

M.Sc. Sem IV  
Paper 1(Theoretical organic chemistry-II)  
Sample Questions

Q 1) The \_\_\_\_ describes a linear free energy relationship relating reactions rates and equilibrium constants.

- a. Hammett equation
- b. Dimroth's ET parameter
- c. Swain-Scott equation
- d. Taft model

Q 2) If the value of reaction constant ( $\rho$ )  $> 1$  then,

- a. The reaction builds positive charge
- b. The reaction is more sensitive to substituents and negative charge is built during reaction
- c. The reaction is less sensitive to substituents and negative charge is built during the reaction
- d. No sensitivity to substituents and no charge is built

Q 3) \_\_\_\_ represent susceptibility of reaction series to electronic effect

- a. Reaction constant( $\sigma$ )
- b. Equilibrium constant (k)
- c. Substituent constant ( $\rho$ )
- d. Rate constant (R)

Q 4) Yukawa-Tsuno equation applicable for enhanced resonance effect in the \_\_\_\_.

- a. Electrophilic reactions of o- and p-substituted organic compounds
- b. Electrophilic reactions of p- and m-substituted organic compounds
- c. Nucleophilic reactions of o- and m-substituted compounds
- d. Nucleophilic reactions of p- and m-substituted compounds

Q 5) The nature of an enzyme is

- (a) Lipid
- (b) Vitamin
- (c) Carbohydrate
- (d) Protein

Q 6) Nucleophilicities of protic solvents are measured by the \_\_\_\_\_.

- a. Taft model
- b. Okamoto-Brown equation
- c. Grunwald-Winstein equation
- d. Hammett equation

Q 7) A -----is a mechanically interlocked molecular architecture consisting of a "dumbbell shaped molecule" which is threaded through a "macrocycle".

- a) Cryptands
- b) catenanes
- c) cyclodextrins
- d) rotaxane

Q 8) Cyclodextrins (CDs) are a family of cyclic oligosaccharides with a -----outer surface and a -----central cavity.

- a) hydrophilic, lipophilic
- b) hydrophobic, lipophilic
- c) lipophobic, lipophilic
- d) hydrophilic, hydrophobic

Q 9) The most common form of free energy relationships are \_\_\_\_\_.

- a. Linear free energy relationship
- b. Gibbs free energy relationship
- c. Electron free energy relationship
- d. Quadratic free energy relationship

Q 10)  $\alpha$ -haloketone rule applies when there is an axial halogen next to the keto group of -----  
--- moiety carbonyl.

- a) Cyclohexane
- b) cyclohexanone
- c) cyclopentanone
- d) cyclodecanone

Q 11) A measure of the ionizing power of a solvent, based on \_\_\_\_\_.

- a. Maximum wave number of the longest wavelength
- b. Minimum wave number of the longest wavelength
- c. Minimum wave number of the shortest wavelength
- d. Maximum wave number of the shortest wavelength

Q 12) Which one of the following statements is true for hydrogen bonding?

- a) The position of H-atoms is normally determined by X-ray diffraction.
- b) Sulfonamides can be considered isosteres for peptides due to a similar ability to form H-bonds.
- c) The strength of an H-bond depends on the acidity and basicity of donor and acceptor, respectively.
- d) Nitro groups (NO<sub>2</sub>) are good H-bond acceptors.

Q 13) Solvation of H-bonding tends to reduce \_\_\_\_\_.

- a. Electrophilicity
- b. Solvent polarity
- c. Rate of reaction
- d. Nucleophilicity

Q 14) Which one of the following statements is true for container molecules?

- a) H-bonded capsules accelerate the rate, for example of Diels-Alder reactions, through inclusion of the starting materials inside the capsule.
- b) The complexation in H-bonded capsules is generally entropy-controlled.
- c) A packing coefficient of 55% (ratio between the guest's van der Waals volume and the interior volume of the capsule) is optimal for complexation involving H-bonding and ion pairing.
- d) Carcerand formation is always accompanied by solvent inclusion.

Q 15) ) Cyclodextrins are a family of cyclic oligosaccharides, consisting of a macrocyclic ring of glucose subunits joined by -----

- a)  $\alpha$ -1,3 glycosidic bonds
- b)  $\beta$ - 1,4 glycosidic bonds.
- c)  $\beta$ -1,6 glycosidic bond
- d)  $\alpha$ -1,4 glycosidic bonds.

Q 16) The basic Hammett equation is

a.  $\log \frac{k}{k_0} = \rho \cdot \sigma$

b.  $\log \frac{k}{k_0} = \delta \cdot \rho$

c.  $\log \frac{k}{k_0} = \delta \cdot \sigma_A$

d.  $\log \frac{k}{k_0} = \rho \cdot \sigma_A$

Q 17) Reaction constant value is high in \_\_\_\_\_

- a. 40% ethanol
- b. Acetic acid
- c. Water
- d. Absolute methanol

Q 18) -----are a family of synthetic bicyclic and polycyclic multidentate ligands for a variety of cations.

- a) catenanes.
- b) Crown ethers
- c) Cryptands
- d) cyclodextrins

Q 19) When alkali metal ions are complexed with the cyclic ether 18-crown-6, the most stable complex is formed with:

- a) Li<sup>+</sup>
- b) Na<sup>+</sup>
- c) K<sup>+</sup>
- d) Rb<sup>+</sup>

Q 20) Cryptands are three-dimensional analogues of -----.

- a) cyclodextrins
- b) catenanes
- c) crown ether
- d) micelles

Q 21) ..-----are cyclic chemical compounds that consist of a ring containing several ether groups.

- a) catenanes
- b) cryptands,
- c) Crown ethers
- d) cyclodextrins

Q 22) Cyclodextrins are produced from -----by enzymatic conversion.

- a)Protein
- b) starch
- c)lignin
- d)Carbohydrate

Q 23) ----- are a family of cyclic oligosaccharides, consisting of a macrocyclic ring of glucose subunits joined by  $\alpha$ -1,4 glycosidic bonds.

- a) catenanes
- b) Cyclodextrins
- c) micelles
- d) cryptands

Q 24) The resulting complexes from cryptands are -----

- a)Hydrophilic
- b) lipophilic
- c)Hydrophobic
- d) lipophobic

Q 25) -----are three-dimensional analogues of crown ethers.

- a) cyclodextrins
- b) catenanes
- c) micelles
- d)Cryptands