NATIONAL OPEN UNIVERSITY OF NIGERIA
, Plot 91, Cadastral Zone, Nnamdi Azikiwe Expressway Jabi, Abuja
FACULTY OF SCIENCE

OCTOBER/ NOVEMBER, 2016 EXAMINATION

COURSE CODE: CHM 408

COURSE TITLE: POLYMER CHEMISTRY

COURSE UNIT: 2 Units

TIME: 2 hours

INSTRUCTION: ***Answer question 1 and any other three questions***

Question 1 *9 ½ marks)*

a) Discuss briefly the significance of the following steps in addition polymerization;
(i) initiation
(ii) propagation
(iii) termination.
b)
Elucidate the effects of each of the following polymer solubility:
i) polarity ii) cross linking iii) molecular weight iv) branching
(2 marks each = **8 marks**)

Question 2

a) Itemize and describe any five simple identification tests for polymer. (***12 ½ marks)***
b) Define the following basic thermodynamic parameters: Enthalpy, Entropy and Gibbs' free energy. ***4 ½ marks***
c) Give a formula that connects these parameters together. (***½ mark)***

Question 3

a) i) Distinguish between a good solvent and a poor solvent. (**2 marks**)
ii) List any five polymers and their dissolution solvents. **(5 marks)**
b) Describe the relevance of chromatography in the polymer industry (6 marks)
c) Identify three physical properties (in each case) of polymer that can be discovered by the following analytical techniques:
i) infrared/FTIR ii) thermomechanical analysis iii X-ray **(4 ½ marks)**

Question 4

a) List and explain six properties of thermoplastics that distinguish them from thermosetting

bpolymers **(7 Marks)**

b) With the aid of relevant equations describe the mechanism of condensation polymerization. **(10 ½ Marks)**

Question 5

a) Discuss in detail each of the following types of isomerism:

i) Orientational isomerism. **(3 $\frac{1}{2}$ marks)**

ii) Geometrical isomerism. **(3 $\frac{1}{2}$ marks)**

iii) Structural isomerism. **(3 $\frac{1}{2}$ marks)**

b) Differentiate between tactic and atactic polymers. **(7 marks)**

Question 6

a) Discuss in detail the mechanical properties of polymers. **(5 marks)**

b) Enumerate five agents of degradation and likely susceptible polymers. **(7 $\frac{1}{2}$ marks)**

c).i. Explain with illustrations the meaning of polymer degradation.

ii. List the different types of polymer degradation you know. **(2 ½ Marks each; 5 marks)**