

**NATIONAL OPEN UNIVERSITY OF NIGERIA**

**University Village, Plot 91 Cadastral Zone, Nnamdi Azikiwe Express Way, Jabi - Abuja.**

**FACULTY OF SCIENCES**

**DEPARTMENT OF PURE AND APPLIED SCIENCES**

**JULY 2017 EXAMINATION**

**COURSE CODE: CHM 302**

**COURSE TITLE: POLYMER CHEMISTRY 1**

**TIME: 2 HOURS**

**INSTRUCTION: Question one is compulsory. Answer question one and**

 **any other three questions.**

**QUESTION ONE**

1ai) Differentiate between the following:

1. Polymers
2. Monomers
3. Polymerization (3 marks)

1aii) Expatiate on condensation polymerization. (6 marks)

1bi) Which will you prefer as an industrialist to produce polythene between the following methods? Justify your answer.

1. Process of high pressure [ICI] technique which involve minute amount of oxygen as free radical initiator,1500atm and temperature of 2000C as operating condition.The polymeric chain produced is of low density of 0.92g/cm3 and has methyl branching.
2. Zeigler process which occurs at 50-750C and 2-7atm, TiCl4 and Al(CH3)3 act as catalyst. Polymerization is by ionic mechanism. Product obtained has moderate high density of 0.945cm3, with softening temperature of 120-1280C. (41/2 marks)

1bii) Explain briefly crystallinity in polymers. (5 marks)

ci) What factors determine the rate of dissolution of polymers. . (11/2 marks)

1cii) How does polymer biodegradation and polymer degradation differ? (5 marks)

**QUESTION TWO**

2a) Write short note on the following:

1. Homopolymers
2. Bifunctional
3. Copolymers
4. Terpolymers (101/2 marks)

2b) Give the name of the polymer formed from the monomers below and state their applications.

1. Vinyl acetate
2. Tetrafluoroethylene
3. Vinyl alcohol (41/2 marks)

**QUESTION THREE**

3a)Enumerate on the effect of chain length on the physical properties of polymers.

 (9 marks)

3b) Highlight the main differences between elastomers and fibers. (6 marks)

**QUESTION FOUR**

4a) What is the effect of the following on the solubility of polymers.

1. Temperature
2. Pressure
3. Polarity
4. Surface area (6 marks)

4b) Explain briefly isotactic, syndiotactic and atactic polymer configurations, and state their effect on polymer properties. (9 marks)

**QUESTION FIVE**

5a) Discuss addition polymerization by radical mechanism. (9 marks)

5b) Outline the difference between addition and condensation polymerization. (6 marks)