



NATIONAL OPEN UNIVERSITY OF NIGERIA
UNIVERSITY VILLAGE, PLOT 91 CADASTRAL ZONE, NNAMDI AZIKIWE EXPRESS WAY,
JABI - ABUJA.

FACULTY OF SCIENCES
DEPARTMENT OF CHEMISTRY
2024 1 EXAMINATION

COURSE CODE: CHM 302
COURSE TITLE: POLYMER CHEMISTRY
COURSE UNIT: 2
TIME: 2 HOURS
INSTRUCTION: *Answer question one and any other two questions.*
Question 1 score 30marks with the other two scoring 20marks each

QUESTION ONE

- 1a. Give details of the established methods of producing polyethylene using Philips process(4mark)
- ai. How are reactive molecules first formed? (2mark)
- aii. State one importance of polymer degradation? (2mark)
- bi. Fill the table below. (5mark)

Abbreviation	Polymer	Recycling number
PP		
HDPE		
PETE/PET		
PS		
FAOP		
	(0.5mark)	(0.5mark)

- bii. What do you understand by the degree of crystallinity of a polymer? (3mark)
- c. With an example or illustration, write on the term "living polymer"? (5mark)

- cii. How is the relationship between the partial pressure of a gas and its solubility in a solvent expressed? (3mark)
- d. What is thermogravimetry? (2mark)
- e. How does solubility of a solute typically varies with temperature? (2mark)
- f. Based on enthalpy and entropy relationship; how does fibers differ from Elastomers? (2mark)

QUESTION TWO

- ai. What are the main determinants of what polymer can be used for. (4mark)
- aii. Name three strong forces crystallizable thermoplastics have? (1.5mark)
- aiii. What is the process known as when a radical reacts with a monomer? (1.5mark)
- b. Discuss Syndiotactic polymerization(5mark)
- ci. What is Flory-Huggins solution theory(4mark)
- cii. What is the difference between High-density polyethylene (HDPE) and Low-density polyethylene (LDPE)? (4mark)

QUESTION THREE

- ai. In radical addition chain growth polymerization, termination stage may be initiated through what four means? (5mark)
- aii. What forces are the polar carbonyl and cyano groups responsible for in polyesters and polyacrylonitriles? (1mark)
- bi. Differentiate between incongruent dissolutions, congruent and complex solubility equilibrium. (5mark)
- bii. What are the two basic patterns of polymerizations? (1mark)
- c. Give an illustration of practical beneficial application of polymer degradation(4mark)
- ci. How does the presence of electron withdrawing groups affect the formation of the reactive anion? (4mark)

QUESTION FOUR

- ai. Exhaustively discuss the term "Rate of Dissolution" (5mark)
- aii. What may result from reduced crystallinity in polymers? (1mark)
- b. Critically discuss the implications of polymer crosslinking stating five implications(5mark)
- bii. Show the five patterns of additional polymerization(2.5mark)
- ci. Why is additional polymer called Chain growth polymer(2mark)
- cii. Which polyethylene production process is preferred and why(4.5mark)

QUESTION FIVE

- ai. Name three methods of the amount of solute in a solution can be determined? (3mark)
- aii. Discuss cholesteric liquid crystal. (5mark)
- aiii. How does the degree of crystallinity affect the properties of a polymer? (2mark)
- b. Discuss the following;
- i. Bifunctional polymer (2.5mark)
 - ii. Cross link polymer (2.5mark)
- c. Discuss the term "Solubility"(5mark)

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