

COMMON PRE-BOARD EXAMINATION 2017-2018

CHEMISTRY

CLASS XII

Time Allowed: 3 hours

Maximum Marks: 70

General Instructions:

1. Please check that this question paper contains 4 printed pages.
2. All questions are compulsory.
3. Marks for each question are indicated against it.
4. Question number 1 to 5 carry 1 mark each. Answer in one word or one sentence each.
5. Question number 6 to 10 carry 2 marks each. Answer in about 30 words each.
6. Question number 11 to 22 carry 3 marks each. Answer in about 40 words each.
7. Question 23 carries 4 marks and answer in about 50 words.
8. Question number 24 to 26 carry 5 marks each. Answer in about 70 words each.
9. Use of calculator not permitted. Use of log table permitted.

1. What is meant by the term ‘forbidden zone’ in reference to band theory of solids? 1
2. Why is the adsorption phenomenon always exothermic? 1
3. Write the IUPAC name of optically active isomer of C₄H₉Br. 1
4. Why does NO₂ dimerise? 1
5. Write an equation for the preparation of phenol from Cumene. 1
6. a) Define “van’t Hoff factor”
b) State Raoult’s law 2
7. a) What is elementary reaction?
b) The unit of rate constant for a reaction is mol⁻²L²s⁻¹. What is the order of the reaction?
OR
A reaction is of second order with respect to a reactant. How is its rate affected if the concentration of the reactant is (i) doubled (ii) reduced to half? 2
8. Draw the structure of the following molecules:
(i) XeOF₄ (ii) HClO₄ 2

9. Find the hybridization and magnetic behavior of $[\text{Ni}(\text{CN})_4]^{2-}$
[At. No. of Ni=28] 2
10. a) How will you distinguish chemically between methylamine and dimethyl amine?
b) Primary and secondary amines have higher boiling point than tertiary amine. Why? 2
11. Copper crystallises with face centred cubic unit cell. If the radius of copper atom is 127.8 pm, calculate the density of copper metal.
(Atomic mass of Cu = 63.55 u and Avogadro's number $N_A = 6.02 \times 10^{23} \text{ mol}^{-1}$) 3
12. Calculate the amount of KCl which must be added to 1 kg of water so that the freezing point is depressed by 2 K. (K_f for water = $1.86 \text{ K kg mol}^{-1}$, Molar mass of KCl=74.5 g/mol)
Assuming that KCl undergoes complete dissociation 3
13. The half-life for radioactive decay of ^{14}C is 5730 years. An archaeological artifact containing wood has only 80% of the ^{14}C found in living trees. Calculate the age of the artifact. 3
14. What is the difference between multimolecular and macromolecular colloids? Give one example of each type. How are associated colloids different from these two types of colloids? 3
15. State briefly the principles which serve as basis for the following operations in metallurgy:
(i) Froth floatation process
(ii) Zone refining
(iii) Refining by liquation.
- OR**
- Describe the role of:
i) NaCN in the extraction of gold from gold ore. 3
ii) SiO_2 in the extraction of copper from copper matte
iii) Iodine in the refining of Zirconium
16. a) Complete the following chemical equations:
i) $\text{NaOH}(\text{aq}) + \text{Cl}_2(\text{g}) \longrightarrow$
(Hot and conc.)
ii) $\text{XeF}_4 + \text{O}_2\text{F}_2 \longrightarrow$
b) Sulphur in vapour state exhibits paramagnetism. 3
17. A chloride of fourth group cation in qualitative analysis gives a green coloured complex [A] in aqueous solution which when treated with ethane-1, 2-diamine (en) gives pale yellow solution [B] on subsequent addition of ethane-1, 2-diamine turns to blue/purple [C] and finally to violet [D]. Write the structures of complexes [A], [B], [C] and [D].
Write the name of compound C. 3
18. a) Write the mechanism for the dehydration of ethanol at 413K.
b) Give an example for Williamson synthesis. 3

19. a) Arrange the following in the increasing order of the property given in bracket.
 (i) CH_3Br , CH_3Cl , CHBr_3 and CH_2Br_2 (boiling point)
 (ii) $\text{C}_6\text{H}_5\text{CH}_2\text{Br}$, $(\text{C}_6\text{H}_5)_2\text{CHBr}$, $\text{C}_6\text{H}_5\text{CH}(\text{CH}_3)\text{Br}$, $(\text{C}_6\text{H}_5)_2\text{C}(\text{CH}_3)\text{Br}$ (S_N^2 pathway) 3
- b) How do you prepare phosgene from chloroform? Write the equation.
20. Complete the following chemical equations:
 (i)
$$\text{R}-\overset{\text{O}}{\parallel}{\text{C}}-\text{NH}_2 \xrightarrow[\text{H}_2\text{O}]{\text{LiAlH}_4}$$

 (ii) $\text{C}_6\text{H}_5\text{N}_2\text{Cl} + \text{H}_3\text{PO}_2 + \text{H}_2\text{O} \longrightarrow$
 (iii) $\text{C}_6\text{H}_5\text{NH}_2 + \text{Br}_2 (\text{aq}) \longrightarrow$ 3
21. (i) Write any two differences between DNA and RNA.
 (ii) Name the disease caused by the deficiency of Vitamin A and write its sources.
 (iii) Write the hydrolysis products of sucrose. 3
22. Write the names and structures of the monomers of the following polymers:
 (i) Buna-S
 (ii) Dacron
 (iii) Neoprene 3
23. Mr. Naresh works in a multi-national company. He is stressed due to his hectic schedule. Mr. Amit, his friend, comes to know that he has started taking sleeping pills without consulting the doctor. Mr. Amit requests Naresh to stop this practice and takes him to a Yoga centre. With regular Yoga sessions, Mr. Naresh is now a happy and relaxed man. After reading the above passage, answer the following questions:
 (i) Write the values shown by Mr. Amit.
 (ii) Which class of drugs do sleeping pills belong to? Give an example.
 (iii) Name the chemicals present in Dettol.
 (iv) What are narrow spectrum antibiotics? 4
24. (a) What type of a battery is lead storage battery? Write the anode and cathode reactions and the overall cell reaction occurring in the operation of a lead storage battery.
 b) Depict the galvanic cell in which the following reaction takes place:

$$\text{Zn}(\text{s}) + 2\text{Ag}^+(\text{aq}) \longrightarrow \text{Zn}^{2+}(\text{aq}) + 2\text{Ag}(\text{s})$$

 State:
 (i) Which one of its electrodes is negatively charged?
 (ii) The reaction taking place at each of its electrode.

OR

a) Define conductivity and molar conductivity for the solution of an electrolyte. How do they vary when the concentration of electrolyte in the solution increases?

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b) What are fuel cells? Write the reactions involved at each electrode in H₂-O₂ fuel cell.

25 a) Give a possible explanation for each one of the following:

(i) Carboxylic acid does not undergo Friedel-Crafts reaction.

(ii) Cyclohexanone forms cyanohydrin in good yield but 2, 4, 6-trimethylcyclohexanone does not.

b) An organic compound with molecular formula C₉H₁₀O forms 2, 4-DNP derivative, reduces Tollen's reagent and undergoes Cannizzaro's reaction. On vigorous oxidation it gives 1,2-benzene-di-carboxylic acid. Identify the compound and write the equations for the reactions.

OR

a) Give chemical tests to distinguish between

(i) Ethanal and Propanal

(ii) Benzoic acid and Ethylbenzoate

b) How would you bring about the following conversions:

(i) Propanone to Propene

(ii) Benzaldehyde to benzophenone

(iii) Ethanol to 2-Hydroxybutanal

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26. a) Explain the following:

(i) The members in the actinoid series exhibit a large number of oxidation states than the corresponding members in the lanthanoid series.

(ii) With same (d⁴) configuration Cr (II) is reducing whereas Mn (III) is oxidizing agent.

(iii) Transition metals in general act as good catalysts.

b) Complete the following chemical reaction equations:

i) $\text{MnO}_4^- + \text{NO}_2^- + \text{H}^+ \longrightarrow$

ii) $\text{Cr}_2\text{O}_7^{2-} + \text{OH}^- \longrightarrow$

OR

a) Give reasons for the following:

i) Density of 3d elements increases from Sc to Cu.

ii) La³⁺ and Lu³⁺ are colourless and diamagnetic. (La=57 Lu=71).

b) An ore of a metal A (black in colour) is fused with KOH in presence of oxygen to form a green mass B. B is extracted with water and acidified to get pink coloured compound C. Identify A, B & C and give the equations involved in the reaction. Name the process involved in the conversion of B to C.

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