

National Exams

04-BS-12, Organic Chemistry

December 2011

3 hours duration

Notes

1. If doubt exists as to the interpretation of any question, the candidate is urged to submit with the answer paper, a clear statement of any assumptions made.
2. This is a CLOSED BOOK EXAM.
A Casio or Sharp approved calculator is permitted.
3. Candidates may use any non-programmable calculator, ex. a Casio or Sharp model
4. ANSWER ALL FIVE PROBLEMS
5. Each problem is of equal value
6. Note that the questions (a), (b), (c), (d), (e), (f) or (g) of each problem can be treated independently

Problem No. 1 (20 points)

a) Write the balanced equation of the mono-chlorination reaction of ethane.

(10 points)

b) Organic compounds may be represented in several ways. For the line structure shown here:



(i) Draw the structural formula

(5 points)

(ii) Draw also its condensed formula

(5 points)

Problem No2. (20 points total)

a) Give the names of the following alkyl groups:

(i) $-\text{CH}_3$

(5 points)

(ii) $-\text{CH}_2\text{CH}_3$

(5 points)

(iii) $-\text{CH}_2\text{CH}_2\text{CH}_2-\text{CH}_3$

(5 points)

- b) Provide a concise definition of an isomer (also called structural or constitutional isomer).

(5 points)

Problem No3. (20 points total)

- a) Write a balanced equation for the complete combustion of cyclobutane (ie, reaction with oxygen)

(10 points)

- b) Determine whether each of the following molecules can exist as **CIS -TRANS** isomers:

(i) 3-ethyl-3-hexene

(5 points)

(ii) 3-methyl-2-pentene

(5 points)

Problem No4. (20 points total)

- a) Write the balanced equation for the complete hydrogenation of the following alkyne:

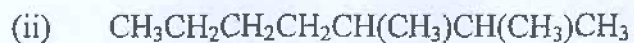


(10 points)

- b) Classify each of the carbon atoms in the following structures as either primary, secondary or tertiary:

(i) $\text{CH}_3\text{CH}_2\text{C}(\text{CH}_3)_2\text{CH}_2\text{CH}_3$

(5 points)



(5 points)

Problem N0. 5 (20 points total)

a) Draw all the constitutional isomers having the molecular formula C_6H_{14}

(10 points)

b) Explain in a concise manner the major differences between organic and inorganic compounds

(10 points)