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

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

Questions

1. Write the IUPAC name of the given compound:

CH_3-$C(CH_3)_2$-CH_2-OH

2. Write the formulae of any two oxoacids of phosphorus.

3. Which would undergo S_N2 reaction faster in the following pair:

C_6H_5-CH_2-CH_2-Br and C_6H_5-CH(Br)-CH_3

4. Out of $AlCl_3$ and NaCl, which is more effective in causing coagulation of a negative sol and why?

5. Write the formula of a compound in which the element Y forms ccp lattice and atoms of X occupy $1/3^{rd}$ of tetrahedral voids.

6. (i) Write down the IUPAC name of the following complex: $[Pt(NH_3)(H_2O)Cl_2]$

(ii) Write the formula for the following complex: tris(ethane-1,2-diamine)chromium(III) chloride

7(a). Write the reagents used in the following reactions:

(i) C_6H_5-CO-CH_3 → C_6H_5-CH_2-CH_3

(ii) CH_3-COOH → CH_3-COCl

OR

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

(i) CH_3CHO, C_6H_5CHO, HCHO (reactivity towards nucleophilic addition reaction)

(ii) 2,4-dinitrobenzoic acid, 4-methoxybenzoic acid, 4-nitrobenzoic acid (acidic character)

8. (i) Why are aquatic species more comfortable in cold water than in warm water?

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

9. Why do transition elements show variable oxidation states? How is the variability in oxidation states of d-block different from that of the p-block elements?

10. Calculate the time to deposit 1.5 g of silver at cathode when a current of 1.5 A was passed through the solution of $AgNO_3$. (Molar mass of Ag = 108 g mol^{-1}, 1 F = 96500 C mol^{-1})

11(a). How do you convert the following:

(i) Prop-1-ene to Propan-2-ol

(ii) Bromobenzene to 2-bromoacetophenone

(iii) 2-bromobutane to But-2-ene

OR

11(b). What happens when

(i) ethyl chloride is treated with NaI in the presence of acetone,

(ii) chlorobenzene is treated with Na metal in the presence of dry ether,

(iii) methyl chloride is treated with KNO_2?

Write chemical equations in support of your answer.

12. Give reasons for the following:

(i) p-nitrophenol is more acidic than p-methylphenol.

(ii) Bond length of C–O bond in phenol is shorter than that in methanol.

(iii) $(CH_3)_3C$–Br on reaction with sodium methoxide ($Na^+ -OCH_3$) gives alkene as the main product and not an ether.

13. Vapour pressure of water at 20°C is 17.5 mm Hg. Calculate the vapour pressure of water at 20°C when 15 g of glucose (Molar mass = 180 g mol^{-1}) is dissolved in 150 g of water.

14. Examine the given defective crystal (an electron trapped at an anion vacancy in an X^+Y^- ionic lattice):

Answer the following questions:

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

(ii) Write the term used for the electron occupied site.

(iii) Give an example of the compound which shows this type of defect.

15. Calculate $E°_{cell}$ and $\Delta_rG°$ for the following reaction at 25°C:

$A^{2+} + B^+ \rightarrow A^{3+} + B$

Given: $K_c = 10^{10}$, 1 F = 96500 C mol^{-1}

16. (i) What type of isomerism is shown by $[Co(NH_3)_5ONO]Cl_2$?

(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 $[Fe(CN)_6]^{3-}$. (Atomic number of Fe = 26)

17. Define adsorption with an example. Why is adsorption exothermic in nature? Write the types of adsorption based on the nature of forces between adsorbate and adsorbent.

18. (i) Name the method used for the refining of titanium.

(ii) What is the role of Zn in the extraction of silver?

(iii) Reduction of metal oxide to metal becomes easier if the metal obtained is in liquid state. Why?

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

(i) Nylon-6,6

(ii) Bakelite

(iii) Polystyrene

20. (i) Which one of the following is a disaccharide: starch, maltose, fructose, glucose

(ii) What is the difference between acidic amino acid and basic amino acid?

(iii) Write the name of the linkage joining two nucleotides.

21. Predict the products of the following reactions:

(i) CH_3-CO-CH_3 + H_2N-NHCONH_2 → ?

(ii) C_6H_5-CH_2-CH_3 reacted with (a) $KMnO_4$/KOH then (b) H^+ → ?

(iii) C_6H_5-COOH reacted with conc. HNO_3/H_2SO_4 → ?

22. (i) E° value for the Mn^{3+}/Mn^{2+} couple is positive (+1.5 V) whereas that of Cr^{3+}/Cr^{2+} is negative (−0.4 V). Why?

(ii) Transition metals form coloured compounds. Why?

(iii) Complete the following equation: $2MnO_4^- + 16H^+ + 5C_2O_4^{2-} \rightarrow$

23. Seeing the growing cases of diabetes and depression among young children, Mr. Lugani, 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. Lugani conducted the 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. Lugani?

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

(iii) What are antidepressant drugs? Give an example.

(iv) Name the sweetening agent used in the preparation of sweets for a diabetic patient.

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

(i) Bond angle in NH_4^+ is greater than that in NH_3.

(ii) Reducing character decreases from SO_2 to TeO_2.

(iii) $HClO_4$ is a stronger acid than HClO.

(b) Draw the structures of the following:

(i) $H_2S_2O_8$

(ii) $XeOF_4$

OR

24(b). (a) Which poisonous gas is evolved when white phosphorus is heated with conc. NaOH solution? Write the chemical equation.

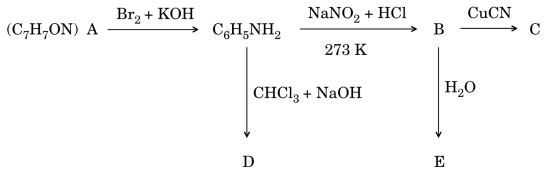
(b) Write the formula of first noble gas compound prepared by N. Bartlett. What inspired N. Bartlett to prepare this compound?

(c) Fluorine is a stronger oxidizing agent than chlorine. Why?

(d) Write one use of chlorine gas.

(e) Complete the following equation: $CaF_2 + H_2SO_4 \rightarrow$

25(a). An aromatic compound 'A' of molecular formula C_7H_7ON undergoes a series of reactions as shown below. Write the structures of A, B, C, D and E in the following reactions:



OR

25(b). (a) Write the structures of the main products when aniline reacts with the following reagents:

(i) Br_2 water

(ii) HCl

(iii) $(CH_3CO)_2O$ / pyridine

(b) Arrange the following in the increasing order of their boiling point: $C_2H_5NH_2$, C_2H_5OH, $(CH_3)_3N$

(c) Give a simple chemical test to distinguish between the following pair of compounds: $(CH_3)_2NH$ and $(CH_3)_3N$

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

t/s: 0, 30, 60 $[CH_3COOCH_3]$/mol L^{-1}: 0.60, 0.30, 0.15

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

(ii) Calculate the average rate of reaction between the time interval 30 to 60 seconds.

OR

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

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

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

(b) A first order reaction takes 23.1 minutes for 50% completion. Calculate the time required for 75% completion of this reaction. (Given: log 2 = 0.301, log 3 = 0.4771, log 4 = 0.6021)

- End of Question Paper -