

BOARD OF SCHOOL EDUCATION HARYANA

Modern Lesson Plan

Class – 11th

Average Age of Pupil – 16/17 years

Subject – Chemistry

Topic – **Electrochemical cell**

1. Instructional Objective: -

Remembering:

- Recognize and recall the parts of electrochemical cell.
- Recognize appropriate method how to work a electrochemical cell.

Understanding:

- Explain the method of a electrochemical cell.
- Explain the role played by each part within an electrochemical cell.
- Define electrochemical cell.

Applying:

- Apply information to determine oxidation and reduction are taken place.
- Identify the half reactions occurring at the anode or cathode.

Analyzing:

- Compare how oxidation and reduction takes place in a electrochemical cell.
- Determine flow of electron in electrochemical cell.
- Establish relationship between oxidation and reduction in a redox reaction.

Evaluating:

- Evaluate the relevance, reliability, and adequacy of data and data collection.
- Evaluate a constructed electrochemical cell.
- Evaluate processes used in planning, problem-solving and decision making.
- Evaluate the direction of flow of electron.

Creating:

- Construct electrochemical cell structure and make model and chart on electrochemical cell.

- Generalize the idea of construct of electrochemical cell, redox reaction and flow of electrons.
- Select and use apparatus and material safety.

2. Instructional Teaching Aids: -

General Teaching Aids: - Chalk, chalk board, duster, colored-chalk, pointer or smart board.

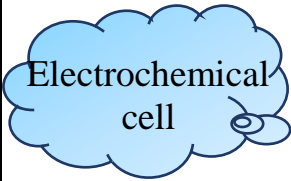
Introduction Aids: - A chart of electrochemical cell.





Previous knowledge assumed: - It is assumed that students have knowledge about the fact that oxidation and reduction.

Previous knowledge testing: -

Sr.No.	Pupil Teacher's Question	Pupil's Answer
1.	What do you mean by oxidation?	Loss of electron is called oxidation.
2.	What is reduction?	Gain of electron is known as reduction.
3.	How oxidation and reduction takes place in a electrochemical cell?	No response

Announcement of the topic: - Finding the students unable to answer the last question pupil teacher will announce the topic “well students today we shall study about the **Electrochemical cell**”.

Teaching Points	Pupil Teacher's Activities	Pupil's Activity	Chalk board work
 <p>Electrochemical cell</p>	<p>What is electrochemical cell?</p>	<p>A device which convert chemical energy to electrical energy in a redox reaction.</p>	<p>A device used to convert the chemical energy produced in a redox reaction into electrical energy is called electrochemical cell.</p>

Teaching Points	Pupil Teacher's Activities	Pupil's Activity	Chalk board work
 <p>Another Name</p>	<p>What is another name of electrochemical cell?</p>	<p>Pupil note down in their note book</p>	<p>Galvanic cell OR Voltaic cell</p>
 <p>Perform experiment</p>	<p>Name the scientist who perform first experiment on the conversion of chemical energy into electrical energy.</p>	<p>Pupil listen carefully.</p>	<p>Luigi Galvani (1780) and Alessandro volta (1800)</p>
 <p>Redox Reaction.</p>	<p>What is redox reaction?</p>	<p>A reaction in which electrons are transfers.</p>	<p>A redox reaction is defined as a chemical reaction in which election are transferred between two reactants participating in it. OR Redox reaction are those in which reduction and oxidation both takes place simultaneously.</p>
<p>Constructions of electrochemical cell</p>	<p>What is the construction of electrochemical cell?</p>		<p>A electrochemical cell consists of two beakers in which oxidation half and reduction half takes place.</p>
 <p>Construction</p>	<p>What is construction of electrochemical cell</p>	<p>Pupil listen carefully and note down in their note book.</p>	<p>The cell is set up as follows: - Take two beakers Zinc rod is placed in line sulphate solution. In another beaker copper rod is placed in copper sulphate</p>

Teaching Points

Pupil Teacher's Activities

Pupil's Activity

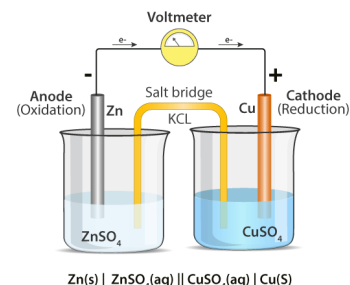
Chalk board work

Diagram of Electrochemical cell

Draw the diagram of electrochemical cell.

Pupil draw the diagram in note book

solution. The two rods are connected by a wire and the two solutions are connected by salt bridge.



Salt Bridge

What is salt bridge

Pupil note down in their note book

A salt bridge is a U-shaped tube containing concentrated solution of an inert electrolyte like KCl, KNO₃, K₂SO₄ etc. or solidified solution of such as electrolyte in agar-agar and gelatin.

Salt Bridge

An inert electrolyte is one whose ions do not take part in the redox reaction and also do not react with electrolyte used.

Functions of salt Bridge



What is the function of salt bridge?

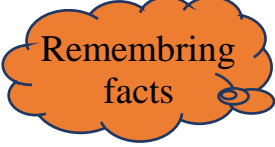
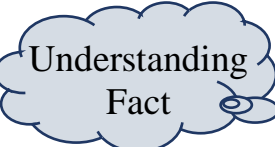
Maintain neutrality

Function of salt Bridge:

- (i) To complete the electrical circuit by allowing the ions to flow from one solution to the other without mixing of the two solutions.
- (ii) To maintain the electrical neutrality

Pupil listen

Teaching Points	Pupil Teacher's Activities	Pupil's Activity	Chalk board work
	<p>Write the reaction involving in electrochemical cell.</p>	<p>carefully and note down in their note book</p>	<p>of the solutions in the two half cells.</p>
	<p>What are the important feature of an electrochemical cell?</p>	<p>Pupil listen carefully and note down in their note book</p>	<p>Redox reaction between Zn and CuSO₄: - $Zn + CuSO_4 \rightarrow ZnSO_4 + Cu$ Oxidation half: - $Zn \rightarrow Zn^{2+} + 2e^-$ Reduction half: - $Cu^{2+} + 2e^- \rightarrow Cu$</p> <p>Important features of an electrochemical cell:</p> <ol style="list-style-type: none"> (i) The Zinc electrode at which oxidation takes place is called the anode. The copper electrode at which the reduction takes place is called cathode. (ii) The electron flow from the negative pole to the positive pole in the external circuit. (iii) The weight of copper rod will increase while that of Zinc rod will decrease as the cell works. (iv) The oxidation of Zinc ions into produces excess of Zn²⁺ ions in the left beaker. Similarly, Reduction of copper ions into copper atom leaves

Teaching Points	Pupil Teacher's Activities	Pupil's Activity	Chalk board work
 Remembring facts	Some remembering facts	For NEET and JEE exams	<p>the excess of SO_4^{2-} ions in the solution in the right beaker.</p> <p>Remembering Facts:-</p> <p>(i) Electrode on which oxidation occurs is called Anode (-ve Pole.)</p> <p>(ii) Electrode on which reduction occurs is called cathode (+ve Pole) oxidation and Anode both start with Vowels.</p>
 Understanding Fact	Note down some understanding fact in electrochemical cell.	Pupil note down in their note book and competitive exams like NEET, JEE etc.	<p>Understanding Fact:</p> <p>(i) Electron flow from anode to cathode in the external circuit.</p> <p>(ii) Inner circuit is completed by the flow of ions through the salt bridge.</p>

Recapitulation: - In order to revise the topic pupil teacher will ask the following recapitulation questions: -

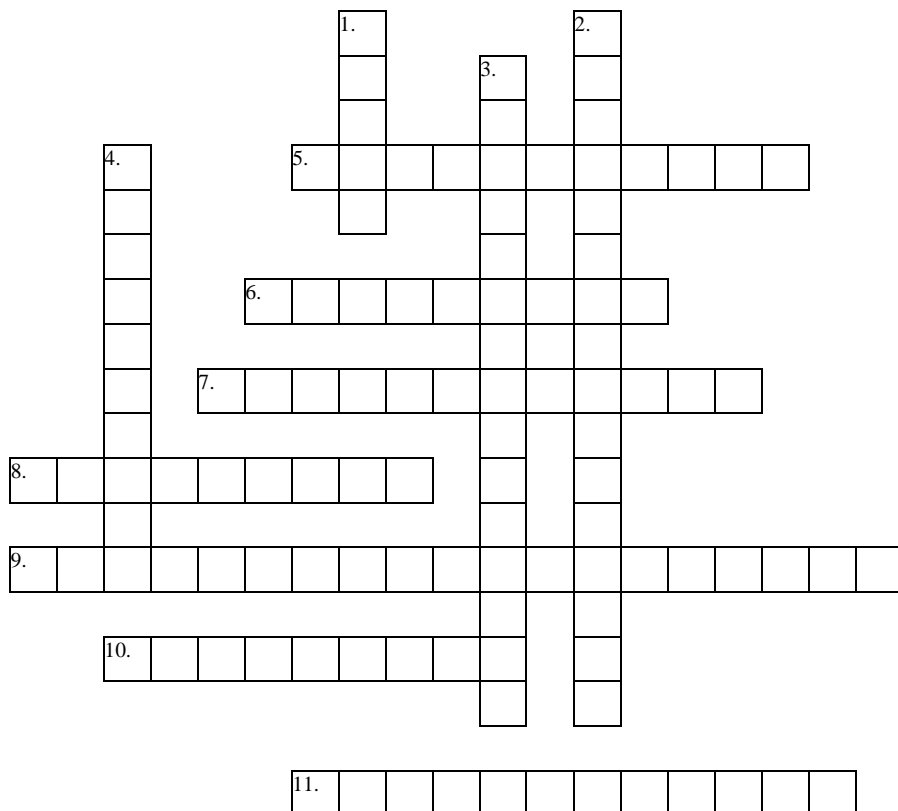
- (i) What is an electrochemical cell?
- (ii) Name the scientist who discovered electrochemical cell?
- (iii) What do you mean by oxidation and reduction?

Home Work: -

- (i) Define salt bridge?
- (ii) What are the functions of salt bridge?

- (iii) What is redox reaction?
- (iv) What are the important features of an electrochemical cell?
- (v) Write the reaction of an electrochemical cell.

Electrochemical cell crossword



Word Bank: -

Electrolytic cell
 Electrochemical cell
 Electrolysis
 Oxidation Number
 Half-reaction
 Electrode
 Redox
 Voltaic cell
 Salt Bridge
 Oxidation
 Reduction

Down: -

1. An oxidation – reduction reaction.
2. Cell that requires a non-spontaneous chemical reaction to occurs (uses battery)
3. Number assigned to keep track of electron gain or loss in redox reaction.
4. Part of voltaic cell that connect two container and allows the flows of ions

8. Gain of election and loss of oxidation number.
9. System in which there's an elective current flowing while a chemical reaction occurs.
10. Site at which oxidation or reduction; or anode or cathode.
11. Reaction that shows either the oxidation or reduction portion of a redox reaction.

Across: -

5. Electrochemical cell in which a spontaneous chemical reaction causes a flow of elections.
6. Loss of electrons and an increase State.
7. Process in which an electric current force a nonspontaneous reaction to occurs.