

**Meghalaya Board
Class XI
Chemistry
Sample Paper 2**

Time allowed: 3 hours

Maximum Marks: 70

General Instructions:

- (i) Write all answers in the answer script.
- (ii) Attempt all parts of a question together in one place.
- (iii) All questions are compulsory.
- (iv) Marks for each question are indicated against it.
- (v) Question No. 1 of Part --I is of Multiple-choice Type, each of $\frac{1}{2}$ mark. Choose and write the correct answer in the Answer Script from the four options given.
- (vi) Question Nos. 2 to 9 of Part --II are very Short-answer Type Questions of 1 mark each. Answer these either in *one* sentence or in *one* word each.
- (vii) Question Nos. 10 to 17 of Part--III are Short-answer Type-I Questions of 2 marks each. Answer these in about 20–30 words each.
- (viii) Question Nos. 18 to 26 of Part--IV are Short-answer Type-II Questions of 3 marks each. Answer these in about 40–50 words each.
- (ix) Question Nos. 27 to 29 of Part--V are Long-answer Type Questions of 5 marks each. Answer these in about 70–80 words each.
- (x) Use of ordinary Scientific calculators and Log Tables are allowed.
- (xi) Mobile phones and Pagers are not allowed in the examination Hall.

PART-I

1. Choose and write the correct answer in the answer script: $\frac{1}{2} \times 8 = 4$

- (a)** Which of the following cannot be prepared by Kolbe's electrolysis process? $\frac{1}{2}$
- (i) C_3H_8
 - (ii) C_4H_{10}
 - (iii) C_2H_6
 - (iv) C_6H_{14}
- (b)** Which of the following compounds will exhibit geometrical isomerism? $\frac{1}{2}$
- (i) 1 - Phenyl - 2 - butene
 - (ii) 3 - Phenyl - 1 - butene
 - (iii) 2 - Phenyl - 1 - butene
 - (iv) 1, 1 - Diphenyl - 1 propane

- (c)** A substance which gives a brick red flame and breaks down on heating giving oxygen and brown gas is: 1/2
- (i) Calcium carbonate
 - (ii) Calcium nitrate
 - (iii) Magnesium carbonate
 - (iv) Magnesium nitrate
- (d)** Clark's method of water softening uses 1/2
- (i) Na_2CO_3
 - (ii) $\text{Ca}(\text{OH})_2$
 - (iii) Ion exchange resin
 - (iv) $\text{Na}_6\text{P}_6\text{O}_{18}$
- (e)** Which of the following is NOT true about the oxidation state of oxygen? 1/2
- (i) It shows oxidation state +3
 - (ii) It shows oxidation state +2
 - (iii) It shows oxidation state -1/2
 - (iv) It shows oxidation states -1
- (f)** The equilibrium constant expression depends on which of the following for the reversible reaction 1/2
- (i) mechanism
 - (ii) stoichiometry and mechanism
 - (iii) the quantities of reactants and products initially present
 - (iv) temperature (Level-M)
- (g)** Which of the following is true for expansion of an ideal gas into vacuum? 1/2
- (i) Energy is gained
 - (ii) Energy is released
 - (iii) Work is done by gas
 - (iv) No change in energy at all
- (h)** A mixture of gases contains H_2 and O_2 gases in the ratio of 1:4 (w/w). What is the molar ratio of the two gases in the mixture? 1/2
- (i) 1:4
 - (ii) 4:1
 - (iii) 16:1
 - (iv) 2:1

PART-II

2. Give an example of a basic buffer. **1**
3. Which of the two is more acidic and why? Acetic acid and chloroacetic acid **1**
4. What happens to the ionic product of water if some acid is added to it? **1**
5. What is the approximate molecular mass of dry air containing 78% N₂ and 22% O₂? (Atomic mass N = 14, O =16 u) **1**
6. Give an example of a decomposition redox reaction. **1**
7. Give the molecular formula of two gases responsible for depletion of ozone layer **1**
8. Write the name and atomic number of the second transition element. **1**
9. Why does H₂ behave as an inert gas? **1**

PART-III

10. Why is acid rain considered to be a threat for Taj Mahal? Explain with chemical reaction. **2**

11. Predict the effect of addition of 2 moles of an ideal gas
 - a) At constant volume
 - b) At constant pressure on the equilibrium:

$$\text{Na}_2\text{CO}_3(\text{s}) + \text{SO}_2(\text{g}) + \frac{1}{2}\text{O}_2(\text{g}) \rightleftharpoons \text{Na}_2\text{SO}_4(\text{s}) + \text{CO}_2(\text{g})$$

Or

 - a) What is the condition required for precipitation to occur?
 - b) In which of the two solutions, solubility of sodium sulphide is more: solution with pH 3.7 or with pH 4.2? **2**

12. What is the hybridization of B in BF₃ and N in NH₃? How does hybridization change when both compounds react to a coordinate bond? **2**

13. Predict the shape of following molecules on the basis of VSEPR theory
 - a) XeF₄ b) ClF₃ **2**

14.
 - a) What is Boyle's temperature?
 - b) What type of intermolecular forces exists between HCl molecules in liq.HCl? **2**

15. Balance the following equation by the half reaction method (acidic medium):

$$\text{C}_2\text{H}_5\text{OH} + \text{MnO}_4^- \rightarrow \text{Mn}^{2+} + \text{CH}_3\text{COOH}$$
 2

16. **2**
 - a) Calculate the mass of one atom of oxygen.
 - b) How many He atoms are present in 4u of He. **2**

17. Calculate the mass percentage composition of copper pyrites(CuFeS₂) **2**

PART-IV

18. Calculate the wavelength, frequency and wave number of a light wave whose period is 2.0×10^{-10} s. **2**

19. Calculate the root mean square and average speed of oxygen molecules at 27°C . **2**

20.

- An electron in which orbit of Li^+ ($Z=3$) would have same energy as the electron in second orbit of H atom?
- State Aufbau's principle

Or

- What is the condition required for precipitation to occur?
- In which of the two solutions, solubility of sodium sulphide be more: solution with pH 3.7 or with pH 4.2?

21. **3**

- Second ionization enthalpy of Na is more than Mg. Why?
- Arrange the following in the increasing order of radius. N, O, P
- Write the general outer electronic configuration of transition elements.

22. Give reason: **3**

- Be and Mg do not impart colour to the flame.
- Li^+ is heavily hydrated in water.

23. Calculate the volume of 1.0 M aq. NaOH that is neutralized by 200 mL of 2.0 M aq. HCl. Also calculate the mass of NaCl produced. **3**

24. **3**

- Which of the two has higher ionic character and why? NaCl or NaI
- Write the molecular orbital configuration of C_2 . Predict its magnetic behaviour.
- H_2O is a liquid at room temperature. Why?

25. In an equilibrium, $\text{A} + \text{B} \rightleftharpoons \text{C} + \text{D}$, A and B are mixed in a vessel at a temperature T. The initial concentration of A was twice the initial concentration of B. After equilibrium was attained, concentration of C becomes thrice the equilibrium conc. of B. Calculate K_c . **3**

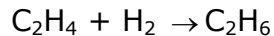
26. **3**

- Give values for all 4 quantum numbers for unpaired electron of Cl ($Z=17$).
- Which quantum number defines orientation of an electron?
- How many electrons in Cr ($Z=24$) have $l = 1$?

PART-V

27.

a) Calculate the enthalpy change for the reaction:



Given enthalpies of combustions of C_2H_4 , H_2 and C_2H_6 are -1401, -1550, -286 kJ mol respectively.

b) Identify the state and path functions in the expression given: $\Delta U = q + w$

c) Predict the sign of ΔG for the following processes:

- i. Melting of ice below 0°C
- ii. Flow of heat from high to low temperature.

Or

a) Standard enthalpies of combustions of C_6H_{10} , H_2 and C_6H_{12} are -3880, -241, -3920 kJ mol⁻¹ resp. Calculate the standard enthalpy of hydrogenation of C_6H_{10} .

b) Calculate the work done when 1 mole of an ideal gas expands freely in vacuum.

c) What is the difference between H-H bond enthalpy and enthalpy of formation of H atom?

28.

a) Give the formulae of components of borax bead.

b) Why does Si not show catenation to the extent as carbon does?

c) Al_2Br_6 is a poor conductor of electricity. Why?

d) $\text{N}(\text{CH}_3)_3$ is pyramidal while $\text{N}(\text{SiH}_3)_3$ is planar. Why?

Or

a) Why does B resemble Si in its properties?

b) Pb (IV) chloride is a good oxidising agent. Why?

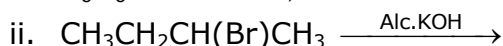
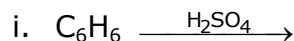
c) Which of the following is acidic and Why? SiO_2 , Al_2O_3 , PbO_2

d) B-F bond length in BF_3 is more than in $[\text{BF}_4]^-$. Why?

29.

a) Which type of isomerism is observed in xylenes?

b) Predict the major products of the following:



c) Name the reagent used to distinguish between following pairs of compounds

- i. propane and propene
- ii. but-1-yne and but-2-yne

Or

- a) Alkanes with even number of carbon atoms have higher melting point than the corresponding ones with odd number. Why?
- b) Name the two conformations of ethane. Which of the two is more stable?
- c) A hydrocarbon 'A' has a vapour density 36. It forms a single monochloro substitution product. Predict the structure of 'A'. Justify your answer. Convert acetic acid to methane.