

**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  $\Psi^2$ .
2. Write electronic configuration of  $\text{Cu}^{+2}$ .
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?  $\text{N}^{-3}$ ,  $\text{O}^{-2}$ ,  $\text{F}^{-1}$ ,  $\text{Al}^{+3}$ ,  $\text{Mg}^{+2}$  and  $\text{Na}^{+1}$ .
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  $\text{NH}_2^{-1}$  and  $\text{H}_2\text{O}$ .
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.  $\text{H}_2\text{O}$  is liquid where as  $\text{H}_2\text{S}$  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.

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17. Differentiate between the following:
- State functions and state variables
  - Reversible and irreversible process
18. Derive the relation between  $K_p$  and  $K_c$  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:
- 'Be' has higher ionization enthalpy than 'B'.
  - 'F' has less negative electron gain enthalpy than 'Cl'.
  - $Mg^{+2}$  is smaller than 'Mg'.
22. Among the elements of third period which one has:
- Most electronegative element.
  - Largest in size
  - Highest ionization enthalpy
  - Most metallic element
  - Element having stable half filled configuration.
  - 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.
- Who will cook pulses faster and why?
  - What value is possessed by Sohan?
26. (i) Predict the entropy change for the following (+ive and -ive)
- boiling of egg
  - 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
- $$MgO(s) + C(s) \longrightarrow Mg(s) + CO(g)$$
- $\Delta_r H^\circ = 91.18 \text{ kJmol}^{-1}$        $\Delta_r S^\circ = 197.67 \text{ JK}^{-1}$ .
27. Assign reason for the following:
- A solution of  $NH_4Cl$  in water shows pH less than 7.
  - 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  $0^\circ C$ .  
(Given  $R = .0821 \text{ L atm mol}^{-1}$ )
32. What is meant by Le-Chatelier's principle? Explain how following factors affects equilibrium.  
(i) Temperature      (ii) Concentration      (iii) Pressure      (iv) Catalyst

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