GULF SAHODAYA (SAUDI CHAPTER) EXAMINATION – 2014

GRADE: XI **SUBJECT – CHEMISTRY**
TIME:3Hrs **SET- A** **MAX MARKS : 70**
Total pages : 04

General instruction:

1. **All questions are compulsory**
2. **Question numbers 1 to 5 are very short answer type carrying 1 mark each.**
3. **Question numbers 6 to 10 are short answer type carrying 2 marks each.**
4. **Question numbers 11 to 22 are also short answer type carrying 3 marks each.**
5. **Question number 23 is value based question, carrying 4 marks.**
6. **Question numbers 24 to 26 are long answer questions, carrying 5 marks each.**
7. **Calculators are not permitted. Use log tables if necessary.**

1. Define Boyle's temperature.

2. Why is it that on being heated in excess supply of air K, Rb and Cs form superoxide in preference to oxides and peroxides?

3. How is Gibb's energy change ΔG^0 is related to equilibrium constant of a reaction?

4. What is the conjugate base and acid of NH_3?

5. In terms of period and group where would you locate the element with Z = 114?

6. A compound contains 54.2 % C, 9.2 % H and 36.6 % oxygen, determine its molecular formula if its molecular weight is 88u.[Atomic weight of C = 12u, H =1u and O =16u]

7. 0.40g of organic compound gives 0.3g of AgBr by Carius method. Find the percentage of bromine in the organic compound. [Atomic weight of Ag =108u, Br =80u].

8. a) For what type of compounds is Kjeldahl's method not applicable?
   b) Why does the solubility of alkaline earth metal hydroxides in water increase down the group?

9. A sample of HI is placed in a flask at 0.2 atmosphere. At equilibrium the partial pressure of HI is 0.04 atmosphere. What is K_p for the given equation?
   $2HI_{(g)} \rightleftharpoons H_{2(g)} + I_{2(g)}$

   OR

   Calculate the degree of ionisation of 0.01M solution of HCN. Ka = 4.8×10^{-10}. Also calculate H^+ ion concentration of the solution.

10. a) With the help of hybridization, explain the shape of acetylene molecule.
    b) Predict the shape of ClF_3 and SF_4.

11. a) State the law of multiple proportion. Illustrate with an example.
    b) What is limiting reagent.

12. a) State Pauli's exclusion principle.
b) List the quantum numbers (m_l and l) for 3d orbitals.
c) Write the electronic configuration of Cu (Z =29)

13. Explain why the bond order of N_2 is greater than N_2^+, but the bond order of O_2 is less than that of O_2^+.

14. a) A golf ball has a mass of 40g and a speed of 45 m/s. If the speed can be measured with an accuracy of 2%, calculate the certainty in its position. ($h = 6.6 \times 10^{-34}$ J s)
b) Which quantum number identifies the size and energy of orbit?
c) Calculate the radius of Bohr's third orbit for hydrogen atom.

OR

a) Electrons are emitted with zero velocity from a metal surface when it is exposed to radiation of wavelength 6800° A. Calculate work function and threshold frequency of the metal
b) What is photoelectric effect?
c) What is the maximum number of electrons with clockwise spin that can be accommodated in second main shell?

15. a) What will be the pressure of the gas mixture when 0.5 L of H_2 at 0.8 bar and 2.0L of O_2 at 0.7 bar is introduced in a vessel of I L capacity at 27°C?
b) What will happen to volume of fixed amount of gas at a certain temperature and pressure if:
i) Temperature is kept constant but pressure is decreased to $^1/_4{}^{th}$ of the original value.
ii) Pressure is halved and temperature K is doubled.

16. i) Derive Henderson equation for acidic buffer solution.
ii) Write the solubility expression (K_{sp}) for $Zr_3(PO_4)_4$.

17. i) Balance the following equation in acidic medium by half reaction method.
$MnO_{4(aq)}^- + Br^-_{(aq)} \rightarrow Mn^{2+}_{(aq)} + Br_{2(l)}$
ii) Depict the galvanic cell in which the reaction $Zn + 2Ag^+ \rightarrow Zn^{2+} + 2Ag$ takes place. Write anodic and cathodic reaction.

18. Give the reaction involved in Solvay's process for the preparation of sodium carbonate. Why K_2CO_3 is not prepared by this method.

19. i) Glycerol can be separated from spent – lye by distillation under reduced pressure only. Explain why?
ii) Write structural formula of but-2-en-oicacid.
iii) How many σ and π bonds are present in

20. i) Account for the following:
a) Electron gain enthalpy of Sulphur is more negative than that of Oxygen.
b) Mg^{2+} ion is smaller in size than O^{2-} ion although both have the same electronic structure.

ii) How would you justify the presence of 32 elements in the sixth period of the periodic table.

21. Reaction of steam on hydrocarbon or coke at high temperature of catalyst yields a mixture of gases.
a) Name the gases produced.
b) Write a reaction of the above mentioned process.
c) Write the reaction when the mixture of gases is reacted with steam in presence of iron chromate as catalyst. Also give the special name of this reaction.

22. a) Addition of HBr to propene yields 2-Bromopropane. Explain the rule and give the mechanism of the reaction.
b) Why is benzene extra ordinarily stable though it contains 3 double bonds.

23. During an educational trip, a group of students visited a village having a beautiful lake. The students collected some plants samples and noticed that some villagers are washing clothes around the lake. They also observed that the dumping of waste material from houses into the lake at certain points.
After few years, the students happened to visit the same village again. They were shocked to find the green cover over the lake water which was unusable and badly stinking

Answer the following questions:
a) What is the name of green cover over lake water?
b) Why the lake water had developed bad smell?
c) How this situation could have been avoided? Give your views.
d) What are the values associated with the above passage.

24. a) Define enthalpy.
b) Calculate the enthalpy change when 2.38g of CO vapourizes at it normal boiling point. Given $\Delta_{vap}H^0$ (CO) = 6.04 kJ/mol.
c) For the reaction $Ag_2O_{(s)} \rightarrow 2Ag_{(s)} + {}^1/_2\ O_{2(g)}$; $\Delta H = 30.56$ kJ/mol and $\Delta S = 0.066$kJ/mol. Calculate the temperature at which ΔG equals zero.
d) Illustrate Hess's law with an example

OR

a) State the first law of thermodynamics.
b) Calculate the standard enthalpy of formation of CH_3OH (l) from the following data:

$CH_3OH\ (l) + {}^3/_2\ O_2\ (g) \rightarrow CO_2\ (g) + 2H_2O\ (l)$	$\Delta_rH = -726$ kJ/mol
$H_2\ (g) + {}^1/_2\ O_2\ (g) \rightarrow H_2O\ (l)$	$\Delta_rH = -286$ kJ/mol
$C\ (g) + O_2\ (g) \rightarrow CO_2$	$\Delta_rH = -393$ kJ/mol

c) Derive the relationship between C_p and C_v for an ideal gas.

25. a) Name the basic structural unit of silicates.
b) What are silicones? How are they prepared? Write any two properties of silicones
c) What happens when Borax is heated strongly?

OR

a) Is boric acid a protic acid? Justify.
b) Boron forms mainly covalent bonds. Why?
c) PbX_2 is more stable than PbX_4. Why?
d) Which is thermodynamically the most stable form of carbon?
e) $[SiF_6]^{2-}$ is known whereas $[SiCl_6]^{2-}$ not. Give reasons.

26. a) How will you carry out the following conversions not more than 2 steps?
    i) Sodium Benzoate to Cyclohexane
    ii) Propyne to Propan-1-one
    iii) Ethyne to Benzene
b) What are the necessary conditions for any compound to show aromaticity?
c) Cis But-2-ene has high boiling point than Trans But-2-ene. Why?

OR

a) Write the mechanism of nitration of benzene.
b) An alkene 'A' on ozonolysis gives a mixture of 2-methyl propan-1-al and propan –1-one. Write the structure and IUPAC name of alkene 'A'.
c) Illustrate the following with an example
    i) Wurtz reaction
    ii) Kolbe's electolysis