



**INDIAN SCHOOL SOHAR**  
**FINAL EXAMINATION 2019-2020**  
**CHEMISTRY**

**CLASS :** XI  
**DATE :** 11.02.2020

**MAX MARKS :** 70  
**TIME :** 3.00 HRS

- (a) All questions are compulsory.  
 (b) Section A: Q.no. 1 to 20 are very short answer questions (objective type) and carry 1 mark each.  
 (c) Section B: Q.no. 21 to 27 are short answer questions and carry 2 marks each.  
 (d) Section C: Q.no. 28 to 34 are long answer questions and carry 3 marks each.  
 (e) Section D: Q.no. 35 to 37 are long answer questions and carry 5 marks each.  
 (f) There is no overall choice. However an internal choice has been provided in two questions in two marks, two questions of three marks and all the three questions of five marks weightage. You have to attempt only one of the choices in such questions.  
 (g) Use log tables if necessary, use of calculators is not allowed.

**SECTION A**

**Read the given passage and answer the questions 1 to 5 that follow:**

Markovnikov, a Russian chemist made a generalisation in 1869 after studying such reactions in detail. These generalisation led Markovnikov to frame a rule called Markovnikov's rule. The rule states that negative part of the addendum (adding molecule) gets attached to that carbon atom which possesses lesser number of hydrogen atoms.

Complete the following reactions:

- $\text{CH}_3\text{-CH=CH}_2 + \text{HCl} \xrightarrow{\text{Peroxide}}$
- $\text{CH}_3\text{C(CH}_3\text{)=CH}_2 + \text{H}_2\text{O} \xrightarrow{\text{H}^+}$
- $\text{CH}_3\text{CH=CH}_2 + \text{HBr} \xrightarrow{(\text{C}_6\text{H}_5\text{CO})_2\text{O}_2}$
- Convert the following: 2-Bromopropane to 1-Bromopropane
- State true or false, if false write the correct statement:  
Peroxide effect happens with all the hydrogen halides.

**Questions 6 to 10 are one word or one sentence answers:**

- 1L of gas at STP weighs 1.97g. What is molecular mass?
- Why is energy of electron negative?
- Give units of 'a' and 'b' which are van der Waals' constants.
- Define standard enthalpy of formation.
- Write structural formula of 3,4,4,5-tetramethylheptane.

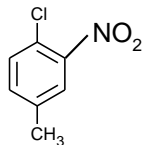
**Questions 11 to 15 are multiple choice questions:**

- Number of angular nodes for 4d orbital is \_\_\_\_\_.  
 (a) 4                      (b) 3                      (c) 2                      (d) 1
- The average kinetic energy per molecule of a gas at a given temperature, T is given by

(a)  $\frac{3}{2}RT$       (b)  $\sqrt{\frac{3RT}{M}}$       (c)  $\sqrt{\frac{\frac{3R}{N_A}T}{\pi M}}$       (d)  $\frac{3RT}{2N_A}$

13. The enthalpy of vapourisation of a liquid is  $30 \text{ kJmol}^{-1}$  and entropy of vapourisation is  $75 \text{ Jmol}^{-1}$ . The boiling point of the liquid at 1 atm is

- (a) 250 K      (b) 400K      (c) 450 K      (d) 600K



14. The IUPAC name for

- (a) 1-Chloro-2-nitro-4-methylbenzene      (c) 1-chloro-4-methyl-2-nitrobenzene  
(b) 2-chloro-1-nitro-5-methylbenzene      (d) m-Nitro-p-chloeo benzene

15. Which of the following is sink for CO?

- (a) Microorganisms present in soil      (c) Plants  
(b) Oceans      (d) Haemoglobin

**Question 16 to 20:**

- (a) Assertion and reason both are correct statements; reason is correct explanation for assertion.  
(b) Assertion and reason both are correct statements; reason is not correct explanation for assertion.  
(c) Assertion is correct statement but reason is wrong statement.  
(d) Assertion is wrong statement but reason is correct statement.

16. **Assertion** : It is impossible to determine the exact position and exact momentum of an electron simultaneously.

**Reason** : The path of an electron in an atom is clearly defined.

17. **Assertion** : Boron has a smaller first ionisation enthalpy than beryllium.

**Reason** : The penetration of a 2s electron to the nucleus is more than the 2p electron hence 2p electron is more shielded by the inner core of electrons than the 2s electrons.

18. **Assertion** : For any chemical reaction at a particular temperature, the equilibrium constant is fixed and is a characteristic property.

**Reason** : Equilibrium constant is independent of temperature.

19. **Assertion** : 10 vol H<sub>2</sub>O gives 10 mL of O<sub>2</sub> at STP.

**Reason** : 10 vol H<sub>2</sub>O<sub>2</sub> is 3.03% and 0.89M.

20. **Assertion** : Beryllium carbonate is kept in the atmosphere of carbon dioxide.

**Reason** : Beryllium carbonate is unstable and decomposes to give beryllium oxide and carbon dioxide.

**SECTION B**

21. One of the spectral lines of caesium has a wavelength of 456 nm. Calculate the frequency of this line. ( $c = 3 \times 10^8 \text{ ms}^{-1}$ )

22. Bond angle in NH<sub>3</sub> is more than in H<sub>2</sub>O. Justify.

23. Balance the equation:  $\text{MnO}_4^- + \text{Fe}^{2+} \rightarrow \text{Fe}^{3+} + \text{Mn}^{2+}$  (in acidic medium)

OR

Arrange HNO<sub>3</sub>, NO, NH<sub>4</sub>Cl, N<sub>2</sub> in decreasing order of oxidation state of nitrogen.

24. Balance  $\text{P} + \text{HNO}_3 \rightarrow \text{H}_3\text{PO}_4 + \text{NO}_2 + \text{H}_2\text{O}$  by oxidation number method.

25. What happens when

- (i) Calcium phosphide is hydrolysed  
 (ii) Ammonia reacts with water
26. 0.90g of organic compound on combustion gas 2.64g of CO<sub>2</sub> and 0.63g of H<sub>2</sub>O. Calculate the percentage of C and H in the compound.
27. Give the product when 1-methylcyclohexene reacts with  
 (i) aqueous acidified KMnO<sub>4</sub> (ii) O<sub>3</sub> followed by Zn/CH<sub>3</sub>COOH  
 OR  
 How will you convert?  
 (i) Propyne into propanone (ii) secondary butyl bromide into but-2-ene

### SECTION C

28. The first (IE<sub>1</sub>) and second (IE<sub>2</sub>) ionisation enthalpies (kJmol<sup>-1</sup>) of three elements I, II and III are given below:

Element	IE <sub>1</sub>	IE <sub>2</sub>
I	403	2640
II	549	1060
III	1142	2000

Identify the element which is likely to be

- (i) non-metal (ii) an alkali metal (iii) an alkaline earth metal
29. (a) Write the molecular orbital configuration of O<sub>2</sub><sup>+</sup>. Calculate its bond order and predict its magnetic behaviour.  
 (b) Using VSEPR model, predict the geometry of SF<sub>6</sub> molecule.

OR

Write the molecular orbital electronic configurations of the following species:

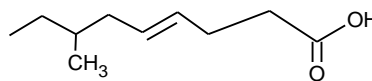
- (i) N<sub>2</sub> (ii) N<sub>2</sub><sup>+</sup> (iii) N<sub>2</sub><sup>-</sup> (iv) N<sub>2</sub><sup>2-</sup>
- (a) Calculate their bond orders.  
 (b) Predict their magnetic behaviour.  
 (c) Which of these shows highest para-magnetism?
30. Explain the following:  
 (i) Boyle's law (ii) Avogadro's law (iii) Critical Temperature
31. Calculate the standard Gibbs energy change for the formation of propane at 298K.  
 $3\text{C}(\text{graphite}) + 4\text{H}_2(\text{g}) \rightarrow \text{C}_3\text{H}_8(\text{g})$   
 $\Delta_f H^\circ$  for propane, C<sub>3</sub>H<sub>8</sub>(g) is -103.8 kJmol<sup>-1</sup>. Given:  $S_m^\circ(\text{C}_3\text{H}_8(\text{g})) = 270.2\text{JK}^{-1}\text{mol}^{-1}$ ,  $S_m^\circ \text{C}(\text{graphite}) = 5.70\text{JK}^{-1}\text{mol}^{-1}$  and  $S_m^\circ \text{H}_2(\text{g}) = 130.7\text{JK}^{-1}\text{mol}^{-1}$ .
32. Among alkaline earth metals:  
 (i) Which has lowest density?  
 (ii) Which has lowest melting point?  
 (iii) Sulphate of which metal is used in X-ray tubes.  
 (iv) Which is the best reducing agent in group 2?  
 (v) Which gives crimson red colour to the flame?

OR

Write chemical equation only, involved in the preparation of each of the following:

- (i) Plaster of Paris (ii) Quick lime (iii) Slaked lime

Also use any one use of each.



33. (a) Write the IUPAC name of the following:  
 (b) What type of isomerism is exhibited by the following compounds?  
 $\text{CH}_3\text{CH}_2\text{CHO}$  and  $\text{CH}_3\text{COCH}_3$   
 (c) Draw the structure of 3-oxopentanal.
34. Explain the following terms:  
 (a) Photochemical smog (ii) Acid rain (iii) Eutrophication

#### SECTION D

35. (a) How many gram atoms are there in 8.0 g of S?  
 (d) The molarity of solution of sulphuric acid is 1.35M. Calculate its molality. (The density of solution is  $1.02 \text{ g cm}^{-3}$ )

OR

- (a) A sample of salt has the following percentage composition Fe = 36.76%, S=21.11% and O=42.14%. Calculate the empirical formula of the compound. (At. Mass of Fe= 56; S=32; O=16)  
 (b) What happens if the compound is heated? Write the balanced chemical equation.
36. (i) Consider the following endothermic reaction:  $\text{CH}_4(\text{g}) + \text{H}_2\text{O}(\text{g}) \rightleftharpoons \text{CO}(\text{g}) + 3\text{H}_2(\text{g})$   
 (a) Write expression for  $K_p$  for the above reaction.  
 (b) How will the values of  $K_p$  and composition of equilibrium mixture be affected by  
 (1) increasing the pressure (2) increasing the temperature  
 (3) using catalyst?
- (ii) Calculate the pH of the resultant mixture of 10 mL of 0.1M  $\text{H}_2\text{SO}_4$  + 10 mL of 0.1 M KOH.

OR

- (i) At 473K, equilibrium constant,  $K_c$  for decomposition of  $\text{PCl}_5$  is  $8.3 \times 10^{-3}$ . If decomposition is depicted as  $\text{PCl}_5(\text{s}) \rightleftharpoons \text{PCl}_3(\text{s}) + \text{Cl}_2(\text{g})$ ;  $\Delta_r H^\circ = 124.0 \text{ kJ mol}^{-1}$ .  
 (a) Write an expression for  $K_c$  for the reaction.  
 (b) What is the value of  $K_c$  for the reverse reaction at same temperature?  
 (c) What would be the effect on  $K_c$  if:  
 (1) the pressure is increased?  
 (2) the temperature is increased?
- (ii) Write equilibrium constant for the following reactions:  
 (a)  $\text{BaCO}_3(\text{s}) \rightleftharpoons \text{BaO}(\text{s}) + \text{CO}_2(\text{g})$   
 (b)  $\text{CH}_4(\text{g}) + 2\text{O}_2(\text{g}) \rightleftharpoons \text{CO}_2(\text{g}) + 2\text{H}_2\text{O}(\text{g})$
37. (i) Draw the structure of  $\text{B}_2\text{H}_6$ .  
 (ii) What happens when:  
 (a) Boric acid is added to water?  
 (b) Aluminium is treated with dilute NaOH?  
 (iii) Give suitable reason for the following:  
 (a)  $[\text{SiF}_6]^{2-}$  is known whereas  $[\text{SiCl}_6]^{2-}$  not.  
 (b) In group 14, the tendency for catenation decreases with increasing atomic number.

OR

- (i) Complete the following chemical equations:  
 (a)  $\text{Fe}_2\text{O}_3 + 3\text{CO} \xrightarrow{\Delta}$  (b)  $\text{CaCO}_3 + 2\text{HCl} \rightarrow$

- (ii) Write a brief account on the following:
- (a) Diamond is covalent, yet it has high melting point.
  - (b) Atomic radius of gallium (135 pm) is less than that of aluminium (143 pm).
  - (c) Graphite is a good conductor of electricity but diamond is insulator.