1. Which of the following statement is wrong about galvanic cell ?
(1) cathode is positive charged
(2) anode is negatively charged
(3) reduction takes place at the anode
(4) reduction takes place at the cathode

2. A standard hydrogen electrode has zero electrode potential because
(1) hydrogen is easier to oxidise
(2) electrode potential is assumed to be zero
(3) hydrogen atom has only one electron
(4) hydrogen is the lightest element.

3. A standard reduction electrode potentials of four metals are
A = – 0.250 V , B = – 0.140 V
C = – 0.126 V , D = – 0.402 V
The metal that displaces A from its aqueous solution is :–
(1) B (2) C
(3) D (4) None of the above

4. The standard electrode potentials for the reactions
$Ag^+ (a) + e^- \longrightarrow Ag(s)$
$Sn^{2+} (a) + 2e^- \longrightarrow Sn (s)$
at 25 °C are 0.80 volt and –0.14 volt, respectively. The standard emf of the cell.
$Sn_{(s)} \mid Sn^{2+}_{(aq)}(1M) \mid\mid Ag^+_{(aq)}(1M) \mid Ag_{(s)}$
is :
(1) 0.66 volt (2) 0.80 volt
(3) 1.08 volt (4) 0.94 volt

5. The thermodynamic efficiency of cell is given by-
(1) $\frac{\Delta H}{\Delta G}$ (2) $\frac{nFE_{cell}}{\Delta G}$ (3) $-\frac{nFE_{cell}}{\Delta H}$ (4) Zero

6. The reduction potential values are given below:
$Al^{3+} \mid Al = -1.67$ volt,
$Mg^{2+} \mid Mg = -2.34$ volt
$Cu^{2+} \mid Cu = +0.34$ volt,
$I_2 \mid 2I^- = +0.53$ volt
Which one is the best reducing agent ?
(1) Al (2) Mg (3) Cu (4) I_2

7. $E°(Ni^{2+} \mid Ni) = -0.25$ volt, $E°(Au^{3+} \mid Au) = 1.50$ volt. The standard emf of the voltaic cell.
$Ni_{(s)} \mid Ni^{2+}_{(aq)}$ (1.0 M) $\mid\mid Au^{3+}_{(aq)}$ (1.0 M) $\mid Au_{(s)}$ is :
(1) 1.25 volt (2) –1.75 volt
(3) 1.75 volt (4) 4.0 volt

8. From the following E° values of half cells,
(i) $A + e \rightarrow A^-$; E° = –0.24 V
(ii) $B^- + e \rightarrow B^{2-}$; E° = +1.25 V
(iii) $C^- + 2e \rightarrow C^{3-}$; E° = –1.25 V
(iv) $D + 2e \rightarrow D^{2-}$; E° = +0.68 V
What combination of two half cells would result in a cell with the largest potential ?
(1) (ii) and (iii) (2) (ii) and (iv)
(3) (i) and (iii) (4) (i) and (iv)

9. Which of the following will increase the voltage of the cell with following cell reaction
$Sn_{(s)} + 2Ag^+_{(aq)} \rightarrow Sn^{+2}_{(aq)} + 2Ag_{(s)}$
(1) Decrease in the concentration of Ag^+ ions
(2) Increase in the concentration of Sn^{+2} ions
(3) Increase in the concentration of Ag^+ ions
(4) (1) & (2) both

10. At 25°C the standard emf of cell having reactions involving two electrons change is found to be 0.295V. The equilibrium constant of the reaction is -
(1) 29.5×10^{-2} (2) 10
(3) 10^{10} (4) 29.5×10^{10}

11. The emf of the cell in which the following reaction, $Zn(s) + Ni^{2+}_{(aq)}$ (a = 0.1) $\rightarrow Zn^{2+}_{(aq)}$ (a = 1.0) + Ni(s) occurs, is found to be 0.5105 V at 298 K. The standard e.m.f. of the cell is :-
(1) –0.5105 V (2) 0.5400 V
(3) 0.4810 V (4) 0.5696 V

12. What is the potential of the cell containing two hydrogen electrodes as represented below
$Pt \mid H_2(g) \mid H^+_{(aq)}(10^{-8}\ M) \mid\mid H^+_{(aq)}(0.001\ M) \mid H_2(g) \mid Pt$
(1) – 0.295 V (2) – 0.0591 V
(3) 0.295 V (4) 0.0591 V

13. Consider the cell, $Cu \mid Cu^{+2} \mid\mid Ag^+ \mid Ag$. If the concentration of Cu^{+2} and Ag^+ ions becomes ten times the emf of the cell :–
(1) Becomes 10 times
(2) Remains same
(3) Increase by 0.0295 V
(4) Decrease by 0.0295 V

14. Given electrode potentials :
$Fe^{3+}_{(aq)} + e^- \longrightarrow Fe^{2+}_{(aq)}$; E° = 0.771 volts
$I_{2(g)} + 2e^- \longrightarrow 2I^-_{(aq)}$; E° = 0.536 volts
$E°_{cell}$ for the cell reaction,
$2Fe^{3+}_{(aq)} + 2I^-_{(aq)} \longrightarrow 2Fe^{2+}_{(aq)} + I_{2(g)}$ is -
(1) $(2 \times 0.771 - 0.536) = 1.006$ volts
(2) $(0.771 - 0.5 \times 0.536) = 0.503$ volts
(3) 0.771 – 0.536 = 0.235 volts
(4) 0.536 – 0.771 = –0.235 volts

15. The equilibrium constant for the reaction
$Sr(s) + Mg^{+2}(aq) \rightleftharpoons Sr^{+2}(aq) + Mg(s)$ is 4×10^{12} at 25°C
The E° for a cell made up of the $Sr \mid Sr^{+2}$ and $Mg^{+2} \mid Mg$ half cells
(log 2 = 0.3)
(1) 0.3717 V (2) 0.7434 V
(3) 0.1858 V (4) 0.135 V

16. Which of the substances Na, Hg, S, Pt and graphite can be used as electrodes in electrolytic cells having aqueous solution ?
(1) Hg and Pt (2) Hg, Pt and graphite
(3) Na, S (4) Na, Hg, S

17. The products formed when an aqueous solution of NaBr is electrolyzed in a cell having inert electrodes are :
(1) Na and Br_2 (2) Na and O_2
(3) H_2, Br_2 and NaOH (4) H_2 and O_2

18. When an aqueous solution of lithium chloride is electrolysed using graphite electrodes
(1) Cl_2 is liberated at the anode.
(2) Li is deposited at the cathode
(3) as the current flows, pH of the solution remains constant
(4) as the current flows, pH of the solution decreases.

19. The ratio of weights of hydrogen and magnesium deposited by the same amount of electricity from aqueous H_2SO_4 and fused $MgSO_4$ are :
(1) 1 : 8 (2) 1 : 12
(3) 1 : 16 (4) None of these

20. The same amount of electricity was passed through two separate electrolytic cells containing solutions of nickel nitrate $[Ni(NO_3)_2]$ and chromium nitrate $[Cr(NO_3)_3]$ respectively. If 0.3 g of nickel was deposited in the first cell, the amount of chromium deposited is :
(at. wt. of Ni = 59, at. wt. of Cr = 52)
(1) 0.1 g (2) 0.17 g (3) 0.3 g (4) 0.6 g

21. 1 mole of Al is deposited by X coulomb of electricity passing through aluminium nitrate solution. The number of moles of silver deposited by X coulomb of electricity from silver nitrate solution is :
(1) 3 (2) 4 (3) 2 (4) 1

22. Calculate the volume of hydrogen at STP obtained by passing a current of 0.536 ampere through acidified water for 30 minutes.
(1) 0.112 litre (2) 0.224 litre
(3) 0.056 litre (4) 0.448 litre

23. One mole of electron passes through each of the solution of $AgNO_3$, $CuSO_4$ and $AlCl_3$ when Ag, Cu and Al are deposited at cathode. The molar ratio of Ag, Cu and Al deposited are
(1) 1 : 1 : 1 (2) 6 : 3 : 2
(3) 6 : 3 : 1 (4) 1 : 3 : 6

24. The charge required for the oxidation of one mole Mn_3O_4 into MnO_4^{2-} in presence of alkaline medium is
(1) 5×96500 C (2) 96500 C
(3) 10×96500 C (4) 2×96500 C

25. The resistance of 0.01 N solution of an electrolyte was found to be 200 ohm at 298 K using a conductivity cell of cell constant 1.5 cm^{-1}. The equivalent conductance of solution is :–
(1) 750 $mhocm^2\ eq^{-1}$ (2) 75 mho $cm^2\ eq^{-1}$
(3) 750 $mho^{-1}\ cm^2\ eq^{-1}$ (4) 75 $mho^{-1}cm^2\ eq^{-1}$

26. If the pressure of H_2 gas is increased from 1 atm to 100 atm keeping H^+ concentration constant at 1 M, the change in reduction potential of hydrogen half cell at 25°C will be
(1) 0.059 V (2) 0.59 V
(3) 0.0295 V (4) 0.118 V

27. Salts of A (atomic weight = 7), B (atomic weight =27) and C (atomic weight = 48) were electrolysed under identical conditions using the same quantity of electricity. It was found that when 2.1 g of A was deposited, the weights of B and C deposited were 2.7 and 7.2 g. The valencies of A, B and C respectively are
(1) 3, 1 and 2 (2) 1, 3 and 2
(3) 3, 1 and 3 (4) 2, 3 and 2

28. The cost of electricity required to deposit 1 g of Mg is Rs. 5.00. How much would it cost to deposit 9 g of Al (At wt. Al = 27, Mg = 24)
(1) Rs. 10 (2) Rs. 27
(3) Rs. 40 (4) Rs. 60

29. The resistance of 0.5 M solution of an electrolyte in a cell was found to be 50 Ω. If the electrodes in the cell are 2.2 cm apart and have an area of 4.4 cm^2 then the molar conductivity (in S $m^2\ mol^{-1}$) of the solution is
(1) 0.2 (2) 0.02
(3) 0.002 (4) None of these

30. Equivalent conductance of 0.1 M HA(weak acid) solution is 10 $Scm^2 equivalent^{-1}$ and that at infinite dilution is 200 $Scm^2 equivalent^{-1}$ Hence pH of HA solution is
(1) 1.3 (2) 1.7 (3) 2.3 (4) 3.7

ANSWER KEY — Exercise-I

Que.	1	2	3	4	5	6	7	8	9	10
Ans.	**3**	**2**	**3**	**4**	**3**	**2**	**3**	**1**	**3**	**3**
Que.	11	12	13	14	15	16	17	18	19	20
Ans.	**2**	**3**	**3**	**3**	**1**	**2**	**3**	**1**	**2**	**2**
Que.	21	22	23	24	25	26	27	28	29	30
Ans.	**1**	**1**	**2**	**3**	**1**	**1**	**2**	**4**	**3**	**3**