

2017 Mid Term Exam
(Organic Chem/Fine Chemicals)

1. Classify the following compounds according to the same oxidation state. (10 pts)
1) ethylene 2) glycolic acid 3) acetamide 4) acetonitrile 5) acetic acid
6) 1,1,1-trichloroethane 7) acetaldehyde 8) ethylene imine

2. Ethylene can be produced from Ethane & Butane. (10 pts)
1) Which process is better for high yield of Ethylene? Explain by drawing mechanisms.
2) What are the byproducts?

3. Acetic acid can be produced either from Ethylene or Butane. (15 pts)
1) Explain briefly about the two processes. Which one is more economic?
2) What are the chemistries and mechanisms of the two?

4. Explain about two processes for Styrene from Ethylene and BTX fraction. (10 pts)

5. About the following chemical conversion: (15 pts)
 $\text{CH}_3\text{CHO} \rightarrow \rightarrow \rightarrow \text{n-Butanol}$
1) What are the structures of intermediates which can be obtained from acetaldehyde?
2) Suggest a possible mechanism for the conversions.
3) What is the name of the key reaction?

6. Ethylene glycol can be produced from ethylene directly without using ethylene oxide. How?
(10 pts)

7. Draw possible conversion mechanism from heptane to toluene in Catalytic Reforming Process. (10 pts)

8. What are the mechanisms of producing branches in production of LDPE? (10 pts)

9. Explain about the difference between the Catalytic Cracking and Thermal Cracking in refinery process (10 pts)

Final Exam : Organic Chem/Fine Chemicals

2017. 6. 13

1. Draw the structures of the following compounds (15 pts)
 - (1) Freon 12
 - (2) Dioxine (TCDD)
 - (3) MDI
 - (4) PCB
 - (5) Diels-Alder product of cycloheptadiene (show correct stereochemistry)
 - (6) Agrochemical manufactured from methyl isocyanate (MIC) and 1-naphtol.
 - (7) What will happen if water is added to MIC? Explain with chemical equation.
2. What are the approx. pKa values of the following compounds? Arrange in the order of increasing pKa values. (15 pts)
 - a) H₂ (), b) ethanol (), c) acetone (), d) diethyl malonate (),
 - e) ethyl acetoacetate (), f) ammonium chloride ()

Ans: < < < < < <
3. Reactions needed for controlling CO/H₂ ratio from synthesis gas. (5 pts)
4. Draw manufacturing processes of the following chemicals from benzene.
 - (1) ε-Caprolactam
 - (2) TDI(20 pts)
 - (3) What do you expect will be the problems of those processes? (10 pts)
5. Draw all the possible structures of C₄ stream, and suggest a process for their separation. (13 pts)
6. Propose the cheapest way to produce the following compounds from methane. (12 pts)
 - (1) DMF,
 - (2) Acetic acid,
 - (3) Methylamine
7. Explain about two economic HMDA production processes when propylene, butadiene, Cl₂, NaCN, HCN, NaOH, H₂, H₂SO₄, NH₃ is available. (10 pts)
8. What are the most important issues in recent organic industry? Examples? How to solve the problems (10 bonus pts)