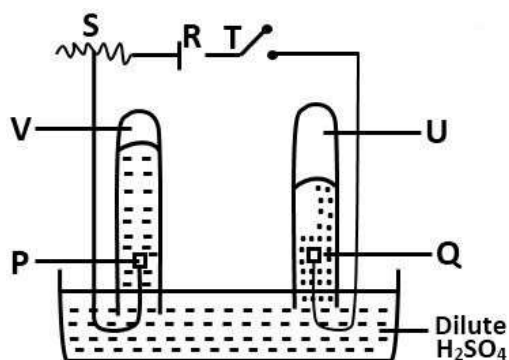
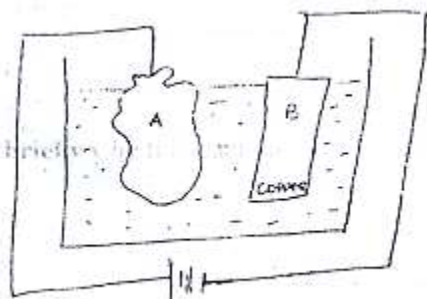




21. (a) What is an electrolyte? (b) Classify each of the following as strong electrolyte/weak electrolyte/non electrolyte. Potassium chloride; sodium ethanoate, aqueous ammonia; cane sugar. (c) Explain the following observations: (i) Graphite conducts electricity, unlike most non-metals (ii) In the electrolysis of copper (II) tetraoxosulphate (VI) solution, the blue colour fades with platinum electrodes while the colour intensity is unaffected with copper electrodes (equations required). (iii) A solution of dry hydrogen chloride in methylbenzene (toluene) does not conduct electricity whereas hydrochloric acid does. [1998/14]
22. Explain why manganese conducts electricity in the solid state but manganese chloride conducts only when molten or in solution [2003/2]
23. (a) Describe the electrolysis of copper (II) tetraoxosulphate (VI) solution, using copper electrodes (b) Will the colour of the copper (II) tetraoxosulphate (VI) solution change at the end of the electrolysis described in (a) above? Give reasons for your answer. [1988/12]
24. Using the diagram below, answer the following questions: (i) Mention two compounds that could be used as electrolytes in the cell. (ii) Write a half-cell equation for the reaction at the anode. [2022/3]



25. (i) Define the term electrolysis (ii) Explain the effect of concentration on the anion that is preferentially discharged in the electrolysis of brine. [2025/2]

Faraday's Laws & Uses of Electrolysis

- Calculate the quantity of electricity passed when 0.4 A flows for 1 hour 20 minutes through an electrolytic cell. A. 4800 C. B. 3340 C. C. 1920 C. D. 32 C [2008/35]
- Calculate the mass of copper deposited, if a current of 0.45 ampere flows through CuSO_4 solution for 1 hour 15 minutes [Cu = 64.0, S = 32.0, O = 16.0, 1F = 96500 C] A. 6.40g. B. 0.67g. C. 0.64g. D. 0.45g. [2017/41]
- The quantity of electricity required to discharge 1 mole of univalent ion is A. 9600 C. B. 48250 C. C. 96500 C. D. 193000 C. [2016/35]
- What mass of copper would be formed when a current of 10.0 A is passed through a solution of CuSO_4 for 1 hour? [Cu = 63.5; 1F = 96500 C] A. 5.9 g. B. 11.8 g. C. 23.8 g. D. 47.3 g. [2011/36]
- The quantity of electricity required to discharge 1 mole of univalent ion is A. 9,600 C. B. 48,250 C. C. 96,500 C. D. 193,000 C. [2010/38]
- The most common process in the extraction of metals from their ore is A. catalysis. B. electrolysis. C. oxidation. D. reduction. [2014/49]
- Which of the following ions require the largest quantity of electricity for discharge at an electrode? A. 2.0 mole of Q^{3+} . B. 2.5 mole of R^{2+} . C. 3.0 mole of T^- . D. 4.0 mole of Y^- . [2002/31]
- The following metals are extracted by the electrolytic method except A. potassium. B. calcium. C. sodium. D. tin. [1990/49]
- What quantity of electrons in moles is needed to discharge two moles of aluminum from aluminum oxide (Al_2O_3)? A. 1. B. 2. C. 4. D. 6. [2004/20]
- Consider the reaction: $2\text{Al}_{(s)} + 6\text{H}^+_{(aq)} \rightarrow 2\text{Al}^{3+}_{(aq)} + 3\text{H}_{2(aq)}$ What is the total number of moles of electrons transferred from the aluminum atoms to the hydrogen ions? A. 3. B. 4. C. 5. D. 6. [2006/38]
- What mass of copper will be deposited by the liberation of Cu^{2+} when 0.1F of electricity flows through an aqueous solution of a copper(II) salt? [Cu = 64] A. 64 g. B. 32 g. C. 12.8 g. D. 3.2 g. [1995/16]
- In which of the following is electrolysis not applicable? I. Production of sulphur(IV) oxide II. Extraction of iron III. Extraction of aluminium IV. Purification of copper A. IV. B. I and II. C. III and IV. D. I, II and III. [1994/8]
- What quantity of silver is deposited when 96500C of electricity is passed through a solution containing silver ions? (Ag = 108, 1F = 96500C) A. 1.08g. B. 5.40g. C. 10.8g. D. 108g. [1988/31]

14. How many faradays of electricity are required to liberate 9g of aluminum? (Al = 27) A. 0.1. B. 0.3. C. 1.0. D. 2.7. [1994/29]
15. What amount of copper is deposited when 13.0g of zinc reacts with excess copper (II) tetraoxosulphate (VI) solution according to the following equation?
 $\text{Zn}_{(s)} + \text{CuSO}_{4(aq)} \rightarrow \text{ZnSO}_{4(aq)} + \text{Cu}_{(s)}$ [Cu = 63.5. Zn = 65] A. 0.1 mole. B. 0.2 mole. C. 0.3 mole. D. 0.4 mole. [1996/37]
16. A current of 4.0 amperes was passed through copper (II) tetraoxosulphate (VI) solution for one hour using, copper electrodes. What was the mass of copper deposited? (Cu = 64, 1F = 96500 C) A. 3.2g. B. 4.8g. C. 6.4g. D. 48g. [1991/42]
17. What is the quantity of electricity produced when a current of 0.5A is passed for 5 hours 45 mins? (1F = 96500C) A. 0.11F. B. 0.12F. C. 0.22F. D. 1.1F. [1992/22]
18. What quantity of copper will be deposited by the same quantity of electricity that deposited 9.0g of aluminium? (A = 27, Cu = 64) A. 64g. B. 32g. C. 7.1g. D. 6.4. [1989/44]
19. What quantity of electrons (in mole) is lost when one mole of iron (II) ions is oxidized to iron (III) ions? A. 5 mole. B. 4 mole. C. 3 mole. D. 1 mole. [1997/15]
20. Determine the amount of electrons needed to deposit 6.4 g of copper during the electrolysis of copper (II) tetraoxosulphate (VI) solution. [Cu = 64] A. 0.10 mole. B. 0.20 mole. C. 1.0 mole. D. 2.0 mole. [2003/32]
21. What amount of copper will be deposited if a current of 10A was passed through a solution of copper (II) salt for 965 seconds? (1F = 96500 C) A. 0.005 mole. B. 0.025 mole. C. 0.05 mole. D. 1.00 mole. [1993/26]
22. What mass of copper would be deposited by a current of 1.0 ampere passing for 965 seconds through copper (II) tetraoxosulphate (VI) solution? [Cu = 63.5; 1F = 96500C] A. 0.318g. B. 0.635g. C. 3.18g. D. 6.35g. [1998/18]
23. Determine the mass of copper deposited by 4.0 moles of electrons in the reaction represented by the equation below: $\text{Cu}^{2+}_{(aq)} + 2\text{e}^- \rightarrow \text{Cu}_{(s)}$ A. 32. B. 64. C. 128. D. 256. [2005/32]
24. During the electrolysis of dilute tetraoxosulphate (VI) acid solution 0.05 mole of electrons were passed. What volume of gas was produced at the anode? (Gaseous molar volume = 22.4dm³ at s.t.p.) A. 0.224 dm³. B. 0.280 dm³. C. 0.560 dm³. D. 2.24 dm³. [1988/49]
25. Electrolysis can be used to I. purify metals. II. extract elements. III. manufacture compounds. IV. electroplate metals A. Iv only. B. I & III. C. III & IV. D. I, II, III & IV. [1991/1]
26. Electrolysis is applied in I. tin-plating II. purification of copper III. extraction of aluminium IV. manufacture of sodium hydroxide A. IV only. B. I and II. C. III and IV. D. I, II, III and IV. [1995/47]
27. Calcium is usually extracted by the electrolysis, of its A. trioxonitrate (V). B. tetraoxosulphate(VI). C. oxide. D. chloride. [1994/24]
28. Which of the following is/are manufactured by the electrolysis of concentrated sodium chloride solution? I. Chlorine II. Sodium hydroxide III. Hydrogen IV. Sodium oxochlorate (I) A. only IV. B. only I and II. C. only III and IV. D. only I, II and III. [1996/43]
29. Why is potassium fluoride added to the electrolyte in the extraction of sodium from fused sodium chloride? A. Pure sodium chloride does not conduct electricity. B. Potassium fluoride prevents the sodium produced from attacking the electrodes. C. Potassium fluoride increases conductivity. D. Potassium fluoride reduces the temperature at which sodium chloride fuses. [1989/30]
30. Which of the following is/are manufactured by electrolysis? I. Calcium II. Chlorine III. Aluminium IV. Iron A. IV Only. B. I and II only. C. III and IV only. D. I, II and III only. [1998/49]
31. Electrolysis is applied in the following processes except A. electroplating. B. extraction of aluminium C. extraction of iron. D. purification of copper. [2006/35]
32. What is the mass of silver deposited when 24,125 C of electricity is passed through a solution of silver salt? [Ag = 108. IF = 96.500 C] A. 432 g B. 108 g C. 54 g D. 27 g. [2020/6]
33. How many coulombs of electricity would liberate 1.08 g of Ag from a solution of silver salt? [Ag = 108.0; 1 F = 96500 C] A. 96500 C B. 9650 C C. 965 C D. 9.65 C [2021/28]
34. What amount of electricity is required to deposit one mole of aluminum from a solution of AlCl₃? A. One Faraday B. One ampere C. Three Faradays D Three amperes [2022/5]
35. Determine the quantity of electricity used when a current of 0.20 amperes is passed through an electrolytic cell for 60 minutes. A. 12C B. 120C C. 360C D. 720C. [2022/11]
36. How many moles of copper would be deposited by passing 1 Faraday of electricity through a CuCl₂ solution? A. 2 B. 1 C. 0.5 D. 0.25 [2023/5]

THEORY

1. State Faraday's first law of electrolysis. [2017/5]
2. Calculate the mass of copper deposited at the cathode when a current of 0.2A is passed through a solution of copper (II) tetraoxosulphate (VI) for 35 minutes using copper electrodes. [H = 1.00, O = 16.0, S = 32.0, Cu = 64.0, 1F = 96,500C] [2013/3]
3. State Faraday's first law. [2014/1]