

Roll No. _____

Code : 112016-043-A

Please check that this question paper contains **26** questions and **7** printed pages.

CLASS-XI
CHEMISTRY (THEORY)

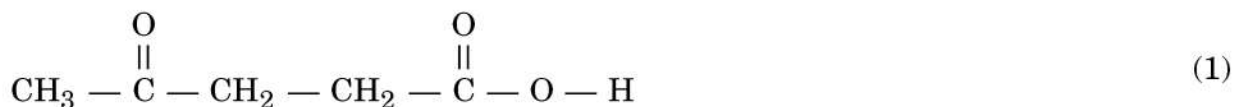
Time Allowed : 3 Hrs.

Maximum Marks : 70

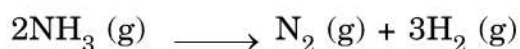
General Instructions :

- (i) All questions are compulsory.
- (ii) There are 26 questions in all. Questions 1 to 5 carry one mark each, Questions 6 to 10 carry two marks each, questions 11 to 22 carry three marks each, question 23 carry four marks and questions 24 to 26 carry five marks each.
- (iii) There is no overall choice. However an internal choice has been provided in one question of two marks, one question of three marks and all the three questions of five marks each. You have to attempt only one of the choices in such questions.
- (iv) Fifteen minutes time has been allotted to read this question paper. During this time, the students will read the question paper only and will not write any answer on the answer script.

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1. What is the physical significance of Vander Waal's constant 'a' ? (1)
2. Write the atomic number of the element present in the third period and seventeenth group of the periodic table. (1)
3. Write the IUPAC name of



4. The value of $\Delta_f H^\circ$ for NH_3 is $-45.9 \text{ kJ mol}^{-1}$. Calculate enthalpy change for the reaction : (1)



5. What is the effect of temperature on viscosity of liquids and why? (1)
6. In the reaction :
- $$\text{C(s)} + 2\text{S (s)} \longrightarrow \text{CS}_2 \text{ (l)} \quad (2)$$
- 4 g of carbon was heated with 8 g of sulphur. (Atomic mass : C = 12, S = 32)
- (a) Which is the limiting reagent ?
- (b) How much carbon disulphide (CS₂) will be formed when the reaction is complete.
7. The following techniques are used to estimate quantitatively other elements (nitrogen, sulphur & halogens) in organic compounds. Identify the name of the method and the element which is estimated by the following methods : (2)
- (a) A known mass of an organic compound is heated with fuming nitric acid in presence of silver nitrate.
- (b) A known mass of an organic compound is heated with copper oxide in the atmosphere of carbon dioxide.
8. In the molecule $\overset{2}{\text{C}}\text{H}_3 - \overset{1}{\text{C}}\text{N}$
- (a) How many sigma and pi bonds are present in this molecule ?
- (b) What is the hybridised state of each carbon atom in it ? (2)
- OR**
- Give reasons for the following :
- (a) The two O–O bond distance in ozone molecule are equal.
- (b) Ethene molecule is trigonal planar.
9. 2.9 g of a gas at 95°C occupied the same volume as 0.184 g of di-hydrogen at 17°C at the same pressure. What is the molar mass of the gas ? (2)
10. (a) Why is boric acid considered a weak acid ?
- (b) Write any two reactions to justify the amphoteric nature of aluminium ? (2)

11. (a) Name the isotope of hydrogen which is
(i) used in nuclear reactor
(ii) radioactive
(b) Why is hydrogen peroxide stored in wax lined bottles in dark ?
(c) Why does ice float on the surface of water ? (3)
12. (a) What is a disproportionation reaction ? Give an example.
(b) Balance the following redox reaction in acidic medium :
- $$\text{Cl}_2\text{O}_7(g) + \text{H}_2\text{O}_2(aq) \rightarrow \text{ClO}_2^-(aq) + \text{O}_2(g) \quad (3)$$
13. (a) How many electrons in an atom may have the following quantum numbers :
 $n = 4; l = 0$
(b) Calculate the number of photons emitted in 10 hours by a 60 W sodium lamp emitting radiations of wavelength 6000 Å. (3)
14. (a) Write the conjugate acid and conjugate base of NH_3 .
(b) Calculate the pH of the solution obtained when 1 ml of 13.6 M HCl is diluted with water to give 1 litre of the solution. (3)

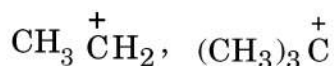
OR

Equal volumes of 0.002 M solution of sodium iodate (NaIO_3) and copper chromate (CuCrO_4) are mixed together. Will it lead to precipitation of copper iodate ?

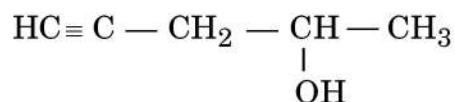
For copper iodate $K_{\text{SP}} = 7.4 \times 10^{-8}$

15. (a) Why atomic radius of gallium is smaller as compared to aluminium ?
(b) What are silicones ? Write its one use.
(c) CCl_4 does not hydrolyse whereas SiCl_4 undergoes hydrolysis. Why ? (3)
16. Describe the following with the help of chemical equations :
- (a) Wurtz Reaction
(b) Friedel–Crafts Reaction
(c) Dehydrohalogenation (3)

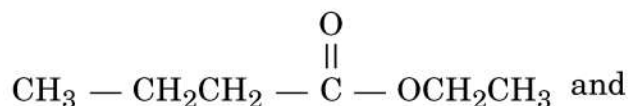
17. (a) Identify the most stable cation in the following set of ions giving reason :



(b) Draw the bond line formula of



(c) What type of isomerism is exhibited by



18. (a) Which series of hydrogen spectrum lies in

- (i) visible region
- (ii) ultraviolet region

(b) A table tennis ball has a mass of 10 g and a speed of 90 ms^{-1} . If the speed can be measured within accuracy of 4%, calculate the uncertainty in the position of the ball. (3)

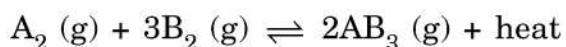
19. Account for the following :

- (a) The first ionization enthalpy of magnesium is higher than that of aluminium.
- (b) Fifth period of the periodic table has 18 elements.
- (c) The first element of all the groups show anomalous behaviour. (3)

20. (a) What do you understand by common ion effect ?

(b) The reaction quotient of a reversible reaction is Q_c and the equilibrium constant is K_c . In which direction equilibrium will shift if $Q_c < K_c$?

(c) For the reaction :



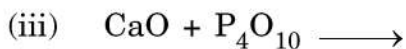
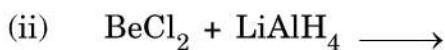
On the basis of Le-Chatlier's principle explain the effect of temperature and pressure to yield maximum amount of AB_3 . (3)

21. (a) Out of molarity and molality which is a better way of expressing the concentration of a solution and why ?
- (b) Boron occurs in nature in the form of two isotopes whose atomic masses are 10.01 u and 11.01 u. The atomic mass of natural boron is 10.81 u. Calculate the percentage of each isotope in natural boron. (3)
22. Write molecular orbital configuration of N_2 and N_2^+ . Calculate the bond order and predict their magnetic behaviour. (3)
23. On World Environment Day, ABC School invited eminent speakers to come and address the school children on the issue of environment conservation. Some of the students were so impressed by the program that they decided to spread awareness in their housing societies. They requested the residents to abstain from using polyethene bags and switch to cloth/jute bags. They also convinced people to observe 'NO ELECTRICITY HOUR' for one hour on every Saturday night.
- (a) What values are shown by the students ?
- (b) What do you mean by green chemistry ?
- (c) How will green chemistry help in reducing environmental pollution ? (4)
24. (a) Give the reactions involved in the Solvay's process for the preparation of sodium carbonate.
- (b) State as to why :
- (i) Be and Mg do not impart any colour to the flame whereas other alkaline earth metals do so.
- (ii) Alkali metals dissolve in liquid ammonia giving deep blue solution.
- (iii) $BeSO_4$ is soluble in water but $BaSO_4$ is insoluble in water. (5)

OR

- (a) Which alkali metal ion forms largest hydrated ion in aqueous solution and why ?
- (b) Write chemical equation for the preparation of Plaster of Paris and give its one use.

(c) Write balanced equations for :



25. (a) What is the difference between extensive and intensive properties ?

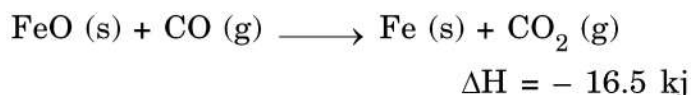
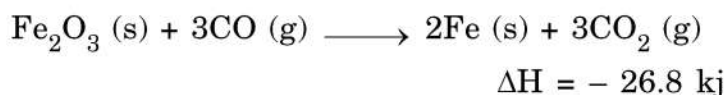
(b) (i) For the reaction



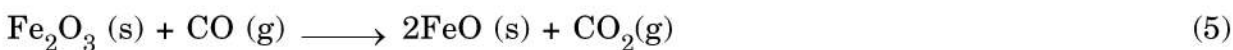
What are the signs of ΔH and ΔS ?

(ii) When $\Delta H > 0$ and $\Delta S < 0$, a reaction is never spontaneous. Why ?

(c) Consider the following two reactions :



What is the value of ΔH for the reaction ?



OR

(a) State Hess's Law of Constant Heat Summation.

(b) The equilibrium constant for a reaction is 10 at 27°C . Calculate the value of ΔG° at 27°C .

(c) Calculate the standard enthalpy change and standard internal energy change for the following reaction at 300 K :



Given that the standard enthalpy of formation of OF_2 , H_2O and HF are 23 kJ mol^{-1} , $- 241.8 \text{ kJ mol}^{-1}$ and $- 268.6 \text{ kJ mol}^{-1}$ respectively.

26. (a) Giving reasons arrange the following in order of property mentioned against each :
- (i) n-Pentane, isopentane, neopentane (increasing boiling point)
 - (ii) Ethene, ethane, ethyne (increasing acidic character)
- (b) Convert
- (i) But-2-ene to Ethanal
 - (ii) Acetylene to Chlorobenzene
 - (iii) Benzene to p-Nitrobromobenzene (5)

OR

- (a) Give the mechanism of addition of HBr to propene in presence of peroxide.
- (b) What happens when (write only chemical equations) :
- (i) Sodium salt of benzoic acid is heated with sodalime.
 - (ii) 2-Methylpropene is treated with acidic potassium permanganate.
 - (iii) Propyne is treated with water at 333 K in the presence of mercuric sulphate and dilute sulphuric acid.

□□□