CBSE Class 12 Chemistry 2015 - Set 56/3/RU

Question Paper

Conducted by the Central Board of Secondary Education (CBSE)

Time Allowed: 3 Hours **Maximum Marks: 70**

General Instructions

(i) This question paper contains 26 questions. All questions are compulsory.
(ii) Questions number 1 to 5 are very short answer questions and carry 1 mark each.
(iii) Questions number 6 to 10 are short answer questions and carry 2 marks each.
(iv) Questions number 11 to 22 are also short answer questions and carry 3 marks each.
(v) Question number 23 is a value based question and carry 4 marks.
(vi) Questions number 24 to 26 are long answer questions and carry 5 marks each.
(vii) Use log tables, if necessary. Use of calculators is not allowed.

Questions

1. Which would undergo S_N1 reaction faster in the following pair:

$CH_3-CH_2-CH_2-Br$ and $CH_3-CH(Br)-CH_3$

2. A delta is formed at the meeting point of sea water and river water. Why?

3. What is the formula of a compound in which the element Y forms ccp lattice and atoms of X occupy 2/3rd of tetrahedral voids?

4. Write the formulae of any two oxoacids of sulphur.

5. Write the IUPAC name of the given compound:

$CH_3-CH(CH_3)-CH_2-O-CH_2-CH_3$

6. (i) On mixing liquid X and liquid Y, volume of the resulting solution decreases. What type of deviation from Raoult's law is shown by the resulting solution? What change in temperature would you observe after mixing liquids X and Y?

(ii) What happens when we place the blood cell in water (hypotonic solution)? Give reason.

7. Calculate the time to deposit 1.27 g of copper at cathode when a current of 2 A was passed through the solution of $CuSO_4$.

(Molar mass of Cu = 63.5 g mol^{-1}, 1F = 96500 C mol^{-1})

8. Write one similarity and one difference between the chemistry of lanthanoids and that of actinoids.

9(a). Write the reagents required in the following reactions:

(i) $CH_2=CH-CH_2OH \rightarrow CH_2=CH-CHO$

(ii) $CH_3-COOH \rightarrow CH_3-CONH_2$

OR

9(b). Arrange the following compounds in increasing order of their property as indicated:

(i) CH_3COCH_3, $C_6H_5COCH_3$, CH_3CHO (reactivity towards nucleophilic addition reaction)

(ii) $Cl-CH_2-COOH$, $F-CH_2-COOH$, CH_3-COOH (acidic character)

10. (i) Write down the IUPAC name of the following complex: $[Co(NH_3)_5Cl]^{2+}$

(ii) Write the formula for the following complex: Potassium tetrachloridonickelate(II)

11. Write any three differences between Physisorption and Chemisorption.

12. Give reasons for the following:

(i) Phenol is more acidic than methanol.

(ii) The C−O−H bond angle in alcohols is slightly less than the tetrahedral angle (109°28′).

(iii) $(CH_3)_3C-O-CH_3$ on reaction with HI gives $(CH_3)_3C-I$ and CH_3-OH as the main products and not $(CH_3)_3C-OH$ and CH_3-I.

13. A solution is prepared by dissolving 10 g of non-volatile solute in 200 g of water. It has a vapour pressure of 31.84 mm Hg at 308 K. Calculate the molar mass of the solute.

(Vapour pressure of pure water at 308 K = 32 mm Hg)

14. (i) Name the method of refining to obtain silicon of high purity.

(ii) What is the role of SiO_2 in the extraction of copper?

(iii) What is the role of depressants in froth floatation process?

15. (i) Which one of the following is a polysaccharide: starch, maltose, fructose, glucose?

(ii) Write one difference between α-helix and β-pleated sheet structures of protein.

(iii) Write the name of the disease caused by the deficiency of vitamin B_{12}.

16. Conductivity of 2.5×10^{-4} M methanoic acid is 5.25×10^{-5} S cm^{-1}. Calculate its molar conductivity and degree of dissociation.

Given: $\lambda^0(H^+) = 349.5$ S cm^2 mol^{-1} and $\lambda^0(HCOO^-) = 50.5$ S cm^2 mol^{-1}.

17. (i) What type of isomerism is shown by the complex $[Cr(H_2O)_6]Cl_3$?

(ii) On the basis of crystal field theory, write the electronic configuration for d^4 ion if $\Delta_o > P$.

(iii) Write the hybridization and shape of $[CoF_6]^{3-}$. (Atomic number of Co = 27)

18(a). How can the following conversions be carried out:

(i) Aniline to bromobenzene

(ii) Chlorobenzene to 2-chloroacetophenone

(iii) Chloroethane to butane

OR

18(b). What happens when

(i) chlorobenzene is treated with $Cl_2/FeCl_3$,

(ii) ethyl chloride is treated with $AgNO_2$,

(iii) 2-bromopentane is treated with alcoholic KOH?

Write the chemical equations in support of your answer.

19. (a) Account for the following:

(i) Cu^+ is unstable in an aqueous solution.

(ii) Transition metals form complex compounds.

(b) Complete the following equation:

$Cr_2O_7^{2-} + 8H^+ + 3NO_2^- \rightarrow ?$

20. Write the names and structures of the monomers of the following polymers:

(i) Terylene

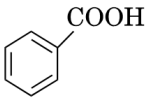
(ii) Buna-S

(iii) Neoprene

21. Predict the products of the following reactions:

(i) $CH_3-\underset{\displaystyle CH_3}{\overset{\displaystyle CH_3}{\overset{|}{C}}}=O \xrightarrow{H_2N-NH_2} ?$

(ii) $C_6H_5-CH_3 \xrightarrow[(b)\ H^+]{(a)\ KMnO_4/KOH} ?$

(iii)  $\xrightarrow{Br_2/FeBr_3} ?$

22. Examine the given defective crystal:

X^+	Y^-	X^+	Y^-	X^+
Y^-	O	Y^-	X^+	Y^-
X^+	Y^-	X^+	O	X^+
Y^-	X^+	Y^-	X^+	Y^-

Answer the following questions:

(i) Is the above defect stoichiometric or non-stoichiometric?

(ii) Write the term used for this type of defect. Give an example of the compound which shows this type of defect.

(iii) How does this defect affect the density of the crystal?

23. Seeing the growing cases of diabetes and depression among young children, Mr. Chopra, the principal of one reputed school, organized a seminar in which he invited parents and principals. They all resolved this issue by strictly banning junk food in schools and introducing healthy snacks and drinks like soup, lassi, milk, etc. in school canteens. They also decided to make compulsory half an hour of daily physical activities for the students in the morning assembly. After six months, Mr. Chopra conducted a health survey in most of the schools and discovered a tremendous improvement in the health of the students.

After reading the above passage, answer the following questions:

(i) What are the values (at least two) displayed by Mr. Chopra?

(ii) As a student, how can you spread awareness about this issue?

(iii) Why should antidepressant drugs not be taken without consulting a doctor?

(iv) Give two examples of artificial sweeteners.

24(a). For the hydrolysis of methyl acetate in aqueous solution, the following results were obtained:

t/s: 0, 10, 20 $[CH_3COOCH_3]$/mol L^{-1}: 0.10, 0.05, 0.025

(a) Show that it follows pseudo first order reaction, as the concentration of water remains constant.

(b) Calculate the average rate of reaction between the time interval 10 to 20 seconds.

(Given: log 2 = 0.3010, log 4 = 0.6021)

OR

24(b). (a) For a reaction A + B → P, the rate is given by Rate = $k[A][B]^2$

(i) How is the rate of reaction affected if the concentration of B is doubled?

(ii) What is the overall order of reaction if A is present in large excess?

(b) A first order reaction takes 30 minutes for 50% completion. Calculate the time required for 90% completion of this reaction.

25(a). (a) Account for the following:

(i) Acidic character increases from HF to HI.

(ii) There is a large difference between the melting and boiling points of oxygen and sulphur.

(iii) Nitrogen does not form pentahalide.

(b) Draw the structures of the following:

(i) ClF_3

(ii) XeF_4

OR

25(b). (i) Which allotrope of phosphorus is reactive and why?

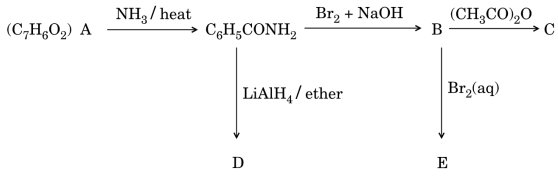
(ii) How are the supersonic jet aeroplanes responsible for the depletion of ozone layer?

(iii) F_2 has lower bond dissociation enthalpy than Cl_2. Why?

(iv) Which noble gas is used in filling balloons for meteorological observations?

(v) Complete the following equation: $XeF_2 + PF_5 \rightarrow ?$

26(a). An aromatic compound 'A' of molecular formula $C_7H_6O_2$ undergoes a series of reactions as shown below. Write the structures of A, B, C, D and E in the following reactions:



OR

26(b). (a) Write the structures of main products when benzene diazonium chloride reacts with the following reagents:

(i) $H_3PO_2 + H_2O$

(ii) CuCN/KCN

(iii) H_2O

(b) Arrange the following in the increasing order of their basic character in an aqueous solution:

$C_2H_5NH_2$, $(C_2H_5)_2NH$, $(C_2H_5)_3N$

(c) Give a simple chemical test to distinguish between the following pair of compounds: $C_6H_5-NH_2$ and $C_6H_5-NH-CH_3$

- End of Question Paper -