

Teacher's Guide for Electrochemistry: Electroplating

The video is about the electroplating of house gates. The video can be used as an extension of a chemistry lesson particularly after students have learned about electrolysis.

The objectives of the lesson are for students to:

1. State the uses of electrolysis in industries.
2. Explain the electroplating of metals involving electrolysis in industries.
3. Write chemical equations to represent the electrolysis process in the industries.
4. Justify uses of electrolysis in industries.

The lessons will be conducted in class and students are to work on the questions given in the lesson within small groups. The simple experiment will be conducted by the students in the class. Teacher has to provide guidance in exploring new ideas during their group activities.

Students should be encouraged to try out making electroplated nail on their own. Hopefully, through this learning approach, students will enjoy learning and will be able to construct new knowledge.

Learning Outcomes:

At the end of the lesson, a student should be able to:

1. State the uses of electrolysis in industries.
2. Explain the electroplating of metals involving electrolysis in industries.
3. Write chemical equations to represent the electrolysis process in the industries.
4. Justify uses of electrolysis in industries.

Prerequisites :

Before watching this video, a student should have prior knowledge on:

1. The basic concept of electrolysis
2. Writing chemical equation

Suggested activities :

1. Problem solving - Brainstorming session
2. Carry out an experiment on the concept of electroplating
3. Discussion

The materials and apparatus in Activity 3 are not only limited to iron nail. You may use any small utensil or tool made of iron like iron spoon. Sea water can be used as an electrolyte to replace copper (II) sulphate.

Note :

If the activities require longer time, this video can be divided into two lessons.

Suggestion :

1. Lesson 1 is from Segment 1 to Segment 4. Let the students discuss and find the answer.
2. In Lesson 2, you can continue with Activity 4 until Segment 6.

ACTIVITY 1 (3 minutes)

Teacher asks the students to discuss in smaller group and present their answers:

1. What makes Daniel and his wife chose chrome plated gate?
2. Why are the prices different for each type of gates?
3. What sort of materials contain in each gate?

ACTIVITY 2 (10 minutes) – discussion

- 1) Teacher should encourage students to discuss in their group about the process of electroplating. The students have to recall the concept of electrolysis that they have learned before and make the relationship between the electrolysis and electroplating.
- 2) After 5 minutes, teacher asks students to share the results of their discussion.

ACTIVITY 3 (9 minutes) – class experiment/ physical activity to demonstrate the concepts of electrochemistry.

Teacher will have to provide the following items for the experiment for each group.

Activity : Coating iron nail with copper through electrolysis.

Materials:

1. Iron nail
2. Copper strip
3. 2 mol/dm³ copper (II) sulphate solution

Apparatus:

1. Beaker
2. Connecting wires with crocodile clips
3. Ammeter
4. Rheostat
5. Batteries
6. Sandpaper
7. Switch

Procedure:

1. Clean of iron nail with sandpaper.
2. Set up the apparatus using the iron nail as the anode and a copper strip as the cathode.
3. Turn on the switch and adjust the current to 0.2 A using the rheostat.
4. Turn off the switch after 30 minute.
5. Record all the observations.
6. Repeat steps 1 to 5 by interchanging the position of the iron nail and copper strip.

The teacher should encourage students to explain the process of electroplating. Teacher assign student to:

- a) Report your observation on the iron nail
- b) Report your observation on the copper strip
- c) Report your observation on the solution?
- d) What is the color of metal form at the iron nail?

Note : 1) Use the higher voltage of power supply and concentrated solution.

2) The experiment will be filmed, in case there will be lack of materials in the lab to be used by students.

ACTIVITY 4 (5 minutes)- class experiment

Teacher asks students to conduct another experiment referring to the task given.

Task 1: Replace the copper (II) sulphate solution with 0.0001mol/dm³ silver nitrate solution and 5 mol/dm³ silver nitrate solution.

Task 2: Replace the copper (II) sulphate solution with sodium chloride solution and sugar solution.

Task 3: Replicate activity 3 and manipulating the distance of copper metal with iron nail.

Teacher will divide the students into 3 groups.

Task 1: Group 1

Task 2: Group 2

Task 3: Group 3

They have to carry out the experiment and report their observation.

Note : Use the lower voltage of power supply and rotate the iron nail.

ACTIVITY 5 (5 minutes) - discussion

1) Teacher encourages students to discuss in their own group why are the lines drawn on the copper plate were not plated with nickel.

2) After 5 minutes, teacher asks students to share the results of their discussion.