

GULF SAHODAYA EXAMINATION, GRADE – XI – 2009

(Saudi Chapter)

SUBJECT: CHEMISTRY

SET – 1

MAX. MARKS: 70

TIME: 3 HOURS

GENERAL INSTRUCTIONS

- All questions are compulsory.
- Marks for each question are indicated against it.
- Questions number **1 to 8** are very short answer questions and carry **1 Mark** each
- Questions number **9 to 18** are short-answer questions and carry **2 Marks** each.
- Questions number **19 to 27** are also short-answer questions and carry **3 Marks** each.
- Questions number **28 to 30** are long-answer questions and carry **5 Marks** each.
- Use Log Tables, if necessary. Use of calculators is **not** allowed.

- Copper oxide obtained by heating copper carbonate or copper nitrate contains copper and oxygen in the same ratio by weight. Which law is illustrated by this observation? State the law. 1
- Give the values of the quantum numbers for the electron with the highest energy in sodium atom. 1
- Arrange the following in the order of increasing radii. O^{2-} , N^{3-} , S^{2-} and F^{-} 1
- Critical temperature for CO_2 and CH_4 are $31.1^{\circ}C$ and $-81.9^{\circ}C$ respectively. Which of these has stronger intermolecular force and why? 1
- What is meant by spontaneous process? What is the criterion for spontaneity? 1
- What is the conjugate base and acid of a) NH_3 b) HSO_4^{-} 1
- Name the gas produced when Calcium carbide is treated with water. Give the chemical equation. 1
- What is meant by Biochemical oxygen demand? 1
- 500 cm^3 of $0.025M$ Na_2SO_4 solution is added to an aqueous solution of $15g$ of $BaCl_2$ resulted in the formation of $BaSO_4$. What is the limiting reagent? How many grams of $BaSO_4$ are formed? ($Ba = 137.34$, $S = 32$, $O = 16$, $Cl = 35.5$) 2
- Calculate the standard enthalpy of formation of $CH_3COOH_{(l)}$ from the following data. 2
 $CH_3COOH_{(l)} + 2 O_{2(g)} \longrightarrow 2CO_{2(g)} + 2H_2O_{(l)} \quad \Delta_r H^{\circ} = -871\text{KJmol}^{-1}$
 $C(s) + O_{2(g)} \longrightarrow CO_{2(g)} \quad \Delta_c H^{\circ} = -393\text{KJmol}^{-1}$
 $H_{2(g)} + 1/2 O_{2(g)} \longrightarrow H_2O_{(l)} \quad \Delta_f H^{\circ} = -286\text{KJmol}^{-1}$
- a) State Heisenberg's uncertainty principle. b) Write the electronic configuration of Chromium (atomic number 24) 2

12. Account for the following: 2
 a) BeF_2 molecule has a zero dipole moment although Be-F bonds are polar.
 b) Axial bonds of PCl_5 are longer than equatorial bonds.
13. a). What happens when Lithium nitrate is heated? 2
 b). How is BeH_2 prepared?
14. What are silicones? How are they prepared? 2
15. a) Write the bond line formula of 3-Bromo-3-Chloroheptane 2
 b) What are the hybridization states of each carbon atom in the following compound
 $(\text{CH}_3)_2\text{CO}$
16. a) State Markovnikov rule. b) Explain the mechanism of HBr addition to unsymmetrical alkenes. 2
17. 0.189g of an organic compound gave in a Carius determination 0.287g of Silver chloride. What is the percentage of chlorine in the given compound? 2

OR

- a). Suggest a method to purify a liquid that decomposes at its boiling point.
 b) Discuss the chemistry of Lassaigne' test for Nitrogen
18. What is smog? How is classical smog different from photochemical smog? 2
19. Permanganate ion reacts with sulphite ion in basic medium to give SO_4^{2-} and MnO_2 . Write balanced chemical equation for the reaction. 3
20. Calculate the frequency and wave length of the radiation emitted when an electron in the hydrogen atom jumps from third orbit to the ground state. In which region of the electromagnetic spectrum will this line lie? ($h=6.62 \times 10^{-34}$ Js, $C = 3 \times 10^8$ m/s) 3

OR

- a). If the velocity of the electron in Bohr's first orbit is $2.19 \times 10^6 \text{ ms}^{-1}$, calculate the de Broglie wavelength associated with it. (mass of electron = 9.11×10^{-31} kg)
 b) State Pauli's exclusion principle.
21. a). Predict the position of the element in the periodic table satisfying the electronic configuration $(n-1)d^1 ns^2$ for $n = 4$ 3
 b). Explain the following:
 1). Electron gain enthalpy of chlorine is more than that of fluorine.
 2). First ionisation enthalpy of Be is greater than that of B.
22. a) Write van der Waal's equation of state for 'n' mole of real gas. 3
 b) What is Boyle point?
 c) The density of a gas is found to be 1.56g/litre at 745 mm pressure and 65°C . Calculate the molecular mass of the gas. ($R=0.0821 \text{ L atm K}^{-1} \text{ mol}^{-1}$)
23. Compare the relative stability of superoxide (O_2^-) and peroxide (O_2^{2-}) and indicate their magnetic properties. 3
24. a) Explain Born-Haber cycle for the determination of lattice enthalpy of NaCl. 3
 b) State Hess's law of constant heat summation
25. Complete and balance the following: 3
 a) $\text{I}_2 + \text{H}_2\text{O}_2 + \text{OH}^- \longrightarrow$
 b) $\text{Al}_4\text{C}_3 + \text{D}_2\text{O} \longrightarrow$
 c) $\text{F}_2(\text{g}) + \text{H}_2\text{O}(\text{l}) \longrightarrow$

26. Account for the following:
a) Lithium shows similarities to magnesium in its chemical behaviour
b) Alkali metals dissolve in liquid ammonia and the solution can acquire different colours.
c) LiI is more soluble than KI in ethanol.

27. a) What is meant by mesomeric effect?
b) Show the negative resonance effect in Nitrobenzene
c) Draw the orbital diagram showing hyperconjugation in ethyl cation

28. a) 1. State Le Chatelier's principle.
2. What is the effect of pressure and temperature on the following equilibrium?
$$2\text{SO}_2(\text{g}) + \text{O}_2(\text{g}) \rightleftharpoons 2\text{SO}_3(\text{g}) + 193.2\text{kJ}$$

b) A sample of fresh apple juice has a pH of 3.76. Calculate $[\text{H}_3\text{O}^+]$

OR

- a) Explain the terms 1) common ion effect 2) Buffer solution
b) Lead chloride has a solubility product of 1.7×10^{-5} at 298 K. Calculate its solubility at this temperature.
c) Why does the solubility of salts of weak acids increase at lower pH?

29 Give reasons:

- a) Boron forms only covalent compounds.
b) $[\text{SiF}_6]^{2-}$ is known whereas $[\text{SiCl}_6]^{2-}$ not
c) In thallium +1 oxidation state is predominant than +3
d) Boric acid is considered as weak acid
e) CCl_4 is resistant to hydrolysis

OR

- a) A certain salt of Boron, X gives the following results. 1) Its aqueous solution is alkaline to litmus. 2) It swells up to a glassy material Y on strong heating. 3) When con. HCl is added to a hot solution of X white crystal of an acid Z separates out. Write equations for all the above reactions and identify X, Y, and Z
b) Explain the structure and bonding of diborane.

30. a) Do the following conversions:
1) Phenol to toluene 2) 1-Bromopropane to 2-Bromopropane
b) Explain the following with example
1) Wurtz reaction 2) Aromatisation
c) State Huckel Rule

OR

- An alkene A on ozonolysis gives compound B. Compound B can also be obtained from an alkyne having molecular formula C_2H_2 by addition of water. Identify A and B. Support your answers with chemical equations. Draw the geometrical isomers of compound A. Which geometrical isomer is more polar? Why?