SAMPLE QUESTION PAPER

CHEMISTRY

Maximum: 60 Scores

Class: HSE I

Cool-off time: 15 minutes

Time: 2 Hours

General instructions to candidates:

- There is a "Cool-off time" of 15 minutes in addition to the writing time
- Read questions carefully before answering
- Calculations, figures and graphs should be shown in the answer sheet
- Give equations were ever necessary

Section A

Answer any four questions. Each question carries one mark each

1. Which is a temperature dependent, molarity or molality?
2. Which orbital is designated with the quantum numbers n = 3, l = 2 ?
3. Give the IUPAC name of the element with atomic number 132.
4. Shape of $BeCl_2$ molecule is _____
5. Identify Lewis acid from the following.

   NH_3, BF_3, H_2O, Cl^-
6. Glycerol can be separated from spent lye by using _____ method.

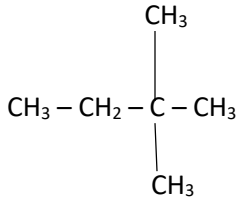
Section B

Answer any 8 questions. Each question carriers 2 marks each.

7. Nitrogen combines with oxygen to form two compounds No and NO_2. Identify and state the law.
8. State Heisenberg's Uncertainty Principle. Give its mathematical expression.
9. What are the important conclusions made by Rutherford from his α ray scattering experiment?
10. BF_3 is non polar. Why?
11. Explain Intensive and extensive properties with suitable examples.
12. What is a buffer solution? Give an example of a buffer solution.
13. $Zn + 2HCl \rightarrow ZnCl_2 + H_2$

    identify the oxidizing and reducing agent.

14. Write the IUPAC name of the following compound.

(a) 

(b) $CH_3 - CO - CH_2 - CH_2 - COOH$

15. Explain Wurtz reaction with suitable example.
16. Give reason for the acidic nature of alkynes
17. State Huckle's rule.

Section C

Answer any eight questions. Each question carries 3 marks each

18. 3 g of hydrogen react with 29 g of oxygen to yield water.
    a) Which is the limiting reagent?
    b) Calculate the maximum amount of water that can be formed.
    c) Calculate the amount of reactant left behind.
19. What are the postulates of Bohr atomic model?
20. Calculate the wave number of radiation due to the transition of an electron from fourth to second orbital of a hydrogen atom. $R_h = 109677\ cm^{-1}$
21. Account the following
    a) Ionization energy of nitrogen is greater than oxygen
    b) Atomic radius decreases from left to right in the periodic table
    c) Electron gain enthalpy of fluorine is less than that of chlorine
22. a) Write the molecular orbital configuration of oxygen molecule
    b) Compare the stabilities of O_2 and O_2^+ using bond order
23. State first law of Thermodynamics. Write its mathematical expression
24. a) Define P^H
    b) Calculate the P^H of a solution with hydrogen ion concentration 3×10^{-3} M
25. Balance the following redox reaction by half reaction method

    $Fe^{2+} + Cr_2O_7^{2-} \rightarrow Fe^{+3} + Cr^{3+}$ (acidic medium)

26. Complete the following reaction

a) $CaC_2 + H_2O \longrightarrow$ _____

b) $C_6H_5 - OH \xrightarrow{Zn\ dust}$ _____

c) $CH3\text{-}COONa \xrightarrow[\blacktriangle]{(NaOH + CaO)}$ _____

Section D

Answer any four questions. Each question carries 4 marks each

28 a) State modern periodic law

b) Size of Na^+ is smaller than Na. Why?

c) Why Lithium and magnesium show similarity in properties?

29 a) Define Hybridization

b) Explain SP^3 hybridization with CH_4 as example

30. a) Give the relationship between ▲G and ▲S

b) Predict the spontaneity of the following reaction at 298 K

$4\ Fe + 3O_2 \longrightarrow 2\ Fe_2O_3$ ▲H = - 1648 KJ/mol, ▲S = - 549.4 J/K/ mol

31. Explain the effect of pressure and temperature on the following equilibrium

$2\ NO_2\ (g) \rightleftharpoons N_2O_4\ (g)$ ▲H = - 57.2 KJ/mol

32. a) What are Conformations?

b) Draw Newman projections of Staggered and eclipsed conformations of ethane

c) Compare the stability of eclipsed and staggered conformations

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