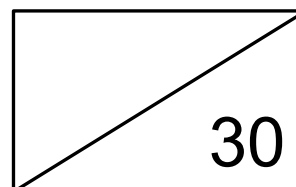


Seb Academy
Topics: Electrolysis
Time allowed: 30 min

Date: _____

Name: _____



Homework 2

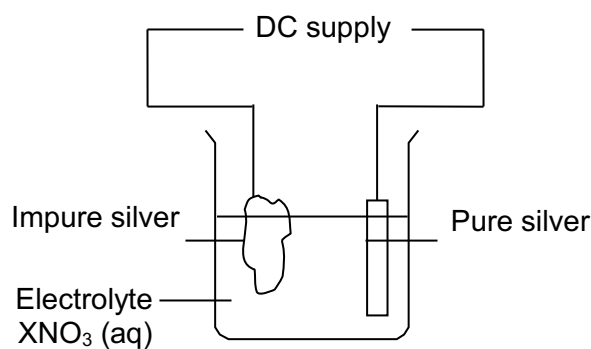
1. Fill in the products formed, and the effect on the electrolyte after the experiment. The first one has been done for you.

	Electrolyte	Electrode	Cathode	Anode	Effect on electrolyte
1.	Concentrated NaCl solution	Pt	Hydrogen gas $2\text{H}^+(\text{aq}) + 2\text{e}^- \rightarrow \text{H}_2(\text{g})$	Chlorine gas $2\text{Cl}^-(\text{aq}) \rightarrow \text{Cl}_2(\text{g}) + 2\text{e}^-$	Na⁺ Cl⁻ H⁺ OH⁻ Since H ⁺ and Cl ⁻ ions were discharged, the solution became alkaline (NaOH), as the concentration of [OH ⁻] is greater than [H ⁺].
2.	Concentrated KI solution	Pt			Na ⁺ I ⁻ H ⁺ OH ⁻
3.	Concentrated CuCl ₂ solution	Graphite			Cu ²⁺ Cl ⁻ H ⁺ OH ⁻
4.	Concentrated Cu(NO ₃) ₂ solution	Graphite			Cu ²⁺ NO ₃ ⁻ H ⁺ OH ⁻

5.	Aqueous CuCl_2 solution	Copper cathode, copper anode			Cu^{2+} Cl^- H^+ OH^-
6.	Aqueous AgNO_3 solution	silver cathode, silver anode			Ag^+ NO_3^- H^+ OH^-

[Total: 15 marks]

2. One of the uses of electrolysis is the purification of metal. A block of impure silver was purified using electrolysis as shown in the diagram below.



- (a) Which electrode is connected to the positive terminal of the d.c. supply? _____ [1]
- (b) Suggest what X may be. _____ [1]
- (c) Write half ionic equations for the reactions taking place at both electrodes. [2]

Cathode:

Anode:

- (d) State what you would observe at the pure silver electrode. [1]

- (e) Describe one change that you would observe if the electrolyte is replaced with aqueous gold nitrate.

[1]

[Total: 6 marks]

18. (2013/N/GCSE/12) Which ions are present in aqueous copper (II) chloride?
- A** Copper (II) ions and chloride ions only
B Copper (II) ions, chloride ions and hydrogen ions only
C Copper (II) ions, chloride ions and hydroxide ions only
D Copper (II) ions, chloride ions, hydrogen ions and hydroxide ions
19. (2014/S4/RP/MYCT/6) Which of the following statements correctly describes how electricity is conducted in an electrolytic cell?
- A** The electrons in the electrolyte move towards the anode to conduct electricity
B The cations produced at the cathode move towards the anode to conduct electricity
C The cations in the electrolyte move towards the cathode to conduct electricity
D The anions in the electrolyte move towards the cathode to conduct electricity

Skill 5 Selective discharge of Anions in Dilute

(ii) anions: halides, hydroxides and sulfates (e.g. aqueous copper(II) sulfate and dilute sodium chloride solution (as essentially the electrolysis of water))

20. (2013/S4/RP/MYCT/9) Electrolysis of a dilute potassium nitrate solution was carried out. What are the products liberated at each electrode?

	Cathode	Anode
A	hydrogen	oxygen
B	hydrogen	nitrogen
C	potassium	oxygen
D	potassium	nitrogen

21. (2006/HC/S4/IP) When dilute sulfuric acid is electrolysed using platinum electrodes, 40 cm³ of oxygen gas is produced. What volume of hydrogen gas is produced in the same experiment?

- A** 120 cm³
B 40 cm³
C 80 cm³
D 0 cm³

22. (2008/HC/S4/IP) Aqueous copper(II) sulphate is electrolysed using graphite electrodes. Which observations will be made?

	At anode (+ve)	At cathode (-ve)	The electrolyte
A	Anode dissolves	Pink solid forms	No change
B	Anode dissolves	Pink solid forms	Blue colour fades
C	Colourless gas forms	Colourless gas forms	No change
D	Colourless gas forms	Pink solid forms	Blue colour fades

23. (2010/HC/S4/IP) What would be observed when aqueous copper(II) sulfate is electrolysed using platinum electrodes?

- I The anode decreases in size.
- II A pink solid is deposited at the cathode.
- III Bubbles of gas are observed at the anode.
- IV The pH of the electrolyte decreases.

- A I, II and III
- B II, III and IV
- C I, II and IV
- D II and III

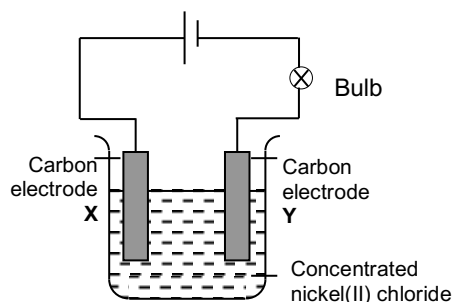
Skill 6 Selective discharge of Anions due to Concentration

(iii) concentration effects (as in the electrolysis of concentrated and dilute aqueous sodium chloride) (In all cases above, inert electrodes are used.)

25. An electrolysis experiment was set up:

What occurs at electrons X?

- A Chloride ions are oxidized
- B Chloride ions are reduced
- C Nickel ions are oxidized
- D Nickel ions are reduced



26. What is observed when concentrated copper(II) chloride is electrolysed using platinum electrodes?

- 1 The anode dissolves to form ions
- 2 Copper is deposited at the cathode
- 3 The intensity of the blue colour of the solution fades over time

A	B	C	D
1, 2 and 3 are correct	1 and 2 are correct	2 and 3 are correct	1 only is correct

[Total: 9 marks]