

**O. P. JINDAL SCHOOL, SAVITRI NAGAR**  
**Half Yearly Examination(2018 – 2019)**

**Class: XI(Sci)**  
**Subject: Chemistry**

**MM: 70**  
**Time: 3 Hours**

Fifteen minutes extra for reading of the question paper.

General Instructions:

- i. All questions are compulsory.
- ii. Question numbers 1 to 5 are very short answer type questions, carrying one mark each.
- iii. Question numbers 6 to 12 are short answer type questions, carrying two marks each.
- iv. Question numbers 13 to 24 are also short answer type questions, carrying three marks each.
- v. Question numbers 25 to 27 are long answer type questions, carrying five marks each.
- vi. There is no overall choice. However, an internal choice has been provided in some questions.
- vii. Use of calculators is not permitted. However, you may use log tables, if necessary.

1. Why falling liquid drops are spherical?

2. Calculate the number of moles of carbon atoms in 3 moles of ethane.

3. Using the s, p, d notations, describe the orbital with following quantum numbers:

- (i)  $n=3, l=2$       (ii)  $n=4, l=1$

4. Which of the following are iso-electronic species : Na, Ne,  $Mg^{2+}$ ,  $F$ ,  $Al^{3+}$ ,  $O^{2-}$ ,  $Na^+$  ?

5. Why is NaCl a bad conductor of electricity in the solid state ?

6. Write the electronic configuration of following elements :

- (i) Chromium      (ii) Calcium

7. A solution was prepared by dissolving 10 g of salt in 180 g of water. Calculate the concentration of the solution in terms of mass by mass percentage.

8. Show the formation of ionic bonds in  $MgCl_2$ .

9. What would be the IUPAC name and symbol of the following elements with atomic numbers (i) 120 (ii) 109

10. List all values of  $l$  and  $m_l$  for  $n=2$ .

11. How many moles of methane are required to produce 22 g of  $CO_2(g)$  after combustion ?

12. On a ship sailing in a Pacific ocean where temperature is  $23.4^\circ C$ , a balloon is filled with 2L air. What will be the volume of the balloon when the ship reaches Indian ocean, where temperature is  $26.1^\circ C$  ?

OR

A vessel of 120 mL capacity contains certain amount of gas at  $35^{\circ}\text{C}$  and 1.2 bar pressure .  
The gas is transferred to another vessel of volume 180 mL at  $35^{\circ}\text{C}$ . What would be its pressure ?

13. Calculate the wave number for the shortest wavelength transition in the Balmer series of atomic hydrogen.

OR

A photon of wavelength  $4 \times 10^{-7}$  m strikes on a metal surface , the work function of the metal being 2.13 eV. Calculate :

(i) the energy of the photon in eV      (ii) the kinetic energy of the emission

14. What is hybridization? Explain  $sp^2$  hybridization undergone by carbon in ethene molecule.

15.(i) Calculate the number of electrons , protons and neutrons present in  $\text{NH}_4^+$  ion.

(ii) How are frequency and wave number related to each other ?

16. How would you explain the fact that the first ionization enthalpy of sodium is lower than that of magnesium but second ionization enthalpy is higher than that of magnesium ?

17. Wet cold weather is more penetrating than dry cold weather . Explain , why?

18. Explain by giving reasons, which of the following sets of quantum numbers are not possible:

(i)  $n=0, l=0, m_l=0, m_s=+1/2$

(ii)  $n=1, l=0, m_l=0, m_s=-1/2$

(iii)  $n=1, l=1, m_l=0, m_s=+1/2$

(iv)  $n=2, l=1, m_l=0, m_s=-1/2$

(v)  $n=3, l=3, m_l=-3, m_s=+1/2$

(vi)  $n=3, l=2, m_l=-1, m_s=-1/2$

19. A 60 watt bulb emits electromagnetic light of wave length 300 nm . Calculate the number of photons emitted per second by the bulb.

OR

Yellow light emitted from a sodium lamp has a wavelength of 600 nm. Calculate the frequency and wave- number of this light.

20. Draw the Lewis structure of nitrite ion and calculate the formal charge on each atom.

21. A compound contains 4.07% hydrogen, 24.27% carbon and 71.65% chlorine . Its molecular mass is 98.96. What are its empirical formula and molecular formula?

22.(i) What subshells are possible in  $n=3$  energy level?

(ii) How many orbitals of all kinds are possible in this ( $n=3$ ) energy level?

23. Consider the following species:  $N^{3-}$ ,  $O^{2-}$ ,  $Al^{3+}$ ,  $F^-$ ,  $Mg^{2+}$ ,  $Na^+$

(i) What is common in them?

(ii) Arrange them in the order of increasing ionic radii.

24.(i) Out of  $\sigma$  and  $\pi$  bonds, which one is stronger and why?

(ii) How many  $\sigma$  and  $\pi$  bonds are present in benzene?

25.(i) Calculate the root mean square speed of methane molecules at  $27^\circ C$ .

(ii) Calculate the density of ammonia ( $NH_3$ ) at  $25^\circ C$  and 10 bar pressure

OR

(i) A neon-dioxygen mixture contains 70.6 g of di-oxygen and 167.5 g of neon. If pressure of the mixture of the gases in the cylinder is 25 bar, what is the partial pressure of dioxygen and neon in the mixture?

(ii) Derive ideal gas equation.

26.(i) On the basis of VSEPR theory, explain the shapes of the following molecules:

(a)  $H_2O$                       (b)  $ClF_3$                       (c)  $NH_3$

(ii)  $XeF_2$  molecule is a linear molecule but it is  $sp^3d$  hybridized. Why?

OR

(i) On the basis of Molecular Orbital Theory, compare the relative stability of the following species and indicate their magnetic properties (diamagnetic or paramagnetic):

$O_2^-$ ,  $O_2^{\cdot -}$ ,  $O_2^+$ ,  $O_2^{2-}$

(ii) Alcohols are highly soluble in water. Why?

27.(i) Define law of multiple proportion and explain by giving one example.

(ii) 2.82g of glucose (molar mass=180) are dissolved in 180 g of water. Calculate the concentration of the solution in terms of molality.

OR

(i) A solution of oxalic acid,  $(COOH)_2 \cdot 2H_2O$  is prepared by dissolving 0.63g of the acid in 300 mL of the solution. Calculate the (a) molarity and (b) normality of the solution.

(ii) Define law of Definite proportions and explain by giving one example.

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22/9/12

(XI-CHE-03)