Unit 4: Electrochemistry

47 MCQs. Correct option in bold. 1 mark each.

1. An electrochemical cell that uses electrical energy to drive a chemical reaction is a(n)
A. fuel cell **B. electrolytic cell**
C. galvanic cell D. dry cell

2. An electrochemical cell that converts chemical energy into electricity is a(n)
A. electrolytic cell B. electroplating cell
C. galvanic cell D. Down's cell

3. A substance that conducts electricity in molten state or aqueous solution and undergoes chemical change is a(n)
A. electrolyte B. non-electrolyte
C. catalyst D. insulator

4. Electrolysis is the decomposition of ionic compounds by
A. heating only B. light only
C. mixing **D. passage of electric current**

5. In an electrolytic cell, oxidation occurs at the
A. battery B. cathode
C. anode D. salt bridge

6. In an electrolytic cell, reduction occurs at the
A. cathode B. wire
C. electrolyte D. anode

7. In the external circuit of an electrolytic cell, electrons move from the
A. electrolyte to the anode B. cathode to the battery
C. cathode to the anode **D. anode to the cathode**

8. Sodium metal is produced industrially by the electrolysis of fused sodium chloride in
A. fuel cell **B. Down's cell**
C. Nelson cell D. Daniel cell

9. Down's cell uses
A. an iron cathode and a carbon anode B. two zinc electrodes
C. a carbon cathode and an iron anode D. two copper electrodes

10. During electrolysis of molten NaCl, the half-reaction at the anode is
A. $Na \rightarrow Na^+ + e^-$ B. $Cl_2 + 2e^- \rightarrow 2Cl^-$
C. $Na^+ + e^- \rightarrow Na$ **D. $2Cl^- \rightarrow Cl_2 + 2e^-$**

11. During electrolysis of molten NaCl, the half-reaction at the cathode is
A. $Cl_2 + 2e^- \rightarrow 2Cl^-$ B. $Na \rightarrow Na^+ + e^-$
C. $Na^+ + e^- \rightarrow Na$ D. $2Cl^- \rightarrow Cl_2 + 2e^-$

12. Electrolysis of molten lead(II) chloride gives lead at the cathode and _____ at the anode.
A. hydrogen gas **B. chlorine gas**
C. oxygen gas D. lead chloride

13. Electrolysis of concentrated aqueous NaCl (brine) is used to produce
A. sodium metal B. sodium carbonate
C. sodium sulphate **D. sodium hydroxide**

14. In the electrolysis of concentrated aqueous NaCl, chlorine gas is produced at the
A. battery B. salt bridge
C. anode D. cathode

15. In the electrolysis of concentrated aqueous NaCl, hydrogen gas is produced at the
A. cathode B. anode
C. electrolyte D. salt bridge

16. In electrolysis of dilute aqueous NaCl using platinum electrodes, the gas produced at the anode is
A. chlorine **B. oxygen** C. hydrogen D. nitrogen

17. In the electrolysis of aqueous $CuSO_4$ with platinum electrodes, the product at the cathode is
A. sulphur B. hydrogen gas
C. copper metal D. oxygen gas

18. In the electrolysis of aqueous $CuSO_4$ with platinum electrodes, the product at the anode is
A. copper metal B. hydrogen gas
C. sulphur dioxide **D. oxygen gas**

19. During electrolysis of $CuSO_4$ with copper electrodes, the anode reaction is
A. $Cu \rightarrow Cu^{2+} + 2e^-$ B. $2H^+ + 2e^- \rightarrow H_2$
C. $Cu^{2+} + 2e^- \rightarrow Cu$ D. $4OH^- \rightarrow 2H_2O + O_2 + 4e^-$

20. In the purification of copper, the impure copper acts as the
A. cathode **B. anode**
C. electrolyte D. salt bridge

21. In copper refining, silver and gold impurities
A. turn into gas B. dissolve in the electrolyte
C. deposit on the cathode **D. fall to the bottom of the cell**

22. In electrolysis of a concentrated halide solution, the product at the anode is
A. nothing B. oxygen
C. the halogen D. hydrogen

23. The electrolytic process used to deposit one metal on another is called
A. electroplating B. refining only
C. galvanic action D. electrolysis of brine

24. In electroplating, the object to be plated is made the
A. anode **B. cathode**
C. electrolyte D. salt bridge

25. In electroplating, the plating metal is made the
A. anode B. electrolyte
C. cathode D. salt bridge

26. Galvanizing is coating of steel with
A. chromium B. copper C. tin **D. zinc**

27. Tin-plated steel is used to make food cans because tin plating is
A. magnetic **B. non-poisonous and prevents corrosion**
C. poisonous D. very costly

28. A galvanic cell is also called a
A. Down's cell B. plating cell
C. voltaic cell D. electrolytic cell

29. In a Daniel cell, the zinc half-cell acts as the
A. cathode **B. anode**
C. voltmeter D. salt bridge

30. In a Daniel cell, the copper half-cell acts as the
A. anode B. electrolyte
C. salt bridge **D. cathode**

31. In a Daniel cell, electrons flow from the
A. zinc rod to the copper rod through the external wire
B. solution to the wire
C. salt bridge to the zinc rod
D. copper rod to the zinc rod

32. A salt bridge contains
A. pure zinc B. dilute sulphuric acid only
C. an inert electrolyte such as KCl D. pure copper

33. In a voltaic cell, the salt bridge
A. stops electrons in the external circuit
B. stores energy
C. generates extra voltage
D. maintains electrical neutrality by allowing ion movement

34. The oxidation half-reaction in a Daniel cell is
A. $Cu \rightarrow Cu^{2+} + 2e^-$ **B. $Zn \rightarrow Zn^{2+} + 2e^-$**
C. $Cu^{2+} + 2e^- \rightarrow Cu$ D. $Zn^{2+} + 2e^- \rightarrow Zn$

35. The reduction half-reaction in a Daniel cell is
A. $Cu^{2+} + 2e^- \rightarrow Cu$ B. $Zn^{2+} + 2e^- \rightarrow Zn$
C. $Zn \rightarrow Zn^{2+} + 2e^-$ D. $Cu \rightarrow Cu^{2+} + 2e^-$

36. Which statement is NOT correct for a galvanic cell?
A. Oxidation occurs at the anode
B. Anions are oxidised at the anode
C. Electrons flow from the cathode to the anode
D. Cations are reduced at the cathode

37. Which statement is NOT true about the Daniel cell?
A. A salt bridge connects the two half-cells
B. The half-cell of an active metal acts as a cathode
C. A spontaneous redox reaction generates electricity
D. Each half-cell has a metal in contact with its ions

38. Which of the following does NOT involve an electrolytic process?
A. Reduction of a metal oxide by a reducing agent
B. Manufacture of sodium from NaCl
C. Refining of copper
D. Electroplating of steel

39. A table of metals arranged by increasing reduction potentials is called the
A. mole table
B. activity of gases
C. periodic table
D. electrochemical series

40. A metal with a lower reduction potential is
A. inert
B. less active
C. more active (more easily oxidised)
D. a non-metal

41. In a voltaic cell, the electrode with the lower reduction potential acts as the
A. cathode
B. salt bridge
C. electrolyte
D. anode

42. If metal A has a higher standard reduction potential than metal B, then
A. metal B is more reactive than metal A
B. metal A loses electrons more easily
C. metal A is more reactive than metal B
D. both have the same reactivity

43. In dilute aqueous NaCl, OH^- ions are discharged at the anode instead of Cl^- because of
A. colour of ions
B. concentration effect and overpotential of chlorine
C. temperature only
D. pressure only

44. A hydrogen-oxygen fuel cell converts the energy of the reaction between hydrogen and oxygen into
A. light only
B. nuclear energy
C. electrical energy
D. sound

45. The electrodes in a hydrogen-oxygen fuel cell are porous carbon containing _____ as catalyst.
A. zinc
B. lead
C. iron
D. platinum

46. In a hydrogen-oxygen fuel cell, the only chemical product is
A. water
B. carbon dioxide
C. ammonia
D. hydrogen peroxide

47. An advantage of fuel cells over petrol engines is that they
A. emit carbon dioxide
B. emit only water vapour and do not pollute
C. use non-renewable gasoline
D. have many moving parts