes, please remove the bullets for the reference section this not appropriate way of putting the references.**	
Minor REVISION comments **Is the language/English quality of the article suitable for scholarly communications?**	Yes, the language and English quality of the manuscript are suitable for scholarly communications.	
Optional/General comments	Please try to revise the “Table.1: **Effect of heavy metal on health** (Orisakwe *et.al*)” the proper captions must be on the top of the table.	

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PART 2:

	Reviewer's comment	**Author's comment** *(if agreed with reviewer, correct the manuscript and highlight that part in the manuscript. It is mandatory that authors should write his/her feedback here)*
Are there ethical issues in this manuscript?	*(If yes, Kindly please write down the ethical issues here in details)*	

Reviewer Details:

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