Electrochemistry

Q.1. Two electrolytic cells, one containing acidified ferrous chloride and another acidified ferric chloride, are connected in series. The ratio of iron deposited at cathodes in the two cells will be :
   a) 3:1
   b) 2:1
   c) 1:1
   d) 3:2

Q.2. A current of 2.0 A passed for 5 hours through a molten metal salt deposits 22.2 g of metal (At wt. = 177). The oxidation state of the metal in the metal salt is
   a) +1
   b) +2
   c) +3
   d) +4

Q.3. The charge required to deposit 9 g of Al from Al^3 solution is (At. wt. of Al = 27.0)
   a) 3216.3 C
   b) 96500 C
   c) 9650 C
   d) 32163 C

Q.4. An electrochemical cell is set up as follows :
$Pt(H_2,1$ atm)/0.1M HCl/0.1 M acetic acid/$(H_2$,1 atm)Pt EMF of this cell will not be zero because
   a) the temperature is constant
   b) the pH of 0.1 M HCl and 0.1 M acetic acid is not the same
   c) acids used in the two compartments are different
   d) EMF of a cell depends on molarities of the acids used

Q.5. The standard reduction potentials of four elements are given below. Which of the following will be the most suitable reducing agent?

| I = –3.04 V | II = – 1.90 V |
| III = 0 V | IV = 1.90 V |

   a) I
   b) II
   c) III
   d) IV

Q.6. The standard EMF of Daniell cell is 1.10 volt. The maximum electrical work obtained from the Daniell cell is
   a) 212.3 kJ
   b) 175.4 kJ
   c) 106.15 kJ
   d) 53.07 kJ

Q.7. The thermodynamic efficiency of cell is given by
   a) $\Delta H/\Delta G$
   b) $nFE/\Delta G$
   c) $nFE/\Delta H$
   d) nFE

Q.8. An increase in equivalent conductance of a strong electrolyte with dilution is mainly due to:
   a) increase in ionic mobility of ions
   b) 100% ionisation of electrolyte at normal dilution
   c) increase in both i.e. number of ions and ionic mobility of ions
   d) increase in number of ions

Q.9. Given:
 (i) $Cu^{2+} + 2e^- \rightarrow Cu$, $E^o = 0.337$ V
(ii) $Cu^{2+} + e^- \rightarrow Cu^+$, $E^o = 0.153$ V

Electrode potential, E^o for the reaction: $Cu^+ + e^- \rightarrow Cu$, will be
   a) 0.90 V
   b) 0.30 V
   c) 0.38 V
   d) 0.52 V

Q.10. Which of the following solutions of KCl will have highest value of specific conductance?
a) 1.0 N
b) 0.1 N
c) 0.01 N
d) 0.001 N

Q.11. The equivalent conductance of Ba^{2+} and Cl^- are respectively 127 and 76 ohm^{-1} cm^{-1} mol^{-1} at infinite dilution. The equivalent conductance of $BaCl2$ at infinite dilution will be
   a) 139.5
   b) 203
   c) 279
   d) 101.5

Q.12. The weight of silver displaced by a quantity of electricity which displaces 5600ml of O_2 at STP will be
   a) 5.4g
   b) 10.8g
   c) 54.9g
   d) 108.0g

Q.13. Once a current of 1.0 ampere was passed through one litre of CuCl2 solution for 16 min and 5 sec, all of the solution's copper was deposited at the cathode. The strength of solution CuCl2 was (Molar mass of Cu = 63.5; Faraday constant = 96,500)
   a) 0.01N
   b) 0.01M
   c) 0.02M
   d) 0.2N

Q.14. On electrolysis of dilute sulphuric acid using platinum electrodes, the product obtained at the anode will be
   a) hydrogen
   b) oxygen
   c) hydrogen sulphide
   d) sulphur dioxide

Q.15. A device that converts the energy of combustion of fields like hydrogen and methane directly into electrical energy is known as
   a) Electrolytic cell
   b) Dynamo
   c) Ni-Cd cell
   d) Fuel cell

Q.16. Without losing its concentration $ZnCl_2$ solution cannot be kept in contact with
- **a)** Au
- **b)** Al
- **c)** Pb
- **d)** Ag

Q.17. Standard solution of KNO_3 is used to make a salt bridge because
- **a)** Velocity of K^+ is greater than that of NO_3^-.
- **b)** Velocity of NO_3^- is greater than that of K^+.
- **c)** Velocity of both K^+ and NO_3^- are nearly same
- **d)** KNO_3 is highly soluble in water.

Q.18. How many coulombs are required for the oxidation of 1 mole of H_2O to O_2 ?
- **a)** 1.93×10^5 C
- **b)** 9.65×10^4 C
- **c)** 3.86×10^5 C
- **d)** 4.825×10^5 C

Q.19. Rust is a mixture of
- **a)** FeO and $Fe(OH)_3$
- **b)** FeO and $Fe(OH)_2$
- **c)** Fe_2O_3 and $Fe(OH)_3$
- **d)** Fe_3O_4 and $Fe(OH)_3$

Q.20. The standard reduction potentials of X, Y, Z metals are 0.52, -3.03, -1.18 respectively. The order of reducing power of the corresponding metals is:
- **a)** Y > Z > X
- **b)** X > Y > Z
- **c)** Z > Y > X
- **d)** Z > X > Y

Q.21. For a cell reaction involving two electron change the standard emf of the cell is found to be 0.295 V at 25°C. The equilibrium constant for the reaction at 25°C will be:

a) 2.95×10^2
b) 10
c) 1×10^{10}
d) 1×10^{-10}

Q.22. If Zn^{2+}/Zn electrode is diluted 100 times, then the change in emf is

a) increase of 59 mV
b) decrease of 59 mV
c) increase of 29.5 mV
d) decrease of 29.5 mV.

Q.23. If the equivalent conductance of 1 M benzoic acid is 12.8 ohm-1 cm² and if the conductance of benzoate ion and H^+ ion are 42 and 288.42 ohm-1 cm² respectively, its degree of dissociation is:

a) 39%
b) 3.9%
c) 0.35%
d) 0.039%

Q.24. The highest electrical conductivity of the following aqueous solutions is of?
a) 0.1 M acetic acid
b) 0.1 M chloro acetic acid
c) 0.1 M fluoroacetic acid
d) 0.1 M difluoro acetic acid

Q.25. Which of the following is not a good conductor?

a) Cu
b) NaCl (aq)
c) NaCl (molten)
d) NaCl(s)