



THE OPEN UNIVERSITY OF SRI LANKA

B.Sc Degree Programme/Stand Alone Course – 2008/2009

POLYMER CHEMISTRY – Level 5 -CHU 3238/CHE 5238
ASSIGNMENT TEST I

M.C.Q. ANSWER SHEET: Mark a cross (X) over the most suitable answer.

Name:

Reg. No.

FOR EXAMINERS USE	
Unanswered	
Correct Answers	
Wrong Answers	
Total	

- | | | |
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| 1. <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 | 2. <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 | 3. <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 |
| 4. <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 | 5. <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 | 6. <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 |
| 7. <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 | 8. <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 | 9. <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 |
| 10. <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 | 11. <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 | 12. <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 |
| 13. <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 | 14. <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 | 15. <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 |
| 16. <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 | 17. <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 | 18. <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 |
| 19. <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 | 20. <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 | |

PART B

(Answer all questions only in the space provided. Attached sheets will not be graded)
(40 marks)

01. a. If the molar mass of polystyrene is 10,400 g/mol, calculate the degree of polymerisation of this polymer.

b. What are the differences between free radical and ionic polymerisation? Discuss.

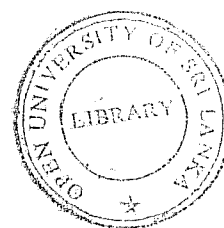
c. What are the components of Ziegler Natta catalyst?

d. What is a graft polymer? Give an example.

02. a. "Depending on the concentration of accelerator and activator relative to sulphur in the vulcanization process, the nature of the product is different". Discuss this statement.

b. What do you mean by oxidative degradation? How do you prevent this?

c. Write a brief account on emulsion polymerisation. What are the advantages and disadvantages of this technique?





ANSWER GUIDE
Polymer Chemistry – Level 5
CHU 3238 / CHU 5238
ASSIGNMENT TEST I (2008/2009)

Part A

01).3	02).5	03).4	04).1
05).5	06).4	07).1	08).3
09).4	10).5	11).1	12).2
13).3	14).4	15).5	16).5
17).5	18).2	19).5	20).4

Part B

01. (a) $\bar{X}_n = \frac{M}{m} = \frac{10,400 \text{ g mol}^{-1}}{104 \text{ g mol}^{-1}}$
 $\bar{X}_n = 100$

(b)

Free Radical	Ionic
<ul style="list-style-type: none"> • Initiation is by an active radical, I^\bullet. • Propagation steps involve the formation of intermediate polymer radicals. • Termination can be by combination. 	<ul style="list-style-type: none"> • By a negative ion, I^- or by a positive ion, I^+. • By intermediate polymer cations or anions. • Not possible.

(c) Catalyst – Halides of group IV – VII elements

Co-catalyst – Organometallic compounds such as alkyl, aryls and hydrides of group I – IV metals.

(d) Polymerization is carried out between a monomer and an existing polymer. The monomers are polymerized and then graft or join to the existing polymer chain.

Example: Natural rubber -- methyl methacrylate

Styrene – butadiene

02. (a) If we use high concentration of accelerator and activator relative to sulphur will favour monosulphide cross link network structure. This product has high degree of cross linking. It is stable to oxidation.

If we use low concentration of accelerator and activator relative to sulphur results low degree of cross linked structure with poor physical properties.

(b) Degradation of polymer by atmosphere O_2 & O_3 can be prevented by using antioxidants.
 Ex: DPPD (diphenyl p-phenylene diamine)

(d) See pages 55 – 56 (CHU 3238 – Unit I)