



The Open University of Sri Lanka

B.Sc Degree/Stand Alone courses in Science – 2006/2007

CHU 3238/CHE 5238 – Polymer Chemistry – Level 5

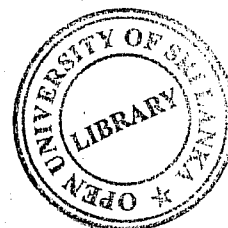
Assignment Test – III

Duration : 1½ Hours

Date : 12th January 2007

Time: 3.30 p.m. – 5.00 p.m.

- Answer all questions.
- Choose the most correct answer to each question and mark this answer with an “X” on the answer script.
- Use a PEN (not a pencil) in answering.
- Any question with more than one answer will NOT be counted.
- 1/6th marks will be deducted for each incorrect answer.
- The use of a non- programmable electronic calculator is permitted.
- Logarithm tables will be provided.



Gas Constant (R)	=	8.314 J mol ⁻¹ K ⁻¹
Avogadro Constant (L)	=	6.023 x 10 ²³ mol ⁻¹
Planks Constant (h)	=	6.63 x 10 ⁻³⁴ Js
Velocity of light (C)	=	3.0 x 10 ⁸ ms ⁻¹
Atmospheric Pressure (π)	=	10 ⁵ Pa (Nm ⁻²)
Faraday constant (F)	=	96,500 C mol ⁻¹
Log _e (X)	=	2.303 log ₁₀ (X)

Part A - MCO

(1). State the correct statements.

Molar mass distribution,

- (a) is similar to Boltzmann's Distribution curve
- (b) gives an indication about the distribution of polymer molecules in a sample
- (c) curve can be experimentally obtained by Gas chromatography

- (1) ab (2) bc (3) abc (4) ac (5) b only

Answer questions 2-8 using the following data

\overline{M}_w and \overline{M}_n (weight and number average) of five polymer samples are,

Sample	(1)	(2)	(3)	(4)	(5)
\overline{M}_w g/mol	8.18×10^6	5.5×10^6	6×10^6	3×10^6	4×10^6
\overline{M}_n g/mol	8.0×10^6	5×10^6	4×10^6	1.5×10^6	2.5×10^6

- (2) Which sample is nearly mono dispersed?
- (3) Which sample has the highest poly dispersity factor?
- (4) Which sample shows narrow molar mass distribution curve?
- (5) Which sample has broader molar mass distribution curve?
- (6) Which sample do you think gives consistent physical properties?
- (7) What is the shortest chain length of the polymer among the above sample if the polymer is a linear polyethylene?
- (1) $56 \times 10^6 \text{ \AA}$ (2) $140 \times 10^6 \text{ \AA}$ (3) $42 \times 10^6 \text{ \AA}$ (4) $21 \times 10^6 \text{ \AA}$ (5) $11 \times 10^6 \text{ \AA}$
- (8) Which sample has the lowest viscosity?
- (9) If the extent of the reaction of an equimolar mixture of diacid and glycol is 0.990, what is the degree of polymerization?
- (1) 10 (2) 100 (3) 1000 (4) 104 (5) none of the above
- (10) Ceiling temperature is useful in
- (1) casting polymer produced
 - (2) the production of dipped products
 - (3) moulding
 - (4) regenerating monomers from polymers
 - (5) none of the above
- (11) A linear poly condensation reaction was terminated after 95% conversion and the number average molar mass was found to be 10000 g/mol
The weight average molar mass in g/mol is,
- (1) 1950 (2) 195 (3) 19500 (4) 195000 (5) 105000 g/mol

(12) Polymer dissolution rate can be increased by

- (a) stirring
- (b) increasing temperature
- (c) increasing surface area
- (d) increasing molar mass

The correct statements are,

- (1) abc (2) abd (3) acd (4) bcd (5) abcd

(13) Polymer solutions behave as non ideal solution because,

- (a) of the size difference between polymer and solvent molecules
- (b) equal accommodation of the two molecules are impossible
- (c) polymer-solvent attractive forces are same

The correct statements are,

- (1) a only (2) b only (3) ab only (4) bc only (5) ac only

(14) Which polymerization techniques results broader molar mass distribution curve

- (1) condensation (2) bulk (3) suspension (4) solution (5) emulsion
polymerisation

(15) Degree of polymerization of polyester can be controlled by,

- (1) mixing stoichiometric ratios of the two monomers
- (2) adding small amount of acetic acid
- (3) adding small amount of alcohol
- (4) cooling
- (5) adding slightly excess amount of one of the monomer

What is the incorrect statement?

(16) In chain polymerization, degree of polymerization depends on,

- (a) concentration of the monomer
- (b) concentration of the initiator
- (c) temperature

The correct statements are,

- (1) abc (2) a only (3) b only (4) ab only (5) ac only

(17) According to steady state assumption,

- (1) Rate of initiation is equal to rate of propagation
- (2) Rate of initiation is equal to rate of termination
- (3) Rate of propagation is equal to rate of termination
- (4) Radicals form at the initiation step should be at the same rate as propagation step
- (5) Radicals form at the propagation step should be destroyed at the termination step

(18) If the number average degree of polymerization is 250, what is the kinetic chain length of the polymer radical if the termination is by disproportionation of free radical polymerization.

- (1) 250 (2) 500 (3) 125 (4) 750 (5) 375

(19) What is the amount of ethylene required to produce the above polymer(in Q 18)

- (1) 3500 (2) 7000 (3) 14000 (4) 21000 (5) 10500

(20) Derivation of rate equation for free radical and ionic polymerization differ only in

- (1) initiation step (2) propagation step
- (3) termination step (4) in all three steps
- (5) initiation and propagation steps