

JEE-ADVANCED-2013-P1-Model

Time:09:00 A.M to 12:00 Noon

IMPORTANT INSTRUCTIONS**Max Marks: 180****PHYSICS:**

Section	Question Type	+Ve Marks	- Ve Marks	No.of Qs	Total marks
Sec – I(Q.N : 1 – 10)	Questions with Single Correct Choice	2	0	10	20
Sec – II(Q.N : 11 – 15)	Questions with Multiple Correct Choice	4	-1	5	20
Sec – III(Q.N : 16 – 20)	Questions with Integer Answer Type	4	-1	5	20
Total				20	60

CHEMISTRY:

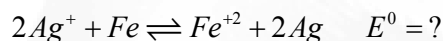
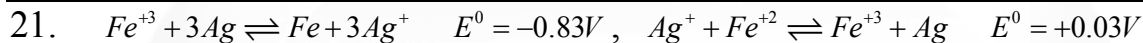
Section	Question Type	+Ve Marks	- Ve Marks	No.of Qs	Total marks
Sec – I(Q.N : 21 – 30)	Questions with Single Correct Choice	2	0	10	20
Sec – II(Q.N : 31 – 35)	Questions with Multiple Correct Choice	4	-1	5	20
Sec – III(Q.N : 36 – 40)	Questions with Integer Answer Type	4	-1	5	20
Total				20	60

MATHEMATICS:

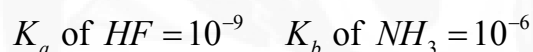
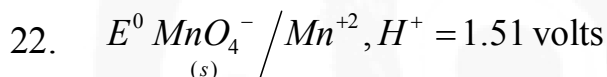
Section	Question Type	+Ve Marks	- Ve Marks	No.of Qs	Total marks
Sec – I(Q.N : 41 – 50)	Questions with Single Correct Choice	2	0	10	20
Sec – II(Q.N : 51 – 55)	Questions with Multiple Correct Choice	4	-1	5	20
Sec – III(Q.N : 56 – 60)	Questions with Integer Answer Type	4	-1	5	20
Total				20	60

CHEMISTRY:**Max.Marks : 60****SECTION I****Single Correct Answer Type**

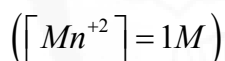
This section contains **10 multiple choice questions**. Each question has four choices (A), (B), (C) and (D) out of which **ONLY ONE** is correct.



- A) 0.86V B) 1.23V C) 1.08V D) 0.8V



In which of the following solutions 1M $KMnO_4$ acts as best oxidising agent?

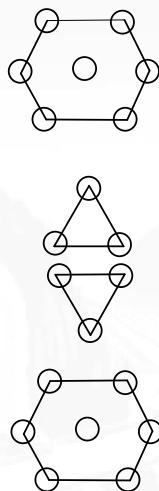


- A) 0.1M NH_3 B) 0.1M HF C) 0.1M NaF D) 0.1M NH_4Cl

23. Limiting equivalent conductances of NaOH, HCl and NaCl are 260, 425 and 125 $S.cm^2.eq^{-1}$ respectively. What is K_w of pure water at a temperature where specific conductance of water is $10^{-8} S.cm^{-1}$

- A) $1.8 \times 10^{-14} M^2$ B) $3.2 \times 10^{-16} M^2$ C) $2.4 \times 10^{-20} M^2$ D) $1.89 \times 10^{-15} M^2$

24. X^{-2} ions adopt the following arrangement in which all tetrahedral voids are occupied by the ions of a metal "M".



If 0.01 moles of the smallest repeating units of the above arrangement are present in "800 ml" aqueous solution, what is the reduction potential of the metallic electrode? The (S.R.P of metal electrode = 0.5V) ($\alpha = 1$)

- A) 0.608V B) 0.56V C) 0.44V D) 0.52V

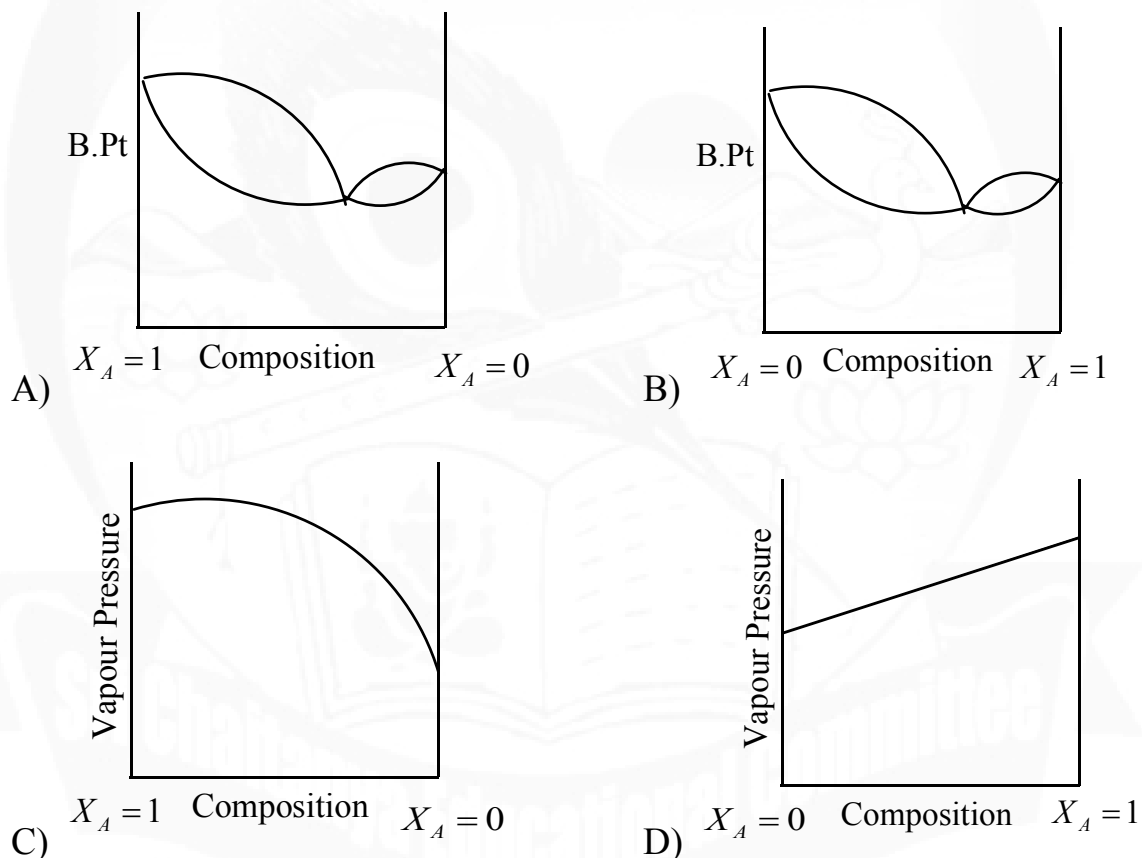
25. Certain quantity of a divalent metal 'M' is added to one litre of one molar $AgNO_3$ solution. 0.8 moles of metal 'A' is deposited along with some 'M' and system has become stand still. What is the single electrode potential of the metallic electrode of "M", at equilibrium if $E^0_{A^+/A}$ is 0.05V. ($\alpha = 1$ for salts)
- A) 0.008V B) 0.004V C) 0.002V D) 0.006V
26. In which case more % of ice separates out from aqueous solution if cryoscopic constant of water is $1.86K\ kg\ mol^{-1}$
- A) 2 m glucose solution kept at $-5^\circ C$
- B) 1 m $NaCl$ ($\alpha = 1$) solution kept at $-3.72^\circ C$
- C) 1 m K_2SO_4 ($\alpha = 1$) solution kept at $-5^\circ C$
- D) 2 m urea solution kept at $-4^\circ C$

27. A substance AB_2 (ionic) is gradually dissociating into A^{+2} and $2B^{-}$ ions with a rate constant 0.0693 min^{-1} . What may be the boiling point of an aqueous one molal AB_2 solution, after 20 minutes from its preparation? ($K_b = 0.52 \text{ K kg mol}^{-1}$)
- A) 102.6°C B) 101.3°C C) 103.9°C D) 105.2°C
28. What is the overall cell reaction for the voltaic cell
- $$Fe/Fe^{+2} // Fe^{+3}/Fe^{+2} : Pt$$
- A) $2Fe^{+3} \rightleftharpoons 3Fe^{+2}$ B) $Fe^{+3} + Fe^{+2} \rightleftharpoons Fe^{+3} + Fe^{+2}$
- C) $3Fe^{+2} \rightleftharpoons 2Fe^{+3} + Fe$ D) $2Fe^{+3} + Fe \rightleftharpoons 3Fe^{+2}$
29. At what temperature 10% w/w aqueous glucose solution acquires the vapour pressure equal to that of pure solvent at its normal boiling point? (Theoretically)
- (1 molal glucose solution boils at 100.52°C)
- A) 101.32°C B) 102.52°C C) 101.92°C D) 100.32°C

30. For two miscible liquids 'A' and 'B' the order of strength of interactions is

$$(A \dots B) < (B \dots B) < (A \dots A)$$

Which of the following can be suitable for the mixture of 'A' and 'B' ?



SECTION II

Multiple Correct Answer(s) Type

This section contains 5 multiple choice questions. Each question has four choices (A), (B), (C) and (D) out of which **ONE or MORE** are correct.

31. Which of the following electrodes are sensitive to P^H in view of their potential?
- A) (MnO_2, Mn^{+2}) couple B) (Fe^{+3}, Fe^{+2}) couple
- C) $Pt : (H_2/aq. NaCl)$ D) $Pt : (O_2/H_2O)$
32. Which statements(s) is(are) correct?
- A) The oxidation potential of hydrogen electrode increases with increase in alkalinity at 1 atm $25^\circ C$
- B) $Pt : H_2/HCl \parallel HCl/Cl_2 : Pt$
 $0.1M \quad 0.1M$ at 1 atm, $25^\circ C$ shows zero potential
- C) $Pt : Ag/AgBr(K_{sp} = 10^{-12}) \parallel AgI(K_{sp} = 10^{-16})/Ag$
 $(sat) \quad (sat)$ shows $E_{cell} < 0$
- D) " $E_{Ag}/AgCl(s), KCl$ " varies with $[Ag^+]$ as well as $[Cl^-]$
33. Elevation in boiling point of an aqueous solution of 'X' is " θ ". On adding stoichiometrically sufficient 'Y' to the solution the elevation in boiling point changed to " 1.5θ ". 'X' and 'Y' may be ____ respectively. ($\alpha = 1$, all salts)
- A) $(AgNO_3, NaCl)$ B) $(Na_3PO_4, BaCl_2)$
- C) (KI, HgI_2) D) $(BaCl_2, Na_3PO_4)$

34. 100 ml of "HCl" solution (theoretically) required $10^{-2} F$ of charge to remove entire Cl_2 at anode. Which statement(s) is(are) true at $25^\circ C$?
- A) The initial P^H of the solution is 1.
 B) In the process equal volumes of gases are released at anode and cathode
 C) The solution suffers 0.365gms of mass loss
 D) The final P^H of solution is less than that of initial.
35. $Na_2C_2O_4$ solution is to be estimated using $KMnO_4$ in acidic medium. Which of the following acid(s) is(are) NOT suitable for acidification
- A) HNO_3 B) $HClO_3$ C) H_2SO_4 D) HI

SECTION III
Integer Answer Type

This section contains **5 questions**. The answer to each question is single digit integer, ranging from 0 to 9 (both inclusive).

36. $E_{A^+/A}^0 = 0.5V$ The reduction potential of the given electrode in the saturated solution of its sulphide is found to be 0.380V. If the solubility product of the metal sulphide is $x \times 10^{-y}$. What is $(y-x)$? $\left(\frac{2.303RT}{F} = 0.06 \right) (\alpha = 1)$

37. 1 mole each of $BaCl_2$, $AgNO_3$ and K_2SO_4 dissolved 10 kilograms of water. The freezing point of the resulting clear solution is found to be $-0.2xK_f$ $^{\circ}C$. What is x ? (all salts 100% ionised, ignore traces) (K_f cryoscopic constant of water)
38. The nernst equation of a cell reaction is $E = E^0 - \frac{0.0591}{n} \log \frac{(Cu^{+2})}{(Cu^+)^2}$ what is 'n'?
39. The saturated aqueous solution of MX_2 ($\alpha = 1$) showed $0.003K_b\%$ elevation in boiling point on celcius scale. What is $(y-x)$ if K_{sp} of MX_2 is $x \times 10^{-y}$? (K_b = cryoscopic constant of water) ($m = M$)
40. At what P^H the following electrode should be kept as anode coupled with SHE cathode to produce $E_{cell} = 0.24V$, keeping quinol, quinone equimolar?

$$\left(\frac{2.303RT}{F} = 0.06 \right)$$

