

Avinashilingam Institute for Home Science and Higher Education for Women  
(Deemed to be University), Coimbatore-641 043

Master's Degree Examination – November 2018  
I Semester

Class : I PG  
Major : Chemistry

Time : 3 hours  
Max. Marks: 60

17MCHC01 Organic Chemistry-I

Part-A  
Choose the correct answer

(10 x 1/2 = 5)

- Phenol is acidic due to
  - Inductive effect
  - Resonance effect
  - Electromeric effect
  - Hyperconjugation
- The weakest bond is
  - covalent
  - $\sigma$
  - $\pi$
  - H-bond
- The necessary condition for a molecule to be optically active is the presence of
  - chirality
  - asymmetric carbon
  - chiral carbon
  - chiral axis
- The number of conformations possible for cyclohexane is
  - 1
  - 2
  - 3
  - infinity
- The electron deficient species is
  - carbocation
  - free radical
  - carbene
  - all the above
- Which of the following is most stable?
  - $\text{CH}_3^-$
  - $\text{C}_6\text{H}_5\text{CH}_2^-$
  - $\text{O}_2\text{NCH}_2^-$
  - $\text{CH}_3\text{CH}_2^-$
- Which of the following would undergo  $\text{SN}^1$  reaction at a faster rate?
  - $\text{C}_6\text{H}_5\text{CH}_2\text{Cl}$
  - $\text{CH}_3\text{Cl}$
  - $(\text{CH}_3)_2\text{CHCl}$
  - $\text{CH}_3\text{CH}_2\text{Cl}$
- Which of the following substrates can show more reactivity in  $\text{SN}^2$  reaction?
  - $\text{CH}_3\text{Cl}$
  - $\text{CH}_3\text{I}$
  - $\text{CH}_3\text{Br}$
  - $\text{CH}_3\text{F}$
- Which of the following is most stable?
  - $\text{Ph}_2\text{CH}^\bullet$
  - $\text{PhCH}_2^\bullet$
  - $(\text{CH}_3)_3\text{C}^\bullet$
  - $\text{CH}_3^\bullet$
- The reaction which is used to obtain bromobenzene from aniline is
  - Hunsdiecker
  - Sandmeyer
  - Mannich
  - Elbs

**Part B**

**5 X 4=20**

**Answer ALL questions**

**Answer should not exceed 200 words or one page**

- 11.a. Predict whether the following compounds would be aromatic or non-aromatic. Justify your prediction.
- |                                |                                  |
|--------------------------------|----------------------------------|
| (i) [10]-annulene              | (ii) cycloheptatriene            |
| (iii) cyclobutadienyl dication | (iv) cyclopentadieny anion [4x1] |
- (or)
- 11.b. Bring out the importance of calixaranes.
- 12.a. What are enantiotopic and diastereotopic ligands? Explain them with an example (each).
- (or)
- 12.b. Explain atropisomerism with examples.
- 13.a. What are kinetically and thermodynamically controlled reactions? Explain them using energy profile diagram.
- (or)
- 13.b. Explain primary kinetic isotope effect with an example.
- 14.a. What is NGP? Discuss its mechanism and stereochemistry.
- (or)
- b. Explain the mechanism and stereochemistry of  $S_N^2$  reaction.
- 15.a. Explain the mechanism and reactivity of free radicals in alkenes.
- (or)
- b. Discuss the mechanism of Hunsdiecker reaction.

**Part C**

**(5 x 7=35)**

**Answer ALL questions**

**Answer should not exceed 600 words or three pages**

- 16.a. Account for the following observations: [2+2+3]
- |  |  |
|--|--|
| (i) aniline is less basic than ammonia   | (ii) toluene exhibits hyperconjugation |
| (iii) The $^1H$ NMR spectrum of [10]-annulene shows two signals at $\delta$ 8.9 & -1.8 ppm with an intensity ratio of 2:1. |  |
- (or)
- b. (i) Glucose and urea are highly soluble in water where as benzene is insoluble. Explain.
- (ii) Describe catenanes and rotaxanes. [3+4]
- 17.a. State and explain axial halo ketone rule. Give its applications.
- (or)
- b. What is asymmetric synthesis? Explain any two methods.
- 18.a. Discuss generation, detection and reactions of free radicals.
- (or)
- b. Give an account on hard and soft acids and bases.
- 19.a. (i) What is PTC? Discuss the mechanism and applications. [5+2]
- (ii) Define the term regioselectivity. Explain it with an example.
- (or)
- b. (i) Describe  $S_NAr$  mechanism and give evidences in favour of it. [5+2]
- (ii) What are ambident nucleophiles? Give any two examples.
- 20.a. Describe the mechanism of Mannich and Sandmeyer reactions. [4+3]
- (or)
- b. Outline the mechanism of (i) Bischler-Napieralski reaction (ii) Darzen condensation. [4+3]