

Sample Practice Paper For AIEEE (Chemistry)

1) The ionization enthalpy of hydrogen atom is $1.312 \times 10^6 \text{ J mol}^{-1}$. The energy required to excite the electron in the atom from $n = 1$ to $n = 2$ is

- 1) $6.56 \times 10^5 \text{ J mol}^{-1}$
- 2) $7.56 \times 10^5 \text{ J mol}^{-1}$
- 3) $9.84 \times 10^5 \text{ J mol}^{-1}$
- 4) $8.51 \times 10^5 \text{ J mol}^{-1}$

2) Which one of the following pairs of species have the same bond order?

- 1) CN^- and CN^+
- 2) O_2^- and CN^-
- 3) NO^+ and CN^+
- 4) CN^- and NO^+

3) Which one of the following constitutes a group of the isoelectronic species?

- 1) NO^+ , C_2^{2-} , CN^- , N_2
- 2) CN^- , N_2 , O_2^{2-} , C_2^{2-}
- 3) N_2 , O_2^- , NO^+ , CO
- 4) C_2^{2-} , O_2^- , CO , NO

4) Four species are listed below:

- i. HCO_3^-
- ii. H_3O^+
- iii. HSO_4^-
- iv. HSO_3F

Which one of the following is the correct sequence of their acid strength?

- 1) $\text{ii} < \text{iii} < \text{i} < \text{iv}$
- 2) $\text{i} < \text{iii} < \text{ii} < \text{iv}$
- 3) $\text{iii} < \text{i} < \text{iv} < \text{ii}$
- 4) $\text{iv} < \text{ii} < \text{iii} < \text{i}$

5) The pK_a of a weak acid, HA , is 4.80. The pK_b of a weak base, BOH , is 4.78. The pH of an aqueous solution of the corresponding salt, BA , will be

- 1) 4.79

- 2) 7.01
- 3) 9.22
- 4) 9.58

6) The correct decreasing order of priority for the functional groups of organic compounds in the IUPAC system of nomenclature is

- 1) $-\text{SO}_3\text{H}$, $-\text{COOH}$, $-\text{CONH}_2$, $-\text{CHO}$
- 2) $-\text{CHO}$, $-\text{COOH}$, $-\text{SO}_3\text{H}$, $-\text{CONH}_2$
- 3) $-\text{CONH}_2$, $-\text{CHO}$, $-\text{SO}_3\text{H}$, $-\text{COOH}$
- 4) $-\text{COOH}$, $-\text{SO}_3\text{H}$, $-\text{CONH}_2$, $-\text{CHO}$

7) The treatment of CH_3MgX with $\text{CH}_3\text{C} \equiv \text{C} - \text{H}$ produces

- 1) $\text{CH}_3\text{C} \equiv \text{C} - \text{CH}_3$
- 2) $\begin{array}{c} \text{H} \quad \text{H} \\ | \quad | \\ \text{CH}_3 - \text{C} = \text{C} - \text{CH}_3 \end{array}$
- 3) CH_4
- 4) $\text{CH}_3 - \text{CH} = \text{CH}_2$

8) The hydrocarbon which can react with sodium in liquid ammonia is

- 1) $\text{CH}_3\text{CH}_2\text{C} \equiv \text{CH}$
- 2) $\text{CH}_3\text{CH} = \text{CHCH}_3$
- 3) $\text{CH}_3\text{CH}_2\text{C} \equiv \text{CCH}_2\text{CH}_3$
- 4) $\text{CH}_3\text{CH}_2\text{CH}_2\text{C} \equiv \text{CCH}_2\text{CH}_2\text{CH}_3$

9) The vapour pressure of water at 20°C is 17.5 mm Hg. If 18g of glucose ($\text{C}_6\text{H}_{12}\text{O}_6$) is added to 178.2 g of water at 20°C , the vapour pressure of the resulting solution will be

- 1) 15.750 mm Hg
- 2) 16.500 mm Hg
- 3) 17.325 mm Hg
- 4) 17.675 mm Hg

10) Gold numbers of protective colloids A, B, C and D are 0.50, 0.01, 0.10 and 0.005, respectively. The correct order of their protective powers is

- 1) $\text{C} < \text{B} < \text{D} < \text{A}$
- 2) $\text{A} < \text{C} < \text{B} < \text{D}$

- 3) $B < D < A < C$
- 4) $D < A < C < B$

11) In a compound, atoms of element Y form ccp lattice and those of element X occupy $\frac{2}{3}$ rd of tetrahedral voids. The formula of the compound will be

- 1) X_2Y_3
- 2) X_2Y
- 3) X_3Y_4
- 4) X_4Y_3

12) In context with the industrial preparation of hydrogen from water gas ($CO + H_2$), which of the following is the correct statement?

- 1) CO is removed by absorption in aqueous Cu_2Cl_2 Solution
- 2) H_2 is removed through occlusion with Pd
- 3) CO is oxidized to CO_2 with steam in the presence of a catalyst followed by absorption of CO_2 in alkali
- 4) CO and H_2 are fractionally separated using differences in their densities

13) Among the following substituted silanes the one which will give rise to cross linked silicone polymer on hydrolysis is

- 1) $RSiCl_3$
- 2) R_2SiCl_2
- 3) R_3SiCl_2
- 4) R_4Si

14) Amount of oxalic acid present in a solution can be determined by its titration with $KMnO_4$ solution in the presence of H_2SO_4 . The titration gives unsatisfactory result when carried out in the presence of HCl , because HCl

- 1) furnishes H^+ ions in addition to those from oxalic acid
- 2) reduces permanganate to Mn^{2+}
- 3) oxidises oxalic acid to carbon dioxide and water
- 4) gets oxidised by oxalic acid to chlorine

**15) Given $E^0_{Cr^{3+}/Cr} = -0.72 V$,
 $E^0_{Fe^{2+}/Fe} = -0.42 V$.**

The potential for the cell $Cr | Cr^{3+} (0.1 M) || Fe^{2+} (0.01 M) | Fe$ is

- 1) 0.339 V
- 2) - 0.339 V
- 3) - 0.26
- 4) 0.26 V

16) Which one of the following is the correct statement ?

- 1) Beryllium exhibits coordination number of six
- 2) Chlorides of both beryllium and aluminium have bridged chloride structures in solid phase
- 3) $B_4H_6 \cdot 2NH_3$ is known as 'inorganic benzene'
- 4) Boric acid is a protonic acid

17) Identify the wrong statement in the following :

- 1) Greenhouse effect is responsible for global warming
- 2) Ozone layer does not permit infrared radiation from the sun to reach the earth
- 3) Acid rain is mostly because of oxides of nitrogen and sulphur
- 4) Chlorofluorocarbons are responsible for ozone layer depletion

18) The coordination number and the oxidation state of the element 'E' in the complex $[E(en)_2(C_2O_4)]NO_2$ (when (en) is ethylene diamine) are, respectively,

- 1) 4 and 2
- 2) 4 and 3
- 3) 6 and 3
- 4) 6 and 2

19) In which of the following octahedral complexes of Co (at no. 27), will the magnitude of Δ_0 be the highest?

- 1) $[Co(C_2O_4)_3]^{3-}$
- 2) $[Co(H_2O)_6]^{3+}$
- 3) $[Co(NH_3)_6]^{3+}$
- 4) $[Co(CN)_6]^{3-}$

20) Larger number of oxidation states are exhibited by the actinoids than those by the lanthanoids, the main reason being

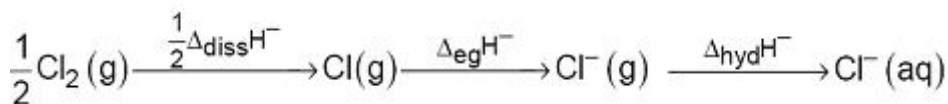
- 1) lesser energy difference between 5f and 6d than between 4f and 5d orbitals
- 2) more energy difference between 5f and 6d than between 4f and 5d orbitals

- 3) more reactive nature of the actinoids than the lanthanoids
- 4) 4f orbitals more diffused than the 5f orbitals

21) Which of the following factors is of no significance for roasting sulphide ores to the oxides and not subjecting the sulphide ores to carbon reduction directly ?

- 1) CO₂ is thermodynamically more stable than CS₂
- 2) Metal sulphides are less stable than the corresponding oxides
- 3) CO₂ is more volatile than CS₂
- 4) Metal sulphides are thermodynamically more stable than CS₂

22) Oxidising power of chlorine in aqueous solution can be determined by the parameters indicated below :

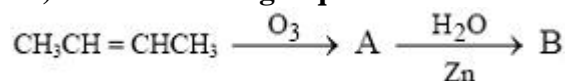


$\frac{1}{2} \text{Cl}_2 (\text{g})$ to $\text{Cl}^- (\text{aq})$ **The energy involved in the conversion of**

(using the data, $\Delta_{\text{diss}} \text{H}_{\text{Cl}_2}^\ominus = 240 \text{ kJ mol}^{-1}$, $\Delta_{\text{eg}} \text{H}_{\text{Cl}}^\ominus = -349 \text{ kJ mol}^{-1}$, $\Delta_{\text{hyd}} \text{H}_{\text{Cl}^-}^\ominus = -381 \text{ kJ mol}^{-1}$) will be

- 1) - 610 kJ mole⁻¹
- 2) - 850 kJ mole⁻¹
- 3) + 120 kJ mole⁻¹
- 4) + 152 kJ mole⁻¹

23) In the following sequence of reactions, the alkene affords the compound 'B'



The compound B is

- 1) CH₃COCH₃
- 2) CH₃CH₂COCH₃
- 3) CH₃CHO
- 4) CH₃CH₂CHO

24) Phenol, when it first reacts with concentrated sulphuric acid and then with concentrated nitric acid, gives

- 1) o-nitrophenol
- 2) p-nitrophenol
- 3) nitrobenzene

4) 2,4,6-trinitrobenzene

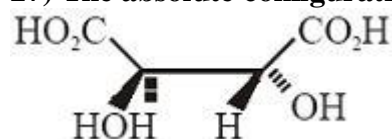
25) Toluene is nitrated and the resulting product is reduced with tin and hydrochloric acid. The product so obtained is diazotised and then heated with cuprous bromide. The reaction mixture so formed contains

- 1) mixture of o- and p-dibromobenzenes
- 2) mixture of o- and p-bromoanilines
- 3) mixture of o- and m-bromotoluenes
- 4) mixture of o- and p-bromotoluenes

26) The organic chloro compound, which shows complete stereochemical inversion during a S_N2 reaction, is

- 1) $(CH_3)_3CCl$
- 2) $(CH_3)_2CHCl$
- 3) CH_3Cl
- 4) $(C_2H_5)_2CHCl$

27) The absolute configuration of

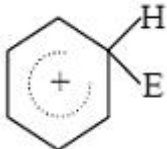
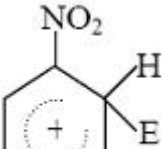
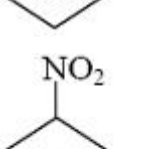
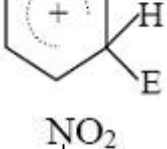


- 1) R, R
- 2) R, S
- 3) S, R
- 4) S, S

28) α -D-(+)-glucose and β -D-(+)-glucose are

- 1) epimers
- 2) anomers
- 3) enantiomers
- 4) conformers

29) The electrophile, E^+ attacks the benzene ring to generate the intermediate σ -complex. Of the following, which σ -complex is of lowest energy ?

- 1) 
- 2) 
- 3) 
- 4) 

30) Standard entropy of X_2 , Y_2 and XY_3 are 60, 40 and 50 $J K^{-1} mol^{-1}$, respectively. For the reaction, $\frac{1}{2} X_2 + \frac{3}{2} Y_2 \rightarrow XY_3$ $\Delta H = -30 kJ$, to be at equilibrium, the temperature will be

- 1) 500 K
2) 750 K
3) 1000 K
4) 1250 K

31) For the following three reactions a, b and c, equilibrium constants are given:

- (1) $CO(g) + H_2O(g) \rightleftharpoons CO_2(g) + H_2(g)$; K_1
(2) $CH_4(g) + H_2O(g) \rightleftharpoons CO(g) + 3H_2(g)$; K_2
(3) $CH_4(g) + 2H_2O(g) \rightleftharpoons CO_2(g) + 4H_2(g)$; K_3

Which of the following relations is correct ?

- 1) $K_2 K_3 = K_1$
2) $K_3 = K_1 K_2$
3) $K_3 K_2 = K_1$

4) $K_1\sqrt{K_2} = K_3$

32) Bakelite is obtained from phenol by reacting with

- 1) CH_3CHO
- 2) CH_3COCH_3
- 3) HCHO
- 4) $(\text{CH}_2\text{OH})_2$

33) The equilibrium constants K_{p1} and K_{p2} for the reactions $\text{X} \rightleftharpoons 2\text{Y}$ and $\text{Z} \rightleftharpoons \text{P} + \text{Q}$, respectively are in the ratio of 1 : 9. If the degree of dissociation of X and Z be equal then the ratio of total pressures at these equilibria is

- 1) 1 : 1
- 2) 1 : 3
- 3) 1 : 9
- 4) 1 : 36

34) For a reaction rate of disappearance of 'A' related to the rate of appearance of 'B' by the

- 1) $-\frac{d[\text{A}]}{dt} = \frac{1}{4} \frac{d[\text{B}]}{dt}$
- 2) $-\frac{d[\text{A}]}{dt} = \frac{d[\text{B}]}{dt}$
- 3) $-\frac{d[\text{A}]}{dt} = 4 \frac{d[\text{B}]}{dt}$
- 4) $-\frac{d[\text{A}]}{dt} = \frac{1}{2} \frac{d[\text{B}]}{dt}$

35) At 80°C , the vapour pressure of pure liquid 'A' is 520 mm Hg and that of pure liquid 'B' is 1000 mm Hg. If a mixture solution of 'A' and 'B' boils at 80°C and 1 atm pressure, the amount of 'A' in the mixture is (1 atm = 760 mm Hg)

- 1) 34 mol percent
- 2) 48 mol percent
- 3) 50 mol percent
- 4) 52 mol percent

ANSWERS

1) 3	2) 4	3) 1	4) 2
5) 2	6) 4	7) 4	8) 1
9) 3	10) 2	11) 4	12) 3
13) 1	14) 2	15) 4	16) 2
17) 2	18) 3	19) 4	20) 1
21) 3	22) 1	23) 3	24) 1
25) 4	26) 3	27) 1	28) 2
29) 1	30) 2	31) 2	32) 3
33) 4	34) 1	35) 3	