

**Important Questions -2019-20**  
**Class – XI (CHEMISTRY)**

---

**Chapter 1- Some Basic Concepts of Chemistry**

**Very short questions ( 1 marks):**

- Write the empirical formulae of the following :
  - Glucose,  $C_6H_{12}O_6$
  - Borazole,  $B_3N_3H_6$
- How many significant figures should be present in the answer of the following calculations?  

---
- What mass of silver nitrate will react with 5.85 g of sodium chloride to produce 14.35 g of silver chloride and 8.5 g of sodium nitrate, if the law of conservation of mass is true?
- 5.00 kg of  $N_2(g)$  and 10.0 kg of  $H_2(g)$  are mixed to produce  $NH_3(g)$ . Calculate the  $NH_3(g)$  formed. Identify the limiting reagent in the production of  $NH_3$  in this situation.
- The reactant which is entirely consumed in reaction is known as limiting reagent. In the reaction
$$2A + 4B \rightarrow 3C + 4D,$$
When 5 moles of A react with 6 moles of B, then
  - Which is the limiting reagent?
  - Calculate the amount of C formed.

**Short questions(3 marks):**

- What is limiting reagent?
  - Oxygen is prepared by catalytic decomposition of potassium chlorate ( $KClO_3$ ). Decomposition of potassium chlorate gives potassium chloride ( $KCl$ ) and oxygen ( $O_2$ ). If 2.45 mol of oxygen is needed for an experiment, how many grams of potassium chlorate must be decomposed?
- Calculate the concentration of nitric acid in moles per litre in a sample which has a density,  $1.41 \text{ g ml}^{-1}$  and the mass percent of nitric acid in it being 69%.
- If the density of methanol is 0.793 kg per litre. What is its volume needed for making 2.5 l of its 0.25 M solution.
- A crystalline salt on being rendered anhydrous loses 45.6% of its weight. The percentage composition of the anhydrous salt is Aluminum = 10.50%, Potassium = 15.1% Sulphur = 24.96%, Oxygen = 49.925. Find the simplest formula of the anhydrous and crystalline salt.
- Calculate the number of atoms in each of the following :
  - 52 moles of He,
  - 52 u of He,
  - 52 g of He.
- Calcium carbonate reacts with aqueous HCl to give  $CaCl_2$  and  $CO_2$  according to the reaction given below :
$$CaCO_3(s) + 2HCl(aq) \rightarrow CaCl_2(aq) + CO_2(g) + H_2O(l)$$
What mass of  $CaCl_2$  will be formed when 250 ml of 0.76 M HCl reacts with 1000g of  $CaCO_3$ ? Name the limiting reagent. Calculate the no. of moles of  $CaCl_2$  formed in the reaction.
- If 4 g of NaOH dissolves in 36g of  $H_2O$ , calculate the mole fraction of each component in the solution. Also, determine the molarity of solution (specific gravity of solution is  $1 \text{ g ml}^{-1}$ )

**Long Questions(5 marks)**

- A welding fuel gas contains carbon and hydrogen only. Burning a small sample of it in oxygen gives 3.38 g carbon dioxide, 0.690 g of water and no other products. A volume of 10.0L (measured at STP) of this welding gas is found to weigh 11.6 g. Calculate (i) empirical formula (ii) molar mass of the gas and (iii) molecular formula.
- A crystalline salt on being rendered anhydrous loses 45.6% of its weight. The percentage composition of the anhydrous salt is Aluminum = 10.50%, Potassium = 15.1% Sulphur = 24.96%, Oxygen = 49.925. Find the simplest formula of the anhydrous and crystalline salt.

## **Chapter 2 Structure of Atom**

### **Very short questions (1 marks):**

15. What is the maximum number of electrons in an atom having  $n = 3, l = 1$  and  $s = +1/2$  ?
16. How many orbitals are present in the M-shell?

### **Short questions ( 2 marks):**

17. What is the maximum number of emission lines when the excited electron of a Hc atom in  $n = 6$  drops in the ground state?
18. An element with mass number 81 contains 31.7% more neutrons as compared to protons. Assign the atomic symbol.
19. In Rutherford's experiment, generally the thin foil of heavy atoms, like gold, platinum etc. have been used to be bombarded by the  $\alpha$ -particles. If the thin foil of light atoms such as aluminium is used, what difference would be observed from the above result?
20. Calculate the wave number for the longest wavelength transition in the Balmer series of atomic hydrogen.
21. Calculate the uncertainty in the velocity of a wagon of mass 2000 kg whose position is known to an accuracy of  $\pm 10$ m.
22. What is Heisenberg uncertainty principle? Explain briefly.
23. Derive the derivation of de-Broglie relationship.
24. What is the energy in joules required to shift the electron of the hydrogen atom from the first Bohr orbit to the fifth Bohr orbit.  
What is the wavelength of the light emitted when the electron return to the ground state?
25. What are the main achievements of Bohr's theory of atom?
26. A photon of wavelength  $4 \times 10^{-7}$  m strikes on metal surface, the work function of the metal being 2.13 eV. Calculate
  - i) The energy of the photon (eV).
  - ii) The kinetic energy of the emission.
  - iii) The velocity of the photoelectron. (1 eV =  $1.6020 \times 10^{-19}$  J)

### **Short questions(3 marks):**

27. Lifetimes of the molecules in the excited states are often measured by using pulsed radiation source of duration nearly in the Nano second range. If the radiation source has the duration of 2 ns and the number of photons emitted during the pulse source is  $2.5 \times 10^{15}$ , calculate the energy of the source.
28. The ejection of the photoelectron from the silver metal in the photoelectron effect experiment can be stopped by applying the voltage of 0.35 V when the radiation 256.7 nm is used. Calculate the work function for silver metal.
29. The diameter of zinc atom is 2.6 A. calculate (a) radius of zinc atom in pm and (b) number of atoms present in a length of 1.6 cm if the atoms are arranged side by side lengthwise.
30. i) Define principal quantum number (n).
31. Write the electronic configuration of  $\text{Cr}^+$  [Atomic number of Cr= 24]

### **Long Questions(5 marks)**

32. i) An atomic orbital has  $n = 3$ . What is possible value of  $l$  and  $m_l$ ?  
ii) List the quantum numbers ( $m_l$  and  $l$ ) of electrons for 3d orbital.  
iii) Which of the following orbitals are possible? 1p, 2s, 2p and 3f.

## **Chapter 3 Periodic Classification of elements**

### **Very short questions ( 1 marks):**

33. On the basis of quantum numbers, justify that the sixth period of the periodic table should have 32 elements.
34. Predict the position of the element in the periodic table satisfying the electronic configuration  $(n - 1)d^1 ns^2$  for  $n = 4$ .

### **Short Questions (2 marks):**

35. In terms of period and group where would you locate the element with  $Z = 114$ ?
36. Two elements x and y have atomic numbers 36 and 58 respectively. On the basis of electronic configuration predict the following:
  - i) The group period and block to which each element belongs.

ii) Are they representative elements?

37 Why does the first ionization enthalpy increase as we go from left to right across a given period of the periodic table?

**Short Questions(3 marks):**

38 How will you explain the fact that first ionization enthalpy of sodium is lower than that of magnesium but its second ionization enthalpy is higher than that of magnesium?

39 Would you expect the second electron gain enthalpy of O as positive, more negative or less negative than the first? Justify your answer.

40 The first ionization enthalpy values (n kJ/mole) of group 13 elements :

B	Al	Ga	In	Tl
801	577	579	558	589

How would you explain this deviation?

41 Explain why chlorine has higher electron affinity than fluorine.

42 Write the general outer electronic configuration of s, p, d, f block elements.

43 Give reason for following :

a) Halogens act as good oxidizing agents.

b) A cation is always smaller than its parent atom.

c) Na and  $Mg^+$  have same number of electrons but removal of electron from  $Mg^+$  requires more energy.

**Long Questions(5 marks)**

44 Predict the formulae of the stable binary compounds that would be formed by the combination of the following pairs of elements.

a) Lithium and Oxygen

b) Magnesium and Nitrogen

c) Aluminum and Iodine

d) Silicon and Oxygen

e) Phosphorus and Fluorine

f) Element 71 and Fluorine

45 The first ( $\Delta_i H_1$ ) and the second ( $\Delta_i H_2$ ) ionization enthalpies (in  $\text{kJ mol}^{-1}$ ) and the ( $\Delta_{eg} H$ ) electron gain enthalpy (in  $\text{kJ mol}^{-1}$ ) of a few elements are given below:

Elements	IE	IE <sub>2</sub>	$\Delta_{eg} H$
I	520	7300	-60
II	419	3051	-48
III	1681	3374	-328
IV	1008	1846	-295
V	2372	5251	+ 48
VI	738	1451	-40

Which of the above element is likely to be :

(i) the least reactive element.

(ii) the most reactive metal.

(iii) the most reactive non-metal.

(iv) the least reactive non-metal.