Cell constant and Electrochemical Cells

1. When electric current is passed through a cell having an electrolyte, the positive ions move towards the cathode and the negative ions towards the anode. If the cathode is pulled out of the solution
   (a) The positive and negative ions will move towards the anode
   (b) The positive ions will start moving towards the anode, the negative ions will stop moving
   (c) The negative ions will continue to move towards the anode and the positive ions will stop moving
   (d) The positive and negative ions will start moving randomly

2. If the half cell reaction $A + e^- \rightarrow A^-$ has a large negative reduction potential, it follows that
   (a) A is readily reduced
   (b) A is readily oxidised
   (c) A^- is readily reduced
   (d) A^- is readily oxidized

3. Mark the *false* statement
   (a) A salt bridge is used to eliminate liquid junction potential
   (b) The Gibbs free energy change, ΔG is related with electromotive force (E), as $\Delta G = -nFE$
   (c) Nernst equation for single electrode potential is $E = E^o - \frac{RT}{nF} ln\, a_{M^{n+}}$
   (d) The efficiency of a hydrogen oxygen fuel cell is 23%

4. The specific conductance of a 0.1 *N KCl* solution at 23^oC is $0.012 ohm^{-1}cm^{-1}$. The resistance of cell containing the solution at the same temperature was found to be 55 *ohm*. The cell constant will be
   (a) $0.142cm^{-1}$ (b) $0.66cm^{-1}$
   (c) $0.918cm^{-1}$ (d) $1.12cm^{-1}$

5. Which of the following reactions occurs at the cathode of a common dry cell
   (a) $Mn \rightarrow Mn^{2+} + 2e^-$
   (b) $2MnO_2 + Zn^{2+} + 2e^- \rightarrow ZnMn_2O_4$
   (c) $2ZnO_2 + Mn^{2+} + 2e^- \rightarrow MnZn_2O_4$
   (d) $Zn \rightarrow Zn^{2+} + 2e^-$

6. In $Cu - Zn$ cell
   (a) Reduction occurs at the copper cathode
   (b) Oxidation occurs at the copper cathode
   (c) Reduction occurs at the anode
   (d) Chemical energy is converted to light energy

7. Which of the following reaction is used to make a fuel cell

(a) $Cd(s) + 2Ni(OH)_3(s) \rightarrow CdO(s) + 2Ni(OH) + H_2O(l)$

(b) $Pb(s) + PbO_2(s) + 2H_2SO_4(aq) \rightarrow 2PbSO_4(s) + 2H_2O(l)$

(c) $2H_2(g) + O_2(g) \rightarrow 2H_2O(l)$

(d) $2Fe(s) + O_2(g) + 4H^+(aq) \rightarrow 2Fe^{2+}(aq) + 2H_2O(l)$

8. When lead storage battery is charged

(a) $PbO_2$is dissolved

(b) $H_2SO_4$is regenerated

(c) $PbSO_4$ is deposited on lead electrode

(d) Lead is deposited on lead electrode

9. When lead storage battery is charged

(a) Lead dioxide dissolves

(b) Sulphuric acid is regenerated

(c) The lead electrode becomes coated with lead sulphate

(d) The amount of sulphuric acid decreases

10. The electrolytic decomposition of dilute sulphonic acid with platinum electrode in cathodic reaction is

(a) Oxidation

(b) Reduction

(c) Oxidation and reduction both

(d) Neutralisation

11. Which colourless gas evolves, when NH_4Cl reacts with zinc in a dry cell battery

(a) NH_4 (b) N_2

(c) H_2 (d) Cl_2

12. Which of the substances Na, Hg, S, Pt and graphite can be used as electrodes in electrolytic cells having aqueous solutions

(a) $Na, Pt$and graphite

(b) $Na$and Hg

(c) $Pt$and graphite only

(d) $Na$and Alonly

13. In electrolysis of dilute H_2SO_4 using platinum electrodes

(a) H_2 is evolved at cathode

(b) NH_3 is produced at anode

(c) Cl_2 is obtained at cathode

(d) O_2 is produced

14. For cell reaction, $Zn + Cu^{2+} \rightarrow Zn^{2+} + Cu$, cell representation is

(a) $Zn \mid Zn^{2+} \| Cu^{2+} \mid Cu$

(b) $Cu \mid Cu^{2+} \| Zn^{2+} \mid Zn$

(c) $Cu \mid Zn^{2+} \| Zn \mid Cu^{2+}$

(d) $Cu^{2+} \mid Zn \| Zn^{2+} \mid Cu$

15. Which one is not called a anode reaction from the following

(a) $Cl^- \rightarrow \frac{1}{2}Cl_2 + e^-$

(b) $Cu \rightarrow Cu^{++} + 2e^-$

(c) $Hg^+ \rightarrow Hg^{++} + e^-$

(d) $Zn^{2+} + 2e^- \rightarrow Zn$

16. A cell from the following which converts electrical energy into chemical energy

(a) Dry cell

(b) Electrochemical cell

(c) Electrolytic cell

(d) None of these

17. In the cell $Zn|Zn^{2+}||Cu^{2+}|Cu$, the negative electrode is

(a) Cu (b) Cu^{2+}

(c) Zn (d) Zn^{2+}

18. Which of the following statements is correct ? Galvanic cell converts

(a) Chemical energy into electrical energy

(b) Electrical energy into chemical energy

(c) Metal from its elemental state to the combined state

(d) Electrolyte into individual ions

19. Hydrogen–oxygen fuel cells are used in space–craft to supply

(a) Power for heat and light

(b) Power for pressure

(c) Oxygen

(d) Water

20. The standard cell potential of $Zn|Zn^{2+}{}_{(aq)}||Cu^{2+}{}_{(aq)}|Cu$ cell is 1.10 *V*. The maximum work obtained by this cell will be

(a) 106.15 *kJ* (b) – 212.30 *kJ*

(c) – 318.45 *kJ* (d) – 424.60 *kJ*

21. The relationship between standard reduction potential of cell and equilibrium constant is shown by

(a) $E^0_{cell} = \frac{n}{0.059} log\ K_c$

(b) $E^0_{cell} = \frac{0.059}{n} log\ K_c$

(c) $E^0_{cell} = 0.059 \rightleftarrows n \rightleftarrows log\ K_c$

d) $E^0_{cell} = \frac{log\ K_c}{n}$

22. Consider the Galvanic cell $Zn^{\Theta}|ZnSO_4||CuSO_4|Cu^{\oplus}$ the reaction at cathode is

(a) $Zn^{2^+} + 2e^- \rightarrow Zn$

(b) $Cu^{2+} + 2e^- \rightarrow Cu$

(c) $Cu^{2+} + Zn \rightarrow Cu + Zn^{2+}$

(d) $Zn^{2+} + Cu \rightarrow Zn + Cu^{2+}$

23. The cell reaction $Cu + 2Ag^+ \rightarrow Cu^{+2} + Ag$ is best represented by

(a) $Cu_{(s)}|Cu^{+2}{}_{(aq)}||Ag^+{}_{(aq)}|Ag_{(s)}$

(b) $Pt|Cu^{+2}||Ag^+{}_{(aq)}|Ag_{(s)}$

(c) $Cu^{+2}|Cu||Pt|Ag$

(d) None of the above representations

24. $\underset{\text{(anode)}}{Zn_{(s)}|Zn^{2+}_{(aq)}}||\underset{\text{(cathode)}}{Cu^{2+}_{(aq)}|Cu_{(s)}}$ is

(a) Weston cell (b) Daniel cell

(c) Calomel cell (d) Faraday cell

(e) Standard cell

25. The specific conductance of a solution is 0.2 $ohm^{-1}cm^{-1}$ and conductivity is 0.04 ohm^{-1}. The cell constant would be

(a) 1 cm^{-1} (b) 0 cm^{-1}

(c) 5 cm^{-1} (d) 0.2 cm^{-1}