

INTERNATIONAL INDIAN SCHOOL - DAMMAM
MODEL EXAMINATION
CLASS—XI CHEMISTRY—(JANUARY-2015)
SET - A

MAX.MARKS:70
TIME: 3 HOUR

General Instructions:

1. All questions are compulsory.
2. Question nos.1 to 5 are very short answer questions and carry 1 mark each.
3. Question nos6 to 10 are short answer questions and carry 2 marks each.
4. Question nos.11 to 22 are short answer questions and carry 3 marks each.
5. Question no. 23 is a value based question carrying 4 marks.
6. Question nos.24, 25 & 26 are long answer questions and carry 5 marks each.
7. Use log tables if necessary.

1. Critical temperature of carbon dioxide and methane are 31.1°C and -81.9°C respectively. Which of these has stronger intermolecular forces and why? 1
2. Draw the structure of BeCl_2 (vapour) 1
3. Predict in which of the following entropy increases or decreases. 1
 - (a) A liquid crystallizes into a solid.
 - (b) $\text{H}_2(\text{g}) \longrightarrow 2\text{H}(\text{g})$.
4. Define common ion effect. 1
5. How would you justify the presence of 32 elements in sixth period of the periodic table? 1
6. (i) Which electron displacement effect explains the correct order of acidity of carboxylic acids? 2
 $\text{Cl}_3\text{C COOH} > \text{Cl}_2\text{CH COOH} > \text{Cl CH}_2\text{COOH}$
(ii) Write the IUPAC name of the following compound.
 $\text{CH}_3\text{COCH}_2\text{CH}_2\text{CHO}$
7. (i) Explain why an organic liquid vaporizes at a temperature below its boiling point in its steam distillation. 2
(ii) Draw the resonance structures of $\text{CH}_3\text{CH}=\text{CHCHO}$.
8. (a) State Gay Lussac's law of gaseous volume. 2
(b) How are $0.50\text{mol Na}_2\text{CO}_3$ and $0.50\text{M Na}_2\text{CO}_3$ different?
9. Explain the following. 2
 - (a) Pauli Exclusion Principle.
 - (b) Hund's rule of maximum multiplicity.

OR

- Explain the important aspects of resonance with reference to the CO_3^{2-} ion.
- 10 Calculate the pH of a solution obtained by dissolving 0.3 g of $\text{Ca}(\text{OH})_2$ dissolved in water to give 500 ml of solution. (atomic mass of $\text{Ca}=40\text{u}$, $\text{O}=16\text{u}$, $\text{H}=1\text{u}$) 2
11. (a) What is molarity? 3
 (b) The density of 3M solution of NaCl is 1.25 g/ml. Calculate the molality of the solution. (atomic mass $\text{Na}-23$, $\text{Cl}-35.5$)

OR

- (a) What is limiting reagent?
 (b) Calcium Carbonate reacts with aqueous HCl to give CaCl_2 and CO_2 according to the reaction:
 $\text{CaCO}_3(\text{s}) + 2 \text{HCl}(\text{aq}) \rightarrow \text{CaCl}_2 + \text{CO}_2 + \text{H}_2\text{O}$
 What mass of CaCO_3 is required to react completely with 25 ml of 0.75 M HCl ?
 (Atomic masses : $\text{Ca} = 40 \text{ u}$, $\text{Cl} = 35.5 \text{ u}$, $\text{H} = 1 \text{ u}$, $\text{C} = 12 \text{ u}$, $\text{O} = 16 \text{ u}$)
- 12 (a) Explain photoelectric effect on the basis of Planck's quantum theory. 3
 (b) Calculate the wave length of the de-Broglie wave associated with an electron having kinetic energy $3.0 \times 10^{-25} \text{ J}$.
 Mass of the electron $= 9.1 \times 10^{-31} \text{ Kg}$.
- 13 (a) In terms of Charles law explain why -273°C is lowest possible temperature. 3
 (b) What will be the pressure exerted by a mixture of 3.2 gram of methane and 4.4 gram of carbon dioxide contained in a 9 dm^3 flask at 27°C ?
- 14 (a) State Le Chatelier's principle. 3
 (b) Derive the relationship between dissociation constant of a weak acid and its degree of dissociation.
15. (a) What is meant by LCAO? Use the method to describe the formation of molecular orbital. 3
 (b) Explain why Be_2 molecule does not exist.
- 16 (a) Yellow light emitted from a sodium lamp has a wave length of 580 nm. Calculate the frequency and wave number of yellow light . 3
 (a) Draw the shapes of d_{xy} and d_{z^2} orbitals.
17. (a) What happens when alkali metals are dissolved in ammonia? 3
 (b) Why is LiF almost insoluble in water whereas LiCl soluble not only in water but also in acetone?
 (c) What is dead burnt plaster? How is it obtained from gypsum?
- 18 (i) Account for the following. 3
 (a) Electron gain enthalpy of Chlorine is more than that of Fluorine.
 (b) Ionisation enthalpy of Beryllium is more than that of Boron
 (ii) What would be the IUPAC name and symbol for the element with

- atomic number 120?
19. (a) H_2O_2 is used to restore the color of old paintings containing PbS. Write a balanced equation for the reaction that takes place in this process. 3
 (b) What do you understand by the following:
 (i) Hydrogen economy (ii) Water gas shift reaction.
20. (a) What is Markonikov rule? Explain its mechanism. 3
 (b) Why are terminal alkynes acidic ?
21. (a) Explain why alkyl groups act as electron donors when attached to a π system. 3
 (b) An organic compound contains 69% carbon and 4.8% hydrogen, the remainder being oxygen. Calculate the masses of carbon dioxide and water produced when 0.20g of this substance is subjected to complete combustion.
22. (a) The following reaction 3

$$\text{Zn(s)} + \text{Co}^{2+} \longrightarrow \text{Co(s)} + \text{Zn}^{2+}$$
 occurs in a cell. Write the electrode reactions and compute the standard E.M.F of the cell. Given that $E^0_{\text{Zn}^{2+}/\text{Zn}} = -0.76\text{V}$ and $E^0_{\text{Co}^{2+}/\text{Co}} = 0.28\text{V}$
 (b) Hydrogen peroxide reacts with ozone to produce water and dioxygen gas. Write a balanced equation and indicate the oxidizing and reducing agent.
23. (a) A poster suggests following life style actions on the part of families and individuals: 4
 (i) Use soaps made of vegetable oils instead of using synthetic detergents.
 (ii) Use H_2O_2 for bleaching purpose instead of using chlorine based bleaching agents.
 (iii) Use plastic cans for neatly storing substances.
 (iv) Use bicycle for travelling small distances than petrol or diesel vehicles.
 Answer the following questions based on the above information
 (i) Which of the above life style suggestion promote green chemistry?
 (ii) Which environmental values are promoted through these life styles?
 (iii) What is green Chemistry?
 (iv) What is eutrophication?
24. (a) Write notes on the following. 5
 (i) Wurtz reaction (ii) Friedel – Crafts Acylation reaction.
 (b) Arrange the following compounds in the decreasing order of the property indicated.
 (i) Benzene, n – Hexane, Ethyne. (acidic behavior)
 (ii) Benzene, m – dinitrobenzene, toluene. (reactivity with an electrophile)
 (c) Draw the geometrical isomers of Hex -2 -ene.

OR

(a) How are the following conversions done?

- (i) Sodium ethanoate to ethane.
- (ii) Benzene to m -nitro bromo benzene.

(b) An alkene on ozonolysis gives a mixture of ethanal and pentan -3 - one. Write structure and IUPAC name of A.

(c) Draw Newman projection formula of ethane.

25. (a)How is diborane prepared industrially? Explain its structure. 5

(b)How would you explain the atomic radius of Gallium as compared to aluminum?

(c)Explain the following reactions.

- (i) Silicon dioxide is treated with hydrogen fluoride.
- (ii) Diborane reacts with ammonia.

OR

(a) Account for the following.

- (i) $[SiF_6]^{2-}$ is known whereas $[SiCl_6]^{2-}$ not.
- (ii) Concentrated nitric acid can be transported in aluminum container.

(b) Draw the structure of boric acid.

(c) What are silicones? Write chemical equation for its preparation. List 2 important uses of silicones.

26. (i) The combustion of one mole of ethanol takes place at 298 K and 1 atm. 5

After combustion, $CO_2(g)$ and $H_2O(l)$ are produced and 1365.6 kJ of heat is liberated. Calculate the standard enthalpy of formation $\Delta_f H^0$ of ethanol. Standard enthalpies of formation of $CO_2(g)$ and H_2O

(l) are $-393.5 \text{ kJ mol}^{-1}$ and $-285.83 \text{ kJ mol}^{-1}$ respectively.

(ii) State Hess 's law of constant heat summation.

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

OR

(i) Derive the relationship between ΔH and ΔU . 5

(ii) Calculate the standard entropy change for a reaction $X \rightleftharpoons Y$ if the value of $\Delta H^0 = 28.40 \text{ kJ}$ and equilibrium constant is 1.8×10^{-7} at 298 K.
