

PRACTICE QUESTIONS

SUBJECT – CHEMISTRY

CLASS – XI

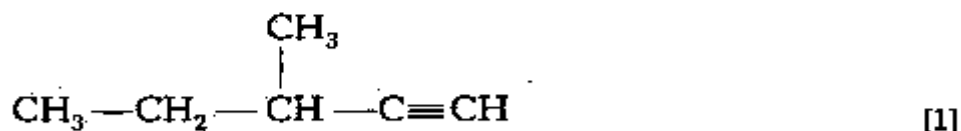
General Instructions

- All questions are compulsory.
- The question paper consists of 26 questions divided into five sections A, B, C, D and E. Section A comprises of 5 questions of 1 mark each, Section B comprises of 5 questions of 2 marks each, Section C comprises of 12 questions of 3 marks each, Section D comprises of 1 question of 4 marks and Section E comprises of 3 questions of 5 marks each.
- All questions in Section A are to be answered in one word, one sentence or as per the exact requirement of the question.
- There is no overall choice. However, internal choice has been provided in some questions. You have to attempt only one of the alternative in all such questions.

Section **A**

1. The first ionisation energy of carbon atom is greater than that of boron atom whereas, the reverse is true for the second ionisation energy. Why? [1]

2. Write the IUPAC name of the given compound:



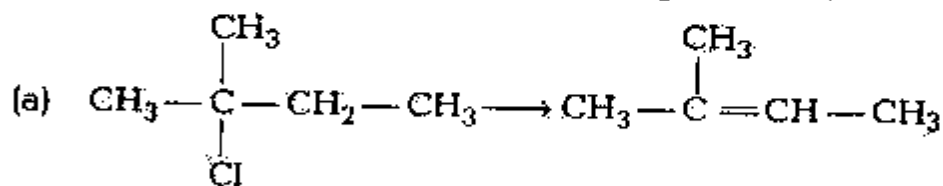
3. Alkynes on reduction with sodium in liquid ammonia form *trans*-alkenes. Will the butene thus formed on reduction of 2-butyne show geometrical isomerism?

4. The critical temperature (T_c) and critical pressure (p_c) of CO_2 are 30.98°C and 73 atm respectively. Can $\text{CO}_2(g)$ be liquified at 32°C and 80 atm pressure? [1]

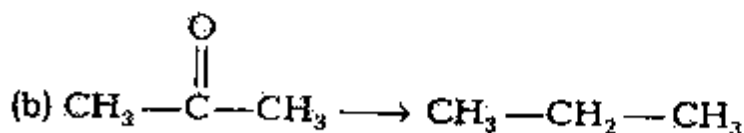
5. What is ΔE for system that does 500 cal of work on surroundings and 300 cal of heat is absorbed by the system? [1]

Section B

6. The ionisation constant of HF, HCOOH and HCN at 298 K are 6.8×10^{-4} , 1.8×10^{-4} and 4.8×10^{-9} respectively. Calculate the ionisation constants of the corresponding conjugate base. [2]
7. (a) If one atom of an element weighs 1.8×10^{-22} g. What is its atomic mass? [1]
 (b) Calculate the mass of BaCO_3 produced when excess of CO_2 is bubbled through a solution of 0.205 mole $\text{Ba}(\text{OH})_2$. [1]
8. Name the reagents used in the following reactions:



[1]



[1]

9. Draw the structure of boric acid showing hydrogen bonding. Which species is present in water? What is the hybridisation of boron in this species? [2]

OR

Carbon and silicon both belong to the group 14, but inspite of the stoichiometric similarity, the dioxides, (i.e. carbon dioxide and silicon dioxide), differ in their structures. Comment. [2]

10. (a) Calculate the formal charge on each oxygen atom and P—O bond order in PO_4^{3-} ion. [1]
 (b) The electronegativity difference between N and F is greater than N and H yet the dipole moment of NH_3 (1.50) is larger than that of NF_3 (0.20). Explain. [1]

Section C

11. The solubility product of $\text{Al}(\text{OH})_3$ is 2.7×10^{-11} . Calculate its solubility in g L^{-1} and also find out the pH of this solution. (Atomic mass of Al = 27 u) [2]
12. (a) Why does H^+ ion always get associated with other atoms or molecules? [1]
 (b) What is the role of hexametaphosphate in water softening process? [1]
 (c) Lakes freezes from top towards bottom. Explain giving reason. [1]
13. A gas bulb of 1L capacity contains 2.0×10^{21} molecules of nitrogen exerting pressure of $7.57 \times 10^3 \text{ Nm}^{-2}$. Calculate the root mean square (rms) speed and the temperature of the gas molecules. If the ratio of the most probable speed to root mean square speed is 0.82, calculate the most probable speed for these molecule at this temperature

21. (a) Which substances are responsible for greenhouse effect? [1]
 (b) Explain the formation of ozone in stratosphere. [1]
 (c) How do chlorofluorocarbons, cause thinning of ozone layer in stratosphere? Give chemical equations in support of your answer. [1]
22. (a) What is the wave number of 4th line in Balmer series of hydrogen spectrum? [1]
 (b) What is the uncertainty involved in the measurement of velocity within a distance of 0.1\AA ? [Given, mass of electron = $9.11 \times 10^{-31}\text{ g}$. Planck's constant = $6.626 \times 10^{-34}\text{ Js}$] [1]
 (c) An element has 2 electrons in its *K* shell, 8 electrons in *L* shell, 13 electrons in *M* shell and 1 electron in *N* shell. What is the element? [1]

Section D

23. Rakhi was very angry because of the oil spot on his favourite suit. Her mother want to make her happy and doesn't know what to do. Her neighbour Mrs. Sharma advised him to use bleach (bleaching powder, CaOCl_2) to remove the oil spot.
- (a) Do you suggest the same thing to remove oil spot? Why or why not? Justify your answer. [1]
 (b) What is the oxidation number of both the Cl atoms in the bleaching powder? [1]
 (c) Which substance, is available in the market to remove such spots? [1]
 (d) What values are associated with Mrs. Sharma? [1]

Section E

24. (a) Account for the following:
- (i) Alkali metals are good reducing agents. Explain. [1]
 (ii) PbO_2 is soluble in NaOH and also in HCl . [1]
 (iii) Sodium oxide solution cannot be stored in Zn or Al vessel. [1]
- (b) Complete the following reactions: [2]
 (i) $\text{SiO}_2 + 2\text{NaOH} \longrightarrow$ (ii) $\text{Ca(OH)}_2 + \text{SO}_2 \longrightarrow$
- or
- (a) What is the nature of CO when it reacts with NaOH ? [1]
 (b) Why is it that although Li^+ is far smaller than the other metal ions, it moves through a solution less rapidly than the others? [1]
 (c) Baking soda or baking powder, they are different or same. [1]
 (d) Aqueous Na_2CO_3 is alkaline in nature. Explain. [1]
 (e) Complete the following reaction: [1]

$$2\text{Na}_2\text{O}_2 + 2\text{CO}_2 \longrightarrow$$

14. (a) How would you account for the following:
- The small size of B^{3+} favour the formation of covalent bond. [1]
 - Diamond is harder than graphite. [1]
- (b) Complete the following reaction:
- $$Na_2B_4O_7 + 2HCl + 5H_2O \longrightarrow$$
- [1]
15. (a) Write the molecular orbital (MO) electron distribution of O_2 . Specify its bond order and magnetic property. [1]
- (b) Draw the molecular structures of XeF_2 , XeF_4 and XeO_2F_2 , indicating the location of lone pair(s) of electrons. [1]
- (c) Predict whether the following molecules are *iso*-structural or not. Justify your answer. [1]
- NMe_3
 - $N(SiMe_3)_3$
16. A plant virus is found to consist of uniform cylindrical particles of 150 Å in diameter and 5000 Å long. The specific volume of the virus is $0.75 \text{ cm}^3/\text{g}$. If the virus is considered to be a single particle, find its molar mass. [3]
17. (a) Calculate the number of radial nodes in 3s and 2p-orbital. [1]
- (b) The energy of second Bohr orbit of the hydrogen atom is -328 kJ mol^{-1} . Calculate the energy of third Bohr orbit. [1]
- (c) Determine the four quantum numbers for valence electron of Rubidium ($Z = 37$). [1]
18. (a) Electron gain enthalpy value of inert gases are zero. Why? [1]
- (b) Arrange the following in increasing order of first ionisation potential: Na, Al, Mg and Si [1]
- (c) Among the following oxides, which is most acidic? [1]
- MgO , Al_2O_3 , P_2O_5 and SiO_2
19. (a) If we mixed an alcohol (bp 97°C) with a hydrocarbon (bp 68°C). Suggest a suitable method to separate the two compound. [1]
- (b) Alkyl groups act as electron donors when attached to a π -system. Why? [1]
- (c) How will you test the presence of carbon and hydrogen in an organic compound? [1]
20. (a) Indicate the σ and π -bond in the following molecule: [1]
- $$HCONHCH_3 \text{ and } C_6H_{12}$$
- (b) Among the following species which is more stable and why? [1]
- $$O_2NCH_2CH_2O^- \text{ or } CH_3CH_2O^-$$
- (c) Why is nitric acid added to sodium extract before adding silver nitrate for testing halogens? [1]
- or
- (a) Ethyl cation is stabilised by hyper conjugation. Justify. [1]
- (b) Why we used Leibeig's test? [1]
- (c) Why is it necessary to use acetic acid and not sulphuric acid for acidification of sodium extract for testing sulphur by lead acetate test? [1]