Sample Paper – 2014
Class – XI
Subject –Chemistry

SA1/CLASS XI/CHEMISTRY/2013-14

[Time allowed: 3 hours] **[Maximum marks: 80]**

General Instructions: (*i*) *All questions are compulsory.*
(*ii*) *Question nos.* ***1*** *to* ***8*** *are very short answer questions and carry* ***1*** *mark each.*
(*iii*) *Question nos.* ***9*** *to* ***18*** *are short answer questions and carry* ***2*** *marks each.*
(*iv*) *Question nos.* ***19*** *to* ***27*** *are also short answer questions and carry* ***3*** *marks each.*
(*v*) *Question nos.* ***28*** *to* ***32*** *are long answer questions and carry* ***5*** *marks each.*
(*vi*) *Use log tables if necessary, use of calculators is not allowed.*

1. State physical significance of Ψ^2.
2. Write electronic configuration of Cu^{+2}.
3. What is the basic difference in approach between Mendeleev's periodic table and Modern periodic table?
4. Consider the following species and find what is common in them? N^{-3}, O^{-2}, F^{-1}, Al^{+3}, Mg^{+2} and Na^{+1} .
5. What are the limitations of octet rule?
6. Define Gibb's free energy?
7. Give one example of buffer solution that is present in human body.
8. Write conjugate acid for NH_2^{-1} and H_2O.
9. Calculate the mass percentage of each element present sodium sulphate.
10. Which one of the atomic orbital has higher energy and why?
    (i) n= 3 l= 2 m= +1
    (ii) n= 4 l= 0 m= 0
11. Lanthanoids and Actinoids are placed in separate rows at bottom of the periodic table. Explain the reason for this arrangement.
12. (a) In terms of period and group, where would you locate the element Z= 111
    (b) Write the atomic number of the element present in fourth period and sixteenth group of the periodic table.
13. H_2O is liquid where as H_2S is gas. Explain why? Give one more example of such condition.
14. (a) At what condition most of the gases obey ideal gas laws.
    (b) Give SI unit of Vander Waal's parameter 'a' and 'b'.
15. Define compressibility factor (Z). What will happen if: (i) Z=1, (ii) Z<1
16. State second law of thermodynamic. Give its mathematical expression and importance.

17. Differentiate between the following:
    (a) State functions and state variables
    (b) Reversible and irreversible process

18. Derive the relation between Kp and Kc for a general reaction: $aA + bB \longrightarrow cC + dD$.
19. Calculate the number of atoms present in: (i) 52 u of He gas (ii) 52 g of Fe metal (iii) 3 molecules of CH_4.
20. An element with mass number 81 contains 31.7 % more neutron as compared to protons. Assign the atomic symbol.
21. Account for the following:
    (i) 'Be' has higher ionization enthalpy than 'B'.
    (ii) 'F' has less negative electron gain enthalpy than 'Cl'.
    (iii) Mg^{+2} is smaller than 'Mg'.
22. Among the elements of third period which one has:
    (i) Most electronegative element.
    (ii) Largest in size
    (iii) Highest ionization enthalpy
    (iv)Most metallic element
    (v) Element having stable half filled configuration.
    (vi) Metalloid element

23. Draw Lewis dot structure of CO_2 and also write their all possible resonating structure with resonance hybrid.
24. (i) Which of the species have similar shape and why? NO_2^{-1}, NO_2^{+1}, CO_2 and O_3.
    (ii) Which out of NF_3 and NH_3 has higher dipole moment and why?
25. Rohan takes an open pan to cook pulses at hill station while Sohan cooks the same in pressure cooker at the same place. The gas cylinder of Rohan lasts for every 15 days where as Sohan uses one cylinder per month.
    (i) Who will cook pulses faster and why?
    (ii) What value is possessed by Sohan?
26. (i) Predict the entropy change for the following (+ive and -ive)
    (a) boiling of egg (b) process of crystallization
    (ii) Find out whether it is possible to reduce MgO using carbon at 298 K , If not , at what temperature it becomes spontaneous? For reaction $MgO(s) + C(s) \longrightarrow Mg(s) + CO(g)$
    $\Delta rH^o = 91.18\ kJmol^{-1}$ $\Delta rS^o = 197.67\ JK^{-1}$.
27. Assign reason for the following:
    (i) A solution of NH_4Cl in water shows pH less than 7.
    (ii) In qualitative analysis NH_4Cl is added before adding NH_4OH for testing $Fe^{+3}$and Al^{+3} ions.
28. A box contains some identical red coloured balls, labeled as A, each weighing 2 grams. Another box contains identical blue coloured balls, labeled as B, each weighing 5 grams. Consider the combinations of AB, AB_2, A_2B and A_2B_3. And show that the law of multiple proportions is applicable.
29. (i) How many sub-shell are associated with n=4.
    (ii) What do you mean by dual behavior of particles?

(iii) Who replaced the concept of fixed path with probability of finding electron?

(iv)State the theory according to which energy travel in discontinuous form.

(v) Explain Pauli's exclusion principle.

30. Draw Molecular Orbital energy level diagram of O_2 and N_2. Compare their bond order and magnetic properties.

31. (i) Why air is dense at sea level? Explain.

(ii) What is aqueous tension?

(iii) Calculate the total pressure in a mixture of 4 g of O_2 and 2 g of H_2 confined to a total volume of 1 L at 0 ^{0}C.

(Given R= .0821 L atm mol^{-1})

32. What is meant by Le-Chatelier's principle? Explain how following factors affects equilibrium.

(i) Temperature (ii) Concentration (iii) Pressure (iv)Catalyst