NATIONAL OPEN UNIVERSITY OF NIGERIA
UNIVERSITY VILLAGE, PLOT 91 CADASTRAL ZONE, NNAMDI AZIKIWE EXPRESS WAY,
JABI - ABUJA.
FACULTY OF SCIENCES
DEPARTMENT OF CHEMISTRY
2025_2 EXAMINATIONS

COURSE CODE: **CHM 408**
COURSE TITLE: **POLYMERCHEMISTRY**
COURSE UNIT: **2**
TIME: **2HOURS**
INSTRUCTION: ***Answer question one and any other two questions.***
Question 1 score 30marks with the other two scoring 20marks each

Question 1

a. Discuss Addition polymerization? (6mark)
b. Discuss the following terms used in describing the response of material to stress –strain

i. Ultimate elongation(3marks)
ii. Tensile strength(3marks)

c. Discuss Hydrolytic degradation? (6mark)
d. Explain structural isomerism? (6mark)
e. Discuss the following;
Nuclear Magnetic Resonance Spectroscopy (NMR)(3mark)
X-ray Diffraction (XRD)(3mark)

Question 2

a. Discuss Geometrical isomerism(4mark)
b. With the aid of a table, Show the condensed formula and a physical property for the below polymers(6mark)

i. Cis-Polychloroprene
ii. Poly(methyl methacrylate)
iii. Poly(vinylacetate)
iv. Polyacrylonitrile

c. Give four polymers that are gotten from anionic polymerization(2mark).

d. For solution process, show the defined expressions for free energy, enthalpy and entropy of mixing(3mark)
e. Explain how the below affect the mechanical strength of a polymer? (5marks)
i. Effects of Additives
ii. Effect of Blending and Copolymerization

Question 3

a. From the first and second law of thermodynamics derive the pressure-volume expansion and work relationship. (6mark)

b Brief discuss catonic polymerization stating the stages of reaction(6mark)

c. For solution process, show the defined expressions for free energy, enthalpy and entropy of mixing (3mark)

d. Discuss the below types copolymerization

i. Random copolymers(2.5mark)

ii. Alternating copolymers(2.5mark)

Question 4

a. What is dynamic mechanical thermal analysis (4marks)

b. Discuss how the below properties affect solubility of polymers.

i. Crystallinity (strong hydrogen bonding) (2.5mark)

ii. Polarity or non-polarity (2.5mark)

c. Discuss five benefits of polyurethane(8mark)

d. Discuss the use of IR spectroscopy to identify polymers; (3mark)

Question 5

a. Give a brief information about polymer phase equilibrium(7mark)

b. In a tabular form, show three applications of any two thermosetting polymers(5mark)

c. Discuss the following complex Instrumental Technique used to identify polymers

Glass Liquid Chromatography (GLC) (4mark)

Gel Permeation Chromatography (GPC): (4mark)