

HALF YEARLY EXAMINATION

Mock Test-1

CHEMISTRY

CLASS – XI

**SET - B**

**Time: 3 hrs**

**Total No. of Questions: 30**

**Maximum Marks: 70**

**Name: .....**

**Roll No: .....**

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**GENERAL INSTRUCTIONS**

1. All questions are compulsory
  2. There is no overall choice.
  3. Q. No. 1 to 8 are One Mark Questions; Q. 9 to 18 are Two Mark Questions; Q. 19 to 27 are Three Mark Questions; Q. 28 to 30 are Five Mark Questions.
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**SECTION – A**

1. Write Schrödinger equation and mention all the notations.
2. How are 0.5 m of NaOH different from 0.5 M of NaOH?
3. Write the electronic configuration of O<sub>2</sub>.
4. What is the basic difference between electron gain enthalpy and electro negativity?
5. Under what condition of temperature and pressure do real gases tend to show ideal gas behavior?
6. For an isolated system  $\Delta U = 0$ , then what will be the  $\Delta S$ ?
7. Calculate the wavelength from the Balmer formula when  $n = 3$ .
8. Write down Vander wall equation for one mole of real gas?

**SECTION – B**

9. Arrange the following:
  - (i) CaH<sub>2</sub>, BeH<sub>2</sub> and TiH<sub>2</sub> in order of increasing electrical conductance?
  - (ii) H-H, C-C and F-F in order of increasing bond dissociation enthalpy.
  - (iii) NaH, MgH<sub>2</sub> and H<sub>2</sub>O in order of increasing reducing property?
10. Give the lewis representation of:
  - (i) Nitric acid
  - (ii) Ammonia
  - (iii) Ozone molecule
11. Account for the following:
  - (i) KO<sub>2</sub> is paramagnetic.
  - (ii) LiI is more soluble than KI in ethanol.

12. Predict in which of the following entropy decreases / increases:  
 (i) A liquid crystallizes into a solid. (ii)  $\text{H}_2(\text{g}) \rightarrow 2\text{H}(\text{g})$
13. What is the concentration of sugar ( $\text{C}_{12}\text{H}_{22}\text{O}_{11}$ ) in  $\text{mol L}^{-1}$  if 20g of it is dissolved in enough water to make final volume up to 2L?
14. Calculate the mass of a photon with wavelength  $3.6\text{\AA}$ . [ $h = 6.626 \times 10^{-34} \text{ Js}$ ].
15. Arrange the following compounds in order of increasing ionic character in the molecules:  
 $\text{LiF}$ ,  $\text{K}_2\text{O}$ ,  $\text{N}_2$ ,  $\text{SO}_2$ , and  $\text{ClF}_3$ .
16. Would you expect the second electron gain enthalpy of O as positive, more -ve or less -ve than the first. Justify your answer.
17. What is meant by 'Polar Covalent Bond'? Give suitable example.

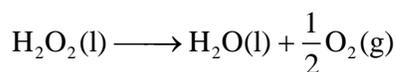
**OR**

Different sigma [ $\sigma$ ] and pi [ $\pi$ ] bond.

18. State Hess's law of constant Heat Summation by giving an example.

### SECTION – C

19. Hydrogen peroxide ( $\text{H}_2\text{O}_2$ ) decomposes according to the equation:



Given that  $\Delta H^\circ = -98.2 \text{ kJ}$  and  $\Delta S^\circ = +70.1 \text{ JK}^{-1}$

- (a) Is this reaction spontaneous at  $25^\circ\text{C}$ ?
- (b) Calculate the value of K for this reaction at  $25^\circ\text{C}$  from given data.
20. (a) State Heisenberg's Uncertainty principle.
- (b) Using s, p, d, f notations, describe the orbital with following quantum numbers:
- (i)  $n = 2, l = 1$
- (ii)  $n = 4, l = 0$
- (iii)  $n = 5, l = 3$
- (iv)  $n = 3, l = 2$
21. Predict the formula of the binary compound formed by the combination of the following pairs of elements:
- (i) Magnesium and nitrogen.
- (ii) Phosphorous and fluorine
- (iii) Aluminum and iodine.
22. Define hybridization. State the hybridization and the shape of  $\text{PCl}_5$  and  $\text{BeF}_2$ .
23. The Balmer series of spectral lines for hydrogen appear in the visible region. What is the lower energy level that these electronic transitions start from, and what transitions correspond to the spectral lines at 379.0 nm and 430.0 nm, respectively?
24. (a) Which type of intermolecular forces exist between KI and  $\text{I}_2$ .
- (b) What will be the pressure of the gaseous mixture when 0.5 L of  $\text{H}_2$  at 0.8 bar and 2.0 L of  $\text{O}_2$  at 0.7 bar are introduced in a 1L vessel at  $27^\circ\text{C}$ ?
25. Calculate the enthalpy change for the process:  
 $\text{CCl}_4(\text{g}) \rightarrow \text{C}(\text{g}) + 4\text{Cl}(\text{g})$   
 And Calculate bond Enthalpy of C-Cl in  $\text{CCl}_4(\text{g})$

$$\Delta_{\text{vap}} H_{(\text{CCl}_4)}^\circ = 30.5 \text{ KJ / mol}$$

$$\Delta_{\text{f}} H_{(\text{CCl}_4)}^\circ = -135 \text{ KJ / mol}$$

$$\Delta_{\text{a}} H_{(\text{c})}^\circ = 715.0 \text{ KJ / mol}$$

$$\Delta_{\text{a}} H_{(\text{Cl}_2)}^\circ = 242 \text{ KJ / mol.}$$

26. Account for the following:

(a) Noble gases are chemically unreactive.

(b) Both  $\text{H}_2\text{O}$  and  $\text{CH}_4$  have tetrahedral geometry but the bond angle in  $\text{H}_2\text{O}$  is  $104.5^\circ$  and that in  $\text{CH}_4$  is  $109.5^\circ$ .

(c) Low ionization enthalpy and high electron gain enthalpy favour ionic bond formation.

27. Arrange the elements B, Al, C, Si and F in:

(a) Increasing order of atomic size.

(b) Increasing order of first ionization enthalpy.

(c) Increasing order of non-metallic character.

### SECTION – D

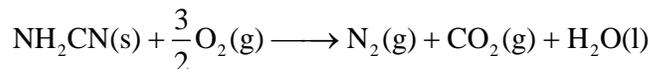
28. Butyric acid contains only C, H and O. A 4.24 mg sample of butyric acid is completely burned. It gives 8.45 mg of  $\text{CO}_2$  and 3.46 mg of  $\text{H}_2\text{O}$ . The molecular mass of butyric acid was determined by experiment to be 88 u. What is molecular formula?

**OR**

Arrange the given dicarbon species in increasing order of their bond lengths giving reasons:



29. (a) The reaction of cyanamide,  $\text{NH}_2\text{CN}(\text{s})$ , with dioxygen was carried out in a bomb calorimeter, and  $\Delta U$  was found to be  $-742.7 \text{ kJ mol}^{-1}$  at 298 K. Calculate the enthalpy change for the reaction at 298 K.



(b) Calculate the number of kilojoules of heat necessary to raise the temperature of 60.0 g of aluminium from  $35^\circ\text{C}$  to  $55^\circ\text{C}$ . Molar heat capacity of Al is  $24 \text{ J mol}^{-1} \text{ K}^{-1}$ .

**OR**

Calculate the lattice enthalpy of  $\text{CaCl}_2$ , given that the enthalpy of

(a) sublimation of Ca is  $121 \text{ kJ mol}^{-1}$ ,

(b) dissociation of  $\text{Cl}_2$  to Cl is  $242.8 \text{ kJ mol}^{-1}$ ,

(c) ionization of Ca to  $\text{Ca}^{2+}$  is  $2422 \text{ kJ mol}^{-1}$ ,

(d) electron gain enthalpy for Cl to  $\text{Cl}^-$  is  $-355 \text{ kJ mol}^{-1}$  and

(e) formation of  $\text{CaCl}_2$  is  $-795 \text{ kJ mol}^{-1}$ .

30. A mixture of  $\text{FeO}$  and  $\text{Fe}_3\text{O}_4$  when heated in air to a constant weight gains 5% in its mass. Find the composition of the initial mixture.

**OR**

(a) A mixture of dihydrogen and dioxygen at 1 bar pressure contains 20% by weight of dihydrogen. Calculate the partial pressure of dihydrogen.

(b) Pay load is defined as the difference between the mass of displaced air and the mass of the balloon. Calculate the pay load when a balloon of radius 10 m, mass 100 kg is filled with helium at 1.66 bar at 27°C. (Density of air =  $1.2 \text{ kg m}^{-3}$  and  $R = 0.083 \text{ bar dm}^3 \text{ K}^{-1} \text{ mol}^{-1}$ .)