

LESSON NOTES

Year/Level: 11 C/D

week 14

Subject: Chemistry

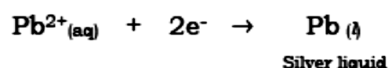
Strand	3 Reactions
Sub Strand	3.2 types of reactions
Content Learning Outcome	Distinguish and describe different types of reactions based on chemical statements and balanced chemical equations

Other Examples of electrolysis

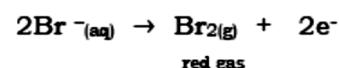
1. Electrolysis of molten Lead Bromide Using Carbon Electrodes

Lead bromide melts at 373°C to form molten lead bromide (PbBr₂), which is made up of mobile lead ions and bromide ions. During electrolysis, lead ions are attracted to the cathode and are reduced to silver lead metal and bromide ions are attracted to the anode forming bromine, a red coloured gas.

Cathode Reaction



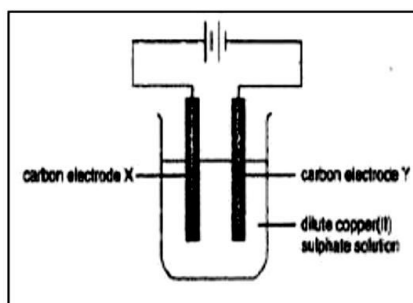
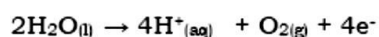
Anode Reaction



2. Electrolysis of Copper Sulphate solution Using Carbon

Copper sulphate solution contains the electrolytes; copper ions, sulphate ions and water. Copper ions are attracted to the cathode and are reduced to reddish brown copper metal. Sulphate ions are attracted to the anode. However, water is oxidised as sulphate ions cannot be oxidised. It releases oxygen gas, so a colourless gas is formed at the anode.

Anode Reaction



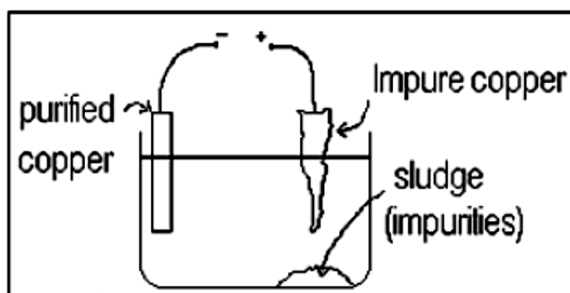
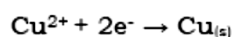
Cathode Reaction



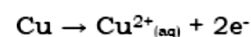
3. Electrolysis of Copper sulphate solution using copper metal electrodes

This set up is used in the *industrial production of copper metal*. In the figure below, impure copper is the anode and pure copper is the cathode.

Cathode Reaction



Anode Reaction

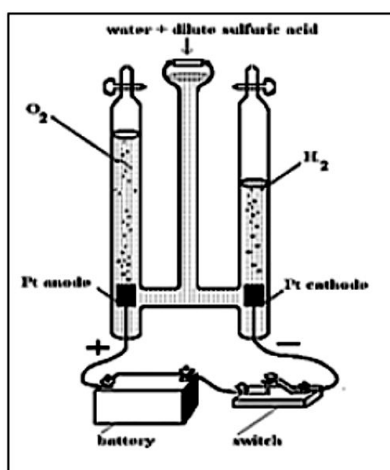


As the electricity is switched on, copper ions are attracted to the cathode and sulphate ions are attracted to the anode. At the cathode, copper ions are reduced to copper metal (reddish brown) deposited on the surface of the pure copper electrode. At the anode, copper is oxidised to copper ions and goes back to the copper sulphate solution. These ions replace the copper ions reduced at the cathode.

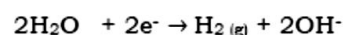
4. Electrolysis of water using carbon electrodes

Hydrogen gas is used as rocket fuel as it burns explosively (self-combust) in oxygen releasing a lot of energy. The product formed is water. The *Energy Industries* around are researching how it can be used as fuel for vehicles, especially buses as its product, water is environment friendly. The risk is the explosive nature of the reaction. Electrolysis of water is used industrially to produce hydrogen gas. Water reduced at the cathode produces hydrogen gas and water oxidised at the anode forms hydrogen ions.

Anode Reaction



Cathode Reaction



1. A concentrated solution of copper sulphate is used as the electrolyte in an electrolysis experiment.

a. What ions are present in the solution? _____

b. What will be oxidized at the anode, water or sulphate ions? _____

c. What will be reduced at the cathode, water or copper ions? _____

d. Write the balanced half-equations for the reactions at anode and cathode

e. What observations would you make during the electrolysis experiment?
