

CHEMISTRY APTITUDE TEST (CAT) : 2010

STAGE - II

[English Version]

Full marks : 50

Time : $1\frac{1}{2}$ hrs.

1. Each question has been provided with four alternative answers. Choose the correct answer : 1×20

a) Which one of the following ion have smallest size —

(i) N^{3-} (ii) F^- (iii) O^{2-} (iv) Na^+

b) Which one of the following is not a green house gas —

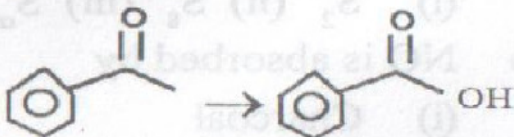
(i) Water vapour (ii) Methane
(iii) Nitrogen (iv) Carbon di-oxide.

c) Which one is a strong reducing agent —

(i) Na (ii) Li (iii) K (iv) Cu

d) Duralumine contains —

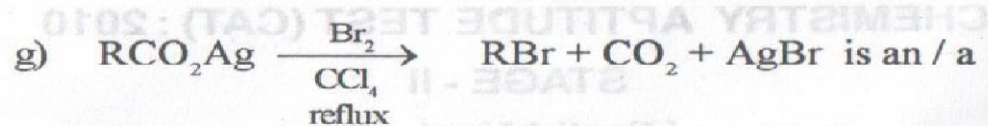
(i) Al, Mg and Zn (ii) Al, Mg, Mn and Cu
(iii) Al and Mn (iv) Al and Ni

e) For the conversion of  which method you will follow —

(i) Hoffman reaction
(ii) Oxidation by $K_2Cr_2O_7 / H_2SO_4$
(iii) Oxidation by CrO_3 —
(iv) Oxidation by Cl_2 - water.

f) Grignard reagent will react with which of the following compounds ?

(i) NaBr (ii) LiBr (iii) CuBr (iv) $MgBr_2$



- (i) Electrophilic substitution reaction
 - (ii) Nucleophilic substitution reaction.
 - (iii) Redical reaction
 - (iv) Elimination-Addition reaction ?
- h) Which one of the following compounds does not respond to Fridel-craft reaction.
- (i) Nitrobenzene
 - (ii) N, N-dimethyl aniline.
 - (iii) Benzoic Acid
 - (iv) None of (i), (ii) & (iii)
- i) In Benzene, benzoic acid molecules exist as —
- (i) Dissociate form
 - (ii) Non-dissociate form
 - (iii) Inter-molecular hydrogen-bonded form
 - (iv) (ii) and (iii) both.
- j) Symbol of monoclinic Sulphur is —
- (i) S_2 (ii) S_8 (iii) S_α (iv) S_β
- k) NO is absorbed by
- (i) Charcoal
 - (ii) Alkali solution
 - (iii) FeSO_4 solution
 - (iv) None of the above.
- l) Inorganic benzene is —
- (i) Quartz
 - (ii) Calcium Carbide
 - (iii) Boron-nitride
 - (iv) Borazine

- m) For a particular chemical reaction, unit of rate-constant is $\text{mol L}^{-1} \text{Sec}^{-1}$. It belongs to —
- Zero order reaction
 - First order reaction
 - Second order reaction
 - Pseudo-first order reaction.
- n) Number of π - bond present in $\text{HCCCH}_2\text{NO}_2$ is —
- 1
 - 2
 - 3
 - 4
- o) Among the H_2 , H_2^+ and H_2^- , the value of bond order —
- All are equal
 - H_2^+ and H_2^- are equal.
 - H_2 and H_2^+ are equal.
 - H_2 and H_2^- are equal.
- p) Bromination of phenol is an example of —
- Addition reaction
 - Substitution reaction
 - Addition-Elimination reaction
 - None of the above.
- q) Which one of the following is a basic amino acid —
- Proline
 - Arginine
 - Glycine
 - Valine.
- r) Biotine is a
- Chemical name of vitamin A
 - Chemical name of vitamin K

- (iii) Chemical name of vitamin H
(iv) Chemical name of vitamin B₁.
- s) Cytochrome P₄₅₀ acts as —
- (i) Oxidising agent.
 - (ii) Reducing agent.
 - (iii) Oxidising and reducing both.
 - (iv) None of the above.
- t) AS₂S₃ Sol is a —
- (i) Positive colloid
 - (ii) Negative colloid
 - (iii) Neutral colloid
 - (iv) None of these.

2. Answer the following questions briefly : 2 × 6

- a) When a solution of salicylic acid is added to a neutral solution of ferric chloride, the colour of the solution becomes violet, for the formation of a complex compound. Write down the structural formula of that coloured substance.
- b) Which one of the following solutions does show high vapour pressure and why?
- (i) 250 ml 1M glucose solution in water.
 - (ii) 250 ml 1 M common salt solution.
- c) Write down the shape and state of hybridisation of the following compounds.
- (i) ClF₃ (ii) IF₅
- d) Why acidity of aqueous solution of boric acid increases upon addition of glucose ?
- e) Why drinking of chemically pure water is harmful ?
- f) Draw the graph of neutralisation reaction between a strong acid and a strong base.

3. Answer the following questions as per instructions :

3 × 6

- a) (i) Write down the compositions of Fehling's and Tollen's solutions.
- (ii) Which one of the following compounds does not respond against Fehling's solution ?
- (a) PhCHO
- (b) PhCOCH (OH)ph
- (c) CH₃CHO 2 + 1
- B. (i) Write down the IUPAC names of the following organic compounds.
- (a) CH₂ = CHCOOH
- (b) CH₃CH (OH) CH₂CHO
- (ii) Write down the structure of trioxane. 2 + 1
- C. What are crown ethers ? Give examples. Why they are called so ? 1 + 1 + 1
- D. A crystal of radioactive KI¹³¹ is added to a saturated aqueous solution of KI. After 2 hours it is filtered. What will be the nature of the filtrate ? 3
- E. What are Buna-S and Buna-N rubber ? 1 $\frac{1}{2}$ + 1 $\frac{1}{2}$
- F. Write down one use of each of the following reagents in organic synthesis.
- (i) OsO₄ (ii) LiAlH₄ (iii) β-naphthol 1 + 1 + 1