

IIT-JEE-2013-P2-Model

Time: 2:00 PM to 5:00 PM

IMPORTANT INSTRUCTIONS

Max Marks: 180

PHYSICS:

Section	Question Type	+Ve Marks	- Ve Marks	No. of Qs	Total marks
Sec – I(Q.N : 1 – 8)	Questions with Multiple Correct Choice	3	-1	8	24
Sec – II(Q.N : 9 – 16)	Questions with Comprehension Type (4 Comprehensions – 2 + 2 + 2 + 2 = 8Q)	3	-1	8	24
Sec – III(Q.N : 17 – 20)	Matrix Matching Type	3	-1	4	12
Total				20	60

CHEMISTRY:

Section	Question Type	+Ve Marks	- Ve Marks	No. of Qs	Total marks
Sec – I(Q.N : 21 – 28)	Questions with Multiple Correct Choice	3	-1	8	24
Sec – II(Q.N : 29 – 36)	Questions with Comprehension Type (4 Comprehensions – 2 + 2 + 2 + 2 = 8Q)	3	-1	8	24
Sec – III(Q.N : 37 – 40)	Matrix Matching Type	3	-1	4	12
Total				20	60

MATHEMATICS:

Section	Question Type	+Ve Marks	- Ve Marks	No. of Qs	Total marks
Sec – I(Q.N : 41 – 48)	Questions with Multiple Correct Choice	3	-1	8	24
Sec – II(Q.N : 49 – 56)	Questions with Comprehension Type (4 Comprehensions – 2 + 2 + 2 + 2 = 8Q)	3	-1	8	24
Sec – III(Q.N : 57 – 60)	Matrix Matching Type	3	-1	4	12
Total				20	60

Sr. IPLCO_P2_Advanced

space for rough work

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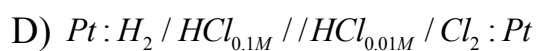
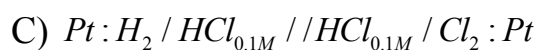
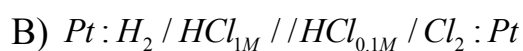
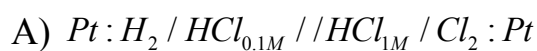
CHEMISTRY:**Max. Marks: 60****SECTION – I****(MULTIPLE CORRECT CHOICE TYPE)**

This section contains **8 multiple choice questions**. Each question has 4 choices (A), (B), (C) and (D) for its answer, out of which **ONE OR MORE is/ are correct**

21. By “Osmotic Pressure” method molecular weight of solutes can be determined in dilute solutions. In such method which of the following give(s) lower molecular weight than actual?
- A) Glucose in water B) Acetic acid in water
- C) Acetic acid in benzene D) NaCl in water
22. Which of the following aqueous solutions freeze(s) at a higher temperature than 0.2 m NaCl ($\alpha = 1$)?
- A) 2.4%w/v urea solution ($d=1.024$ g/cc)
- B) 0.1 m $Hg_2(NO_3)_2$ ($\alpha = 1$)
- C) 2.4 % w/w urea solution.
- D) 0.24 m urea solution

23. SRP for chlorine electrode is $E^\circ_{Cl_2/Cl^-:Pt} = 1.36V$ Which of the following cells

give(s) E_{cell} greater than E_{cell}° ? ($P_{H_2} = 1\text{ bar}, P_{Cl_2} = 1\text{ bar}, 25^\circ C$)



24. Which statement(s) is (are) TRUE?

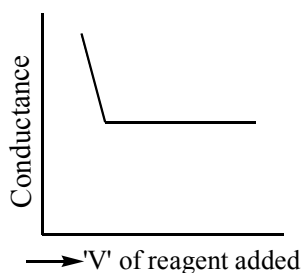
A) Specific conductance of 0.1 M NaCl is greater than that of 0.2 M NaCl

B) Molar conductance of 0.1 M NaCl is greater than that of 0.2 M NaCl

C) Equivalent conductance of 0.1 M KOH is greater than its molar conductance.

D) 0.01 M CH_3COOH offers greater resistance than 0.1 M CH_3COOH in the same conductivity cell.

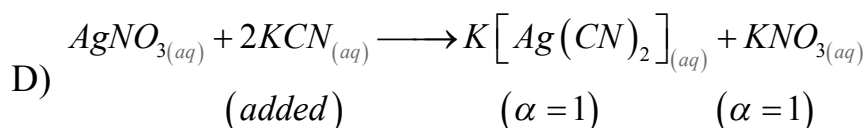
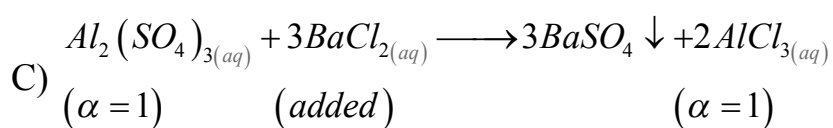
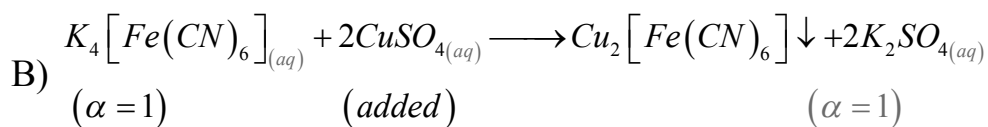
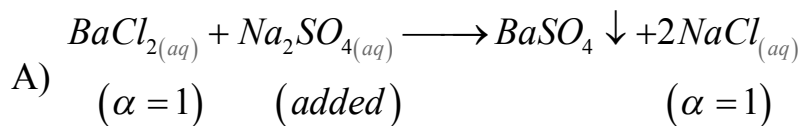
25. In a conductometric titration the following trend is observed (not to scale)



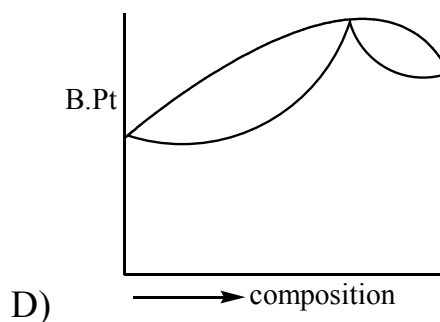
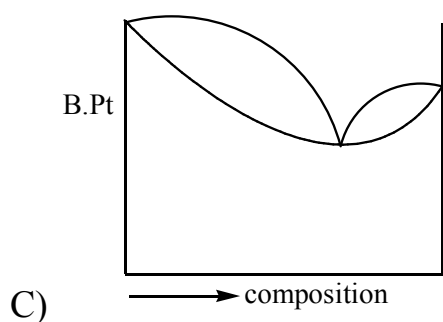
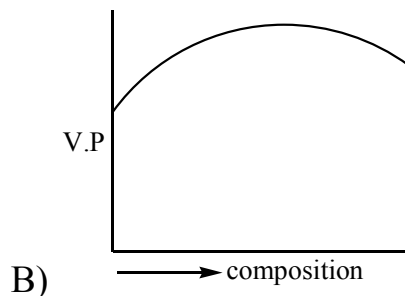
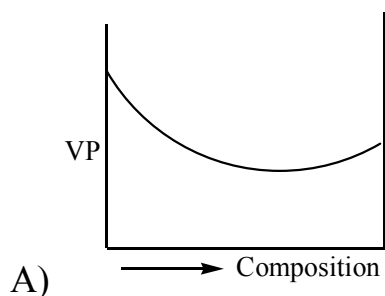
The titration may be

- A) NH_3 gradually added to HCl solution
 - B) HCOOH gradually added to NaOH solution
 - C) HCl is gradually added to NH_3 solution.
 - D) NaOH is gradually added to HCOOH solution.
26. Which of the following property(s) of a dilute glucose solution may increase with increase in temperature?
- A) Vapour pressure of the solution
 - B) Lowering of vapour pressure of the solution
 - C) Relative lowering of vapour pressure
 - D) Mole fraction of the solute in the system.

27. In which case the elevation in boiling point of the final solution is more than that of the initially taken solution? (No limiting reagents)



28. Ethanol-water azeotrope boils at 351.2K at 1 atm. Which curve(s) is (are) suitable to the mixtures of these liquids?



SECTION - II
(COMPREHENSION TYPE)

This section contains **4 groups of questions**. Each group has 2 multiple choice questions based on a paragraph. Each question has 4 choices A), B), C) and D) for its answer, out of which **ONLY ONE** is correct.

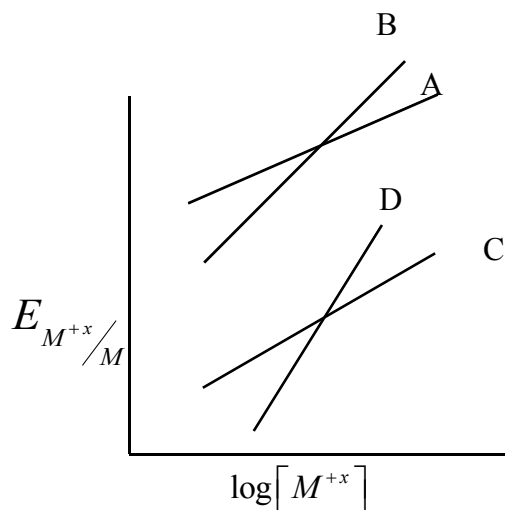
Paragraph for Questions 29 and 30

During Electrolysis process the electrolytic substances are decomposed by consumption of electric energy. Every 'x' faradays of charge can electrolyse 'x' gram equivalents of electrolyte theoretically.

29. In the electrolysis of one litre of 0.1 M $AgNO_3$ aqueous solution with inert electrodes by 10^{-2} faradays, the solution developed a final P^H of 2.3010. What is the efficiency of the circuit?
- A) 20% B) 50% C) 75% D) 100%
30. One litre aqueous solution of 0.1 M HCOOK is electrolyzed with 0.2 Faradays of charge with inert electrolydes. How much total volume of H_2 is released at STP in this process? (Kolbe's electrolysis)
- A) 1.12 lts B) 2.24 lts C) 3.36 lts D) 4.48lts

Paragraph for Questions 31 and 32

Variations of potentials of different metals are shown in the following curves as with varying activities of metal ions.



31. Maximum non expansion work can be derived in standard state from the cell made of the electrodes of
A) A,D B) B,D C) A,C D) B,C
32. If the salts of A,B,C and D are electrolyzed with same quantity of charge in fused state, which metal is deposited in more number of moles at cathode?
A) D B) C C) B D) A

Paragraph for Questions 33 and 34

Chemical information of different electrolytes can be obtained by conductometry experiments.

The conductance of an electrolyte in aqueous medium depends on factors like temperature, nature of ions etc. With the help of molar and equivalent conductance's of electrolytes K_a, K_b values and degree of dissociation can be

obtained. $\alpha = \frac{\lambda_c}{\lambda_\infty}$ where λ_c = molar conductance at a given dilution, λ_∞ = molar conductance at infinite dilution.

33. In a conductivity cell
- A) A non spontaneous redox reaction is made to take place using A.C circuit.
 - B) A non spontaneous redox reaction is made to occur using D.C circuit.
 - C) Decomposition of electrolyte is prevented using A.C circuit.
 - D) Electrolyte decomposes spontaneously in any circuit.
34. Which of the following may have maximum molar conductance at same dilution.
- A) HCl B) NaCl C) NaOH D) AgCl

Paragraph for Questions 35 and 36

Aqueous solutions of certain substance show abnormal Colligative properties due to association or dissociation of solute particles. Hence the normal and abnormal properties are related as $i \times (\text{Normal colligative properties}) = \text{Abnormal colligative properties}$

Where i = VantHoff factor

$$i = \frac{\text{Abnormal no.of particles}}{\text{Normal no.of particles}}$$

35. What is the boiling point of 0.1m MgCl_2 at 1atm which can freeze at the same temperature as 0.2 m glucose solution?

(Ebulioscopic constant of water = $0.52 \text{ K Kg mol}^{-1}$)

- A) 100.104°C B) 100.52°C C) 100.156°C D) 100.208°C

36. Which of the following can not be the elevation in boiling point of “one molal” aqueous solution in which the solute is dimerised to a certain extent?

($K_b = 0.52 \text{ K Kg mol}^{-1}$)

- A) 0.3°C B) 0.4°C C) 0.2°C D) 0.5°C

SECTION – III

(MATRIX MATCH TYPE)

This section contains **4 multiple choice questions**. Each question has matching lists. The codes for the lists have choices (A), (B), (C), and (D) out of which **ONLY ONE** is correct.

37. Conversion Number of Faradays transferred
- (1 mole reactant)
- a) $H_2O \longrightarrow H_2 + \frac{1}{2}O_2$ P) 1
- b) $CH_3OH \xrightarrow{(o)} HCOOH$ Q) 2
- c) $Pb_3O_4 \longrightarrow PbO$ R) 3
- d) $Hg_2Cl_2 \longrightarrow Hg + HgCl_2$ S) 4
- A) a – Q, b – S, c – Q, d – P B) a – S, b – R, c – Q, d – P
- C) a – Q, b – S, c – R, d – P D) a – S, b – Q, c – R, d – P

40.

LIST-ALIST-B

(Products) (Theoretical yields)

(inert electrodes)

(Electrolysis with one faraday)

(discharge potential of $Cl_2 < O_2$)

a) 1 lt 1M NaCl (aq)

P) 0.5 mol H_2

b) 1 lt 0.5 M NaCl (aq)

Q) 0.5 mol Cl_2 c) 1 lt 0.5 M $AgNO_3(aq)$ R) 0.25 mol O_2 d) 1 lt 1M $CuSO_4(aq)$

S) 0.5 mol metal

A) a – PS, b – P, c – RS, d - R,S

B) a – PS, b – PQS, c – RS, d - R,S

C) a – PQ, b – P, c – RS, d - R,S

D) a – PQ, b – PQ, c – PRS, d – PRS