

**SOLUTIONS TO IIT-JEE 2010
CHEMISTRY: Paper-I (Code: 08)**

PART - I

Useful Data

Atomic numbers: Be = 4; C = 6; N = 7; O = 8; Al = 13; Si = 14; Cr = 24; Fe = 26; Zn = 30; Br = 35.

$$1 \text{ amu} = 1.66 \times 10^{-27} \text{ kg}$$

$$h = 6.626 \times 10^{-34} \text{ Js}$$

$$m_e = 9.1 \times 10^{-31} \text{ kg}$$

$$c = 3.0 \times 10^8 \text{ m s}^{-1}$$

$$R_H = 2.18 \times 10^{-18} \text{ J}$$

$$R = 0.082 \text{ L atm K}^{-1} \text{ mol}^{-1}$$

$$N_A = 6.022 \times 10^{23}$$

$$e = 1.6 \times 10^{-19} \text{ C}$$

$$F = 96500 \text{ C mol}^{-1}$$

$$4\pi\epsilon_0 = 1.11 \times 10^{-10} \text{ J}^{-1} \text{ C}^2 \text{ m}^{-1}$$

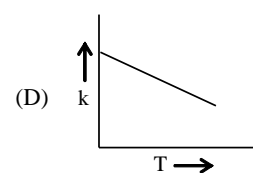
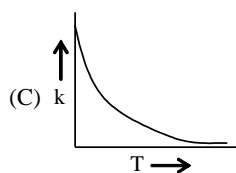
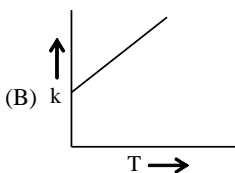
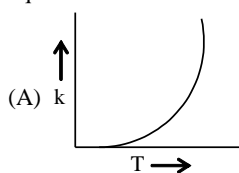
SECTION - I

Single Correct Choice Type

This section contains **8 multiple choice questions**. Each question has four choices (A), (B), (C) and (D), out of which **ONLY ONE** is correct.

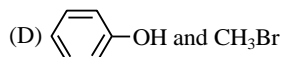
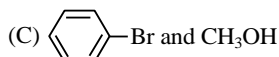
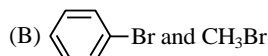
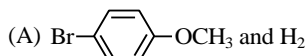
Note: Questions with (*) mark are from syllabus of class XI.

1. Plots showing the variation of the rate constant (k) with temperature (T) are given below. The plot that follows Arrhenius equation is



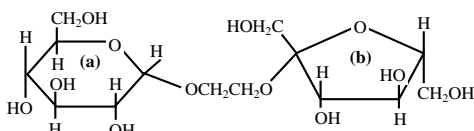
Ans. (A)

2. In the reaction c1ccc(OC)cc1 >>[HBr] the products are



Ans. (D)

3. The correct statement about the following disaccharide is



(A) Ring (a) is pyranose with α -glycosidic link.

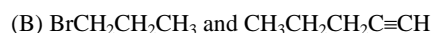
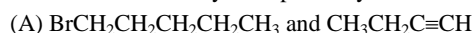
(B) Ring (a) is furanose with α -glycosidic link.

(C) Ring (b) is furanose with α -glycosidic link.

(D) Ring (b) is pyranose with β -glycosidic link.

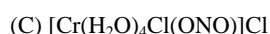
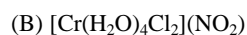
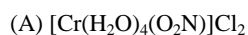
Ans. (A)

- *4. The synthesis of 3-octyne is achieved by adding a bromoalkane into a mixture of sodium amide and an alkyne. The bromoalkane and alkyne respectively are



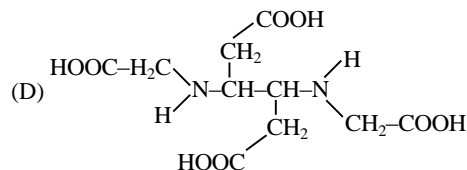
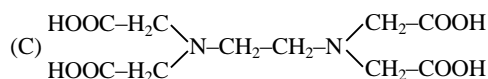
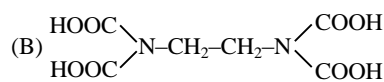
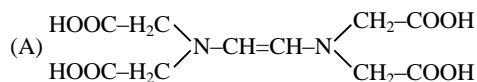
Ans. (D)

5. The ionization isomer of [Cr(H2O)4Cl(NO2)]Cl is



Ans. (B)

6. The correct structure of ethylenediaminetetraacetic acid (EDTA) is



Ans. (C)

*7. The bond energy (in kcal mol^{-1}) of a C-C single bond is approximately

- (A) 1 (B) 10 (C) 100 (D) 1000

Ans. (C)

*8. The species which by definition has **ZERO** standard molar enthalpy of formation at 298 K is

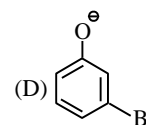
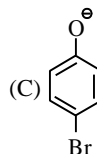
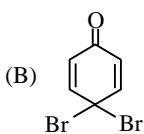
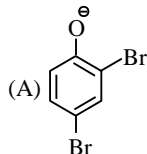
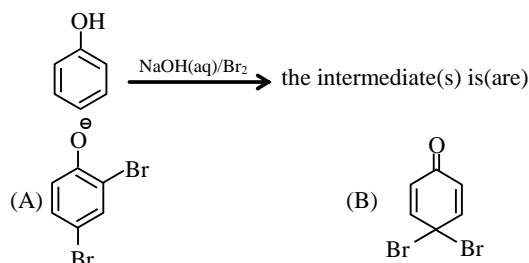
- (A) $\text{Br}_2(\text{g})$ (B) $\text{Cl}_2(\text{g})$ (C) $\text{H}_2\text{O}(\text{g})$ (D) $\text{CH}_4(\text{g})$

Ans. (B)

SECTION - II Multiple Correct Choice Type

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

9. In the reaction



Ans. (A), (C)

*10. Among the following, the intensive property is (properties are)

- (A) molar conductivity (B) electromotive force (C) resistance (D) heat capacity

Ans. (A), (B)

*11. The reagent(s) used for softening the temporary hardness of water is(are)

- (A) $\text{Ca}_3(\text{PO}_4)_2$ (B) $\text{Ca}(\text{OH})_2$ (C) Na_2CO_3 (D) NaOCl

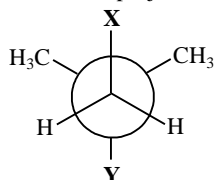
Ans. (B), (C), (D)

*12. Aqueous solutions of HNO_3 , KOH , CH_3COOH and CH_3COONa of identical concentrations are provided. The pair(s) of solutions which form a buffer upon mixing is(are)

- (A) HNO_3 and CH_3COOH (B) KOH and CH_3COONa
(C) HNO_3 and CH_3COONa (D) CH_3COOH and CH_3COONa

Ans. (C), (D)

*13. In the Newman projection for 2,2-dimethylbutane



X and Y can respectively be

- (A) H and H (B) H and C_2H_5 (C) C_2H_5 and H (D) CH_3 and CH_3

Ans. (B), (D)

SECTION – III
Paragraph Type

This section contains **2 paragraphs**. Based upon the first paragraph **3 multiple choice questions** and based upon the second paragraph **2 multiple choice questions** have to be answered. Each of these questions has four choices A), B), C) and D) out of which **ONLY ONE** is correct.

Paragraph for Question 14 to 16

Copper is the most noble of the first row transition metals and occurs in small deposits in several countries. Ores of copper include chalcantite ($\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$), atacamite ($\text{Cu}_2\text{Cl}(\text{OH})_3$), cuprite (Cu_2O), copper glance (Cu_2S) and malachite ($\text{Cu}_2(\text{OH})_2\text{CO}_3$). However, 80% of the world copper production comes from the ore chalcopyrite (CuFeS_2). The extraction of copper from chalcopyrite involves partial roasting, removal of iron and self-reduction.

14. Partial roasting of chalcopyrite produces

- (A) Cu_2S and FeO (B) Cu_2O and FeO (C) CuS and Fe_2O_3 (D) Cu_2O and Fe_2O_3

Ans. (A)

15. Iron is removed from chalcopyrite as

- (A) FeO (B) FeS (C) Fe_2O_3 (D) FeSiO_3

Ans. (D)

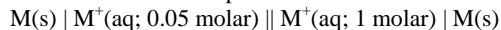
16. In self-reduction, the reducing species is

- (A) S (B) O^{2-} (C) S^{2-} (D) SO_2

Ans. (C)

Paragraph for Question 17 to 18

The concentration of potassium ions inside a biological cell is atleast twenty times higher than the outside. The resulting potential difference across the cell is important in several processes such as transmission of nerve impulses and maintaining the ion balance. A simple model for such a concentration cell involving a metal M is



For the above electrolytic cell the magnitude of the cell potential $|E_{\text{cell}}| = 70 \text{ mV}$.

17. For the above cell

- (A) $E_{\text{cell}} < 0$; $\Delta G > 0$ (B) $E_{\text{cell}} > 0$; $\Delta G < 0$ (C) $E_{\text{cell}} < 0$; $\Delta G^\circ > 0$ (D) $E_{\text{cell}} > 0$; $\Delta G^\circ < 0$

Ans. (B)

18. If the 0.05 molar solution of M^+ is replaced by a 0.0025 molar M^+ solution, then the magnitude of the cell potential would be

- (A) 35 mV (B) 70 mV (C) 140 mV (D) 700 mV

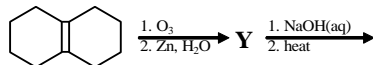
Ans. (C)

SECTION-IV

Integer Answer Type

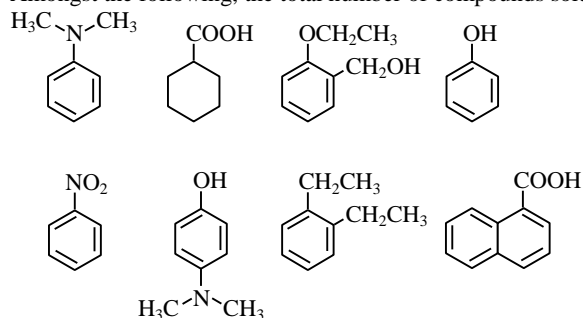
This section contains TEN questions. The answer to each questions is a single digit integer ranging from 0 to 9. The correct digit below the question number in the ORS is to be bubbled.

19. In the scheme given below, the total number of intramolecular aldol condensation products formed from 'Y' is



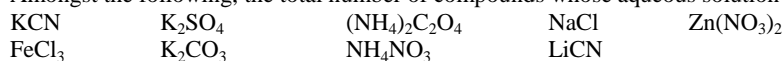
Ans. 1

20. Amongst the following, the total number of compounds soluble in aqueous NaOH is



Ans. 4

*21. Amongst the following, the total number of compounds whose aqueous solution turns red litmus paper blue is



Ans. 3

*22. Based on VSEPR theory, the number of 90 degree F-Br-F angles in BrF₅ is

Ans. 0

*23. The value of n in the molecular formula Be_nAl₂Si₆O₁₈ is

Ans. 3

*24. A student performs a titration with different burettes and finds titre values of 25.2 mL, 25.25 mL, and 25.0 mL. The number of significant figures in the average titre value is

Ans. 3

25. The concentration of R in the reaction R → P was measured as a function of time and the following data is obtained:

[R] (molar)	1.0	0.75	0.40	0.10
t(min.)	0.0	0.05	0.12	0.18

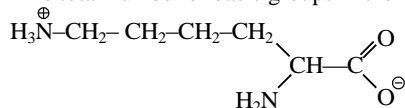
The order of reaction is

Ans. 0

26. The number of neutrons emitted when ²³⁵₉₂U undergoes controlled nuclear fission to ¹⁴²₅₄Xe and ⁹⁰₃₈Sr is

Ans. 3

*27. The total number of basic groups in the following form of lysine is



Ans. 2

*28. The total number of cyclic isomers possible for a hydrocarbon with the molecular formula C₄H₆ is

Ans. 5