



NATIONAL OPEN UNIVERSITY OF NIGERIA
UNIVERSITY VILLAGE, PLOT 91 CADASTRAL ZONE, NNAMDI AZIKIWE EXPRESS WAY,
JABI - ABUJA.
FACULTY OF SCIENCES
DEPARTMENT OF CHEMISTRY
2024_2 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

- a. In tabular form, show a monomeric derivative of ethylene; The substituent, monomer, polymer formed and functions (5marks)
- bi. At what temperature does the solubility of a solute in liquid water typically reach its peak? (2mark)
- bii. How do chemical properties affect the polymer? (3mark)
- biii. What makes the enthalpy of fibers to overcome entropy? (2mark)
- ci. Discuss nematic liquid crystal (5mark)
- cii. Discuss the degrading effect of ozone cracking (5mark)
- d. How do Ziegler-Natta catalysts affect the structure of polymers? (3mark)
- e. What organization developed the Resin identification codes? (2mark)
- f. Give a polymer with exception to typical temperature dependence of solubility? (1mark)
- g. What are the advantages of synthetic polymers compared to natural sources? (2mark)

QUESTION TWO

- ai. Discuss the merit and demerit of representing solubility as molarity and it's like (4mark)
- aii. What is the scientific name of the phenomenon whereby polymers soften when heated? (2mark)
- bi. What is partition coefficient? (3mark)
- bii. State the differences between dissolution rate and solubility? (4mark), the mark is too much

- c. Give two roles of the number symbol on plastics(2mark)
- d. Summarize anionic addition chain-growth polymerization(5mark)

QUESTION THREE

- 3a. Discuss the solubility of a substance(3mark)
- aii. What information can TG curves provide? (2mark)
- b. What are specialty chemicals(5mark)
- c. With the aid of a chemical reaction only, show the mechanism of the Ziegler-Natta process for substituted ethylenes (4mark)
- cii. How is balance achieved between enthalpy and entropy in polymers? (3mark)
- d. What is Partition coefficient (Log P)? (3mark)

QUESTION FOUR

- ai. Using ethylene and with a chemical reaction show the change in saturation from monomer to polymer during additional polymerization. (5marks)
- aii. How do microcrystalline polymers differ from amorphous polymers? (3mark)
- bi. Discuss the degrading effect chlorine(5mark)
- bii. What is responsible for the rigidity of thermoset polymers? (2mark)
- ci. What is the common ion effect in solubility? (2mark)
- cii. What is an example of a living polymer? (1mark)
- ciii. How do molecules move through a polymer matrix? (2mark)

QUESTION FIVE

- ai. What is the principal use of Polystyrene (PS)? (1mark)
- aii. Discuss; polymer configuration(3mark)
- bi. Name four special types of branched polymers? (2mark)
- bii. What do additional polymerization mean. (5mark)
- c. Discuss Atactic polymerization(5mark)
- d. What is the process known as when a radical reacts with a monomer? (1.5mark)
- e. How is the degree of crystallinity of a polymer estimated? (1mark)
- f. What catalyst is used in the Phillips process? (1.5mark)