Unit 8 · Electrolysis

WORKSHEET

Full marks 41

Name _____ Class _____ Roll no. _____ Date _____ Marks _____ / 41

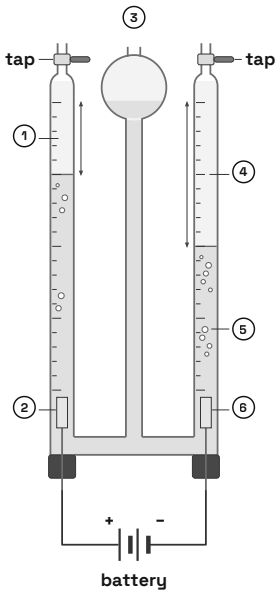
1 Key words [3]

Match each word in Column A with its description in Column B. Write the letter in the box. One description in Column B is not needed. Each match carries 0.5 mark.

Column A		Column B
1. electrolyte	☐	**a.** the electrode joined to the positive terminal in electrolysis
2. anode	☐	**b.** the fraction of dissolved molecules split into ions
3. cation	☐	**c.** a solid that dissolves as whole, uncharged molecules
4. degree of ionization	☐	**d.** coating a metal object with a thin layer of another metal
5. electroplating	☐	**e.** conducts when molten or in solution, and is decomposed by the current
6. anode mud	☐	**f.** a positive ion
		g. less reactive metals that fall to the bottom in electrorefining

2 Label the diagram [3]

The diagram shows Hofmann's voltameter after the current has flowed for a while. Name the parts numbered 1 to 6. For a gas, give its name and its volume. Each carries 0.5 mark.



1. _____ **2.** _____

3. _____ **4.** _____

5. _____ **6.** _____

3 Multiple choice [5]

Choose the correct option for each of the following questions.

i. Which of these is a non-electrolyte? [1]

a. potassium nitrate
b. dilute sulphuric acid
c. glucose
d. ammonia solution

ii. Which pair contains only strong electrolytes? [1]

a. NaCl and CH_3COOH
b. NH_4Cl and NaOH
c. H_2CO_3 and HCl
d. NH_4OH and KCl

iii. During electrolysis, the anode is the electrode that is: [1]

a. joined to the positive terminal, where anions are discharged
b. joined to the negative terminal, where cations are discharged
c. joined to the positive terminal, where cations are discharged
d. not joined to the battery at all

iv. Brine is electrolyzed with carbon electrodes. The products at the cathode and the anode are: [1]

a. sodium and chlorine
b. hydrogen and chlorine
c. hydrogen and oxygen
d. sodium and oxygen

v. In the electrorefining of copper, where do the gold and silver in the impure copper end up? [1]

a. deposited on the cathode with the copper
b. dissolved in the solution
c. in the anode mud at the bottom
d. given off as gases

4 Very short answers [4]

Write very short answers to the following questions.

a. What carries the current in a metal? [1]

b. Write the equation for the ionization of ammonium chloride in water. [1]

c. A cation gains electrons at the cathode. What is this change called? [1]

d. What does making aluminium the anode in dilute sulphuric acid (anodizing) do to it? [1]

5 Short answers [8]

Write short answers to the following questions.

a. Give a reason: solid sodium chloride doesn't conduct electricity, but its solution in water does. [2]

b. Give a reason: ethanoic acid is called a weak electrolyte, though it dissolves completely in water. [2]

c. Give a reason: the blue color of copper sulphate solution fades when it is electrolyzed with carbon electrodes, but not with copper electrodes. [2]

d. Hydrochloric acid of 0.1 mol/L lights a bulb brightly, and ethanoic acid of 0.1 mol/L hardly at all. A very dilute hydrochloric acid may also light it only dimly. Is that hydrochloric acid now a weak electrolyte? Give a reason. [2]

6 Long answers [8]

Write long answers to the following questions.

a. Write any four postulates of Arrhenius theory of electrolytic dissociation. [4]

b. How is impure copper purified by electrolysis? What happens to the impurities? **[4]**

7 Numerical problems **[7]**

Solve the following problems. Show your working.

a. Ethanoic acid of 0.1 mol/L is 1.3% ionized. How many molecules in every 10,000 dissolved are split into ions, and how many ions do they make? **[2]**

Answer:

b. In electrolyzing water, Yangchen collects 45 cm^3 of hydrogen and oxygen together. How much of each did she collect? **[2]**

Answer:

c. A current of 0.2 A is passed through copper sulphate solution for 25 minutes. (i) How much charge flows? (ii) How many electrons is that? (iii) How many copper atoms are deposited on the cathode? (The charge on an electron is 1.6×10^{-19} C.) **[3]**

Answer:

8 Think [3]

Pure water barely conducts, so a little sulphuric acid is added before splitting it. Why isn't common salt used instead, when it is cheaper and easier to find? Name another substance that would do the job, and say why.

9 Activity: Which liquids conduct? (not marked)

With a 9 V battery, an LED with its resistor and two pencils sharpened at both ends, dip both tips about 1 cm apart into each liquid. Rinse and dry them between liquids. Use only a 9 V battery or less, never mains electricity.

Liquid	My guess: bright, dim or dark?	What I found	Electrolyte or non-electrolyte?
salt water			
sugar water			
lemon juice			
vinegar			
tap water			
cooking oil			

Leave the tips in the salt water for a minute. What forms on them? On which is there more?