

Time: 1.30 h

Marks: 40

1. Answer the following questions:

[3 x 1 = 3]

a. At constant temperature the product of pressure and volume of a given amount of a gas is constant this is —

(a) Gay-Lussac law (b) Charles' law (c) Boyle's law (d) None of these

b. The kinetic theory of gases predicts that total kinetic energy of gas depends on——

(a) pressure of the gas (b) temperature of the gas (c) volume of the gas (d) pressure, temperature and volume of the gas

c. Which of the following has strongest +R effect.

(a) -OR (b) -OH (c) -NH₂ (d) -CHO

2. What is electronegativity? Define Pauling electronegativity?

[2]

3. Calculate the effective nuclear charge of the following

[1]

i) 3d electron of Cr ii) 3s electron of Mg

4. Define the following (any two)

[2X2=4]

i) Ionic radius ii) Covalent radius iii) Mulliken Electronegativity iv) Electron affinity

5. Explain hydrogen bonding.

[1]

6. Answer any **two** of the following:

[2x3=6]

a. Draw MOT for O₂ giving its bond order and magnetic property

b. Give the hybridization, shape, geometry of the following

i. XeO₄ ii. NH₄⁺

c. Explain polarizing power and polarizability using Fajan's rule.

7. Answer any three of the following question?

[2x2=4]

a. What is resonance? Why methylamine is stronger base than aniline?

b. Define homolytic and heterolytic cleavage with examples.

c. Explain why dipole moment of CCl₄ is less than that of CHCl₃.

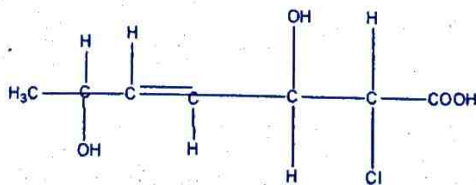
d. What do you mean by hyperconjugative effect? Draw the orbital diagram of hyperconjugation in propene.

e. Write down the differences between inductive and electrometric effect.

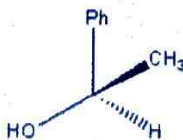
8. Answer any three

[2x3=6]

a. i. How many chiral carbons are present in the given molecule?



ii. Specify the following stereoisomers as R and S



b. Explain why racemic tartaric acid can be resolved but not meso- tartaric acid. Give the chemical method of resolution.

- c. How will you determine the configuration of geometrical isomer?
- d. What is alternating axis of symmetry? Explain with example.

9. Answer the following.

- a. Define vapour pressure, surface tension and co-efficient of viscosity of a liquid. [3]
- b. Describe one method for determination of coefficient viscosity of a liquid' [2]

Or,

Describe one method for determination of surface tension of a liquid.

- c. What is surface active agent? Explain cleansing action of detergents. [1+1=2]

10. Explain: a) Collision frequency b) Mean-free path c) Law of Equipartition of energy d) coefficient of viscosity [1 x 4 = 4]

11. Derive the kinetic gas equation [2]