IIT-JEE 2009

CHEMISTRY

PART -1

[Time allowed: 3 hours] [Maximum Marks: 240]

A. Question paper format:

1. The question paper consists of 3 parts (Chemistry, Mathematics and Physics). Each part consists of 4 sections.

2. **Section I** contains **8** multiple choice questions. Each question has 4 choices (A), (B), (C) and (D) for its answer, out of which **only one is correct.**

3. **Section II** contains **4** 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.**

4. **Section III** contains **2** groups of questions. Each group has 3 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.**

5. **Section IV** contains 2 questions. Each question has four statements (A, B, C and D) given in column I and five statements (p, q, r, s and t) in Column II. Any given statement in column I can have correct matching with **one or more** statements(s) given in column II. For example, if for a given question, statement B matches with the statements given in q and r, then for that particular question, against statement B, darken the bubbles corresponding to q and r in the ORS.

B. Marking scheme

6. For each question in **Section I** you will be **awarded 3 marks** if you darken the bubble corresponding to the correct answer and **zero** mark if no bubbles is darkened. In case of bubbling of incorrect answer, **minus (-1)** mark will be awarded.

7. For each question in **Section II,** you will be **awarded 4 marks** if you darken the bubble (s) corresponding to the correct choice(s) for the answer, and **zero** mark if no bubble is darkened. In all other cases, M**inus (-1)** mark will be awarded.

8. For each question in **Section III,** you will be **awarded 4 marks** if you darken the bubble (s) corresponding to the correct answer, and **zero** mark if no bubble is darkened. In all other cases, m**inus one (-1)** mark will be awarded.

9. For each question in **Section IV,** you will be **awarded 2 marks** for each row in which you have darkened the bubble(s) corresponding to the correct answer. Thus, each question in this section carries a maximum of **8** marks. There is **no negative marking** for incorrect answer(s) for this section.

SECTION-I

Single Correct Choice Type

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

1. The Henry's law constant for the solubility of N_2 gas in water at $298K$ is 1.0×10^5 atm. The mole fraction of N_2 in air is 0.8. The number of moles of N_2 from air dissolved in 10 moles of water at $298K$ and 5 atm pressure is

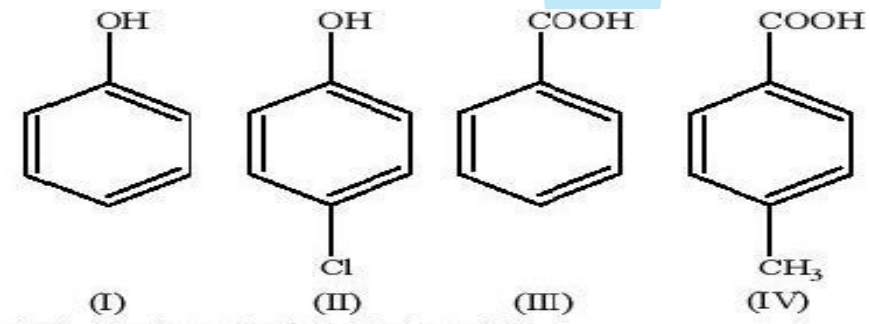
(A) 4.0×10^{-4}

(B) 4.0×10^{-5}

(C) 5.0×10^{-4}

(D) 4.0×10^{-6}

2. The correct acidity order of the following is



(A) $(\mathrm{III})>(\mathrm{IV})>(\mathrm{II})>(\mathrm{I})$

(B) $(\mathrm{IV})>(\mathrm{III})>(\mathrm{I})>(\mathrm{II})$

(C) $(\mathrm{III}) > (\mathrm{II}) > (\mathrm{I}) > (\mathrm{IV})$

(D) $(\mathrm{II}) > (\mathrm{III}) > (\mathrm{IV}) > (\mathrm{I})$

3. The reaction of $\mathrm{P_4}$ with X leads selectively to $\mathrm{P_4O_6}$. The X is

(A) Dry $\mathrm{O_2}$

(B) A mixture of $\mathrm{O_2}$ and $\mathrm{N_2}$

(C) Moist $\mathrm{O_2}$

(D) $\mathrm{O_2}$ in die presence of aqueous NaOH

4. Among cellulose, poly (vinyl chloride), nylon and natural rubber, the polymer in which the intermolecular force of attraction is weakest is

(A) Nylon

(B) Poly (vinyl chloride)

(C) Cellulose

(D) Natural Rubber

5. Given that the abundances of isotopes $^{54}Fe, ^{56}Fe$ and ^{57}Fe and Fe are $5\%, 90\%$ and 5% respectively, the atomic mass of Fe is

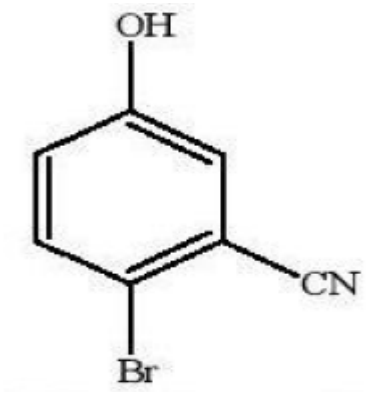
(A) 55.85

(B) 55.95

(C) 55.75

(D) 56.05

6. The IUPAC name of the following compound is



(A) 4-Bromo-3-cyanophenol

(B) 2-Bromo-5-hydroxybenzonitril

(C) 2-Cyano-4-hydroxybromobenzene

(D) 6-Bromo-3-hdyroxybenzonitrile

7. Among the electrolytes $Na_2SO_4, CaCl_2, Al_2(SO_4)_3$ and NH_4Cl, the most effective coagulating agent for Sb_2S_3 sol is

(A) Na_2SO_4

(B) $CaCl_2$

(C) $Al_2(SO_4)_3$

(D) NH_4Cl

8. The term that collects for the attractive forces present in a real gas in the van der Waals equation is

(A) nb

(B) $\frac{an^2}{V^2}$

(C) $-\frac{an^2}{V^2}$

(D) $-nb$

SECTION-II

Multiple Correct Choice Type

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

9. The compound(s) formed upon combustion of sodium metal in excess air is(are)

(A) Na_2O_2

(B) Na_2O

(C) NaO_2

(D) NaOH

10. The correct statement(s) about the compound

$H_3C(HO)HC-CH=CH-CH(OH)CH_3(X)$ is (are)

(A) The total number of stereoisomers possible for X is 6

(B) The total number of diastereomers possible for X is 3

(C) If the stereochemistry about the double bond in X is *trans*, the number of enantiomers possible for X is 4

(D) If the stereochemistry about the double bond in X is *cis*, the number of enantiomers possible for X is 2

11. The compound(s) that exhibit(s) geometrical isomerism is(are)

(A) $\left[\mathrm{Pt(en)Cl_2}\right]$

(B) $\left[\mathrm{Pt(en)_2\,Cl_2}\right]$

(C) $\left[\mathrm{Pt(en)_2\,Cl_2}\right]\mathrm{Cl_2}$

(D) $\left[\mathrm{Pt(NH_3)_2\,Cl_2}\right]$

12. The correct statements) regarding defects in solids is(are)

(A) Frenkel defect is usually favoured by a very small difference in the sizes of cation and anion

(B) Frenkel defect is a dislocation defect

(C) Trapping of an election in the lattice leads to the formation of F-center

(D) Schottky defects have no effect on the physical properties of solids

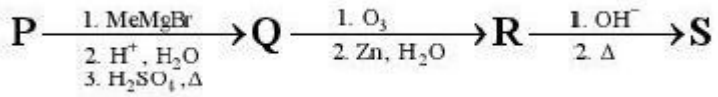
SECTION-III

Comprehension Type

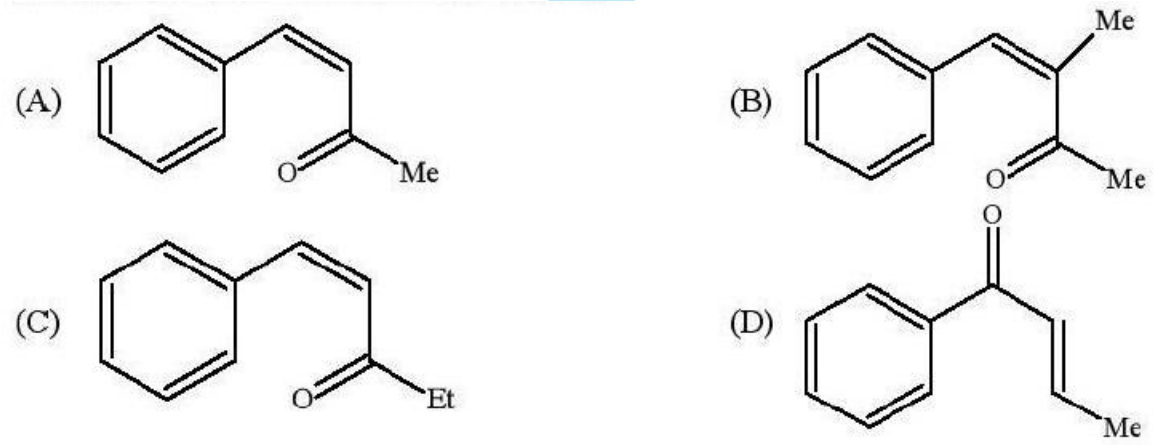
This section contains 2 groups of questions. Each group has 3 multiple choice question based on a paragraph. Each question has 4 choices (A), (B), (C) and (D) for its answer, out of which ONLY ONE is correct.

Paragraph for Question Nos. **13 to 15**

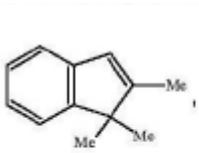
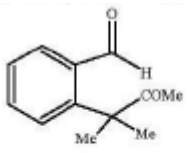
A carbonyl compound $\vec{P}$, which gives positive iodoform test, undergoes reaction with MeMgBr followed by dehydration to give an olefin $\vec{Q}$. Ozonolysis of $\vec{Q}$ leads to a dicarbonyl compound $\vec{R}$, which undergoes intramolecular a Idol reaction to give predominantly $\vec{S}$.

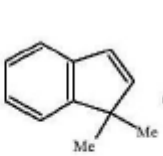
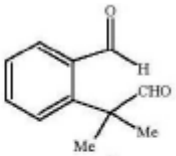


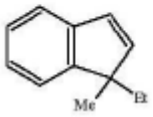
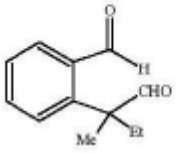
13. The structure of the carbonyl compound $\vec{P}$ is

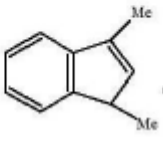
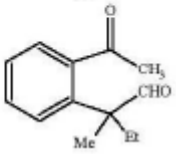


14. The structure of the products $\vec{Q}$ and $\vec{R}$, respectively, are

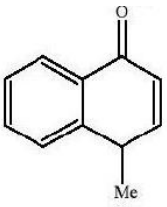
(A)  , 

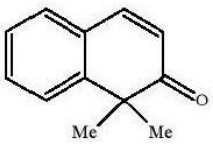
(B)  , 

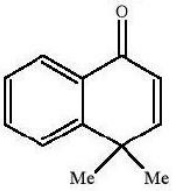
(C)  , 

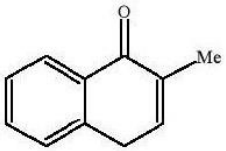
(D)  , 

15. The structure of the product $\vec{S}$ is

(A) 

(B) 

(C) 

(D) 

Paragraph for Question Nos. **16 to 18**

p-Amino-*N*, *N* -dimethylaniline is added to a strongly acidic solution of X. The resulting solution is treated with a few drops of aqueous solution of Y to yield blue coloration due to the formation of methylene blue. Treatment of the aqueous solution of Y with the reagent potassium hexacyanoferrate (II) leads to the formation of an intense blue precipitate. The precipitate dissolves on excess addition of the reagent. Similarly, treatment of the solution of Y with the solution of potassium hexacyanoferrate (IE) leads to a brown coloration due to the formation of Z.

16. The compound X is

(A) $NaNO_3$

(B) $NaCl$

(C) Na_2SO_4

(D) Na_2S

17. The compound Y is

(A) $MgCl_2$

(B) $FeCl_2$

(C) $FeCl_3$

(D) $ZnCl_2$

18. The compound Z is

(A) $Mg_2\left[Fe(CN)_6\right]$

(B) $Fe\left[Fe(CN)_6\right]$

(C) $Fe_4\left[Fe(CN_6)_3\right]$

(D) $K_2Zn_3\left[Fe(CN_6)\right]_2$