



THE OPEN UNIVERSITY OF SRI LANKA  
B. Sc. Degree Programme – 2006/2007  
CHU 3238 / CHE 5238 – Polymer Chemistry  
Assignment Test III

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

Reg. No:

	FOR EXAMINERS USE ONLY		
	Answers	No:	Marks
Part A	Correct Answers		
	Incorrect Answers		
	Unmarked		
Part B			
Total			

1. 

1	2	3	4	5
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2. 

1	2	3	4	5
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3. 

1	2	3	4	5
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4. 

1	2	3	4	5
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5. 

1	2	3	4	5
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6. 

1	2	3	4	5
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7. 

1	2	3	4	5
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8. 

1	2	3	4	5
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9. 

1	2	3	4	5
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10. 

1	2	3	4	5
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11. 

1	2	3	4	5
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12. 

1	2	3	4	5
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13. 

1	2	3	4	5
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14. 

1	2	3	4	5
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15. 

1	2	3	4	5
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16. 

1	2	3	4	5
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17. 

1	2	3	4	5
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18. 

1	2	3	4	5
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19. 

1	2	3	4	5
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20. 

1	2	3	4	5
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**Part B - Structured Essay (40 marks)**

**Answer all the questions in the spaces provided. Attached sheets will not be graded.**

(1) Weight fraction of three molecules of a polymer sample containing only four molecules are 0.2, 0.3 and 0.4 and corresponding molar masses are  $1 \times 10^4$ ,  $2 \times 10^4$ ,  $3 \times 10^4$  and  $4 \times 10^4$  g/mol.

i) What is the weight fraction of the 4<sup>th</sup> molecule.

ii) Calculate  $\overline{M}_w$  and  $\overline{M}_n$

iii) What is the polydispersity factor

(2) (i) Write down the assumptions used in the derivation of kinetic chain length of a polymer by free radical polymerization.

(ii) Give reasons for using accelerator and activator in rubber vulcanization

# CHU 3238- Polymer Chemistry

## Answer guide for Assignment Test III

2006/2007

### Part A-MCQ

1. 1	11. 3
2. 1	12. 1
3. 4	13. 3
4. 1	14. 2
5. 4	15. 1
6. 1	16. 5
7. 3	17. 2
8. 4	18. 1
9. 2	19. 2
10. 4	20. 3

### Part B

1.

(i).  $0.2+0.3+0.4+x = 1$   
So,  $x = 0.1$

(ii).

$$\begin{aligned}\overline{M}_w &= M_1w_1 + M_2w_2 + M_3w_3 + M_4w_4 \\ &= 10^4 (1 \times 0.2 + 2 \times 0.3 + 3 \times 0.4 + 4 \times 0.1) \text{ g/mol} \\ &= \underline{\underline{2.4 \times 10^4 \text{ g/mol}}}\end{aligned}$$

$$\overline{M}_n = \frac{1}{\frac{w_1}{M_1} + \frac{w_2}{M_2} + \frac{w_3}{M_3} + \frac{w_4}{M_4}}$$

$$\overline{M}_n = \frac{1}{\frac{0.2}{1 \times 10^4} + \frac{0.3}{2 \times 10^4} + \frac{0.4}{3 \times 10^4} + \frac{0.1}{4 \times 10^4}}$$

$$\overline{M}_n = 1.9 \times 10^4 \text{ gmol}^{-1}$$

(iii) 
$$\frac{\overline{M}_w}{\overline{M}_n} = \frac{2.4}{1.9} = 1.26$$

(2) (i) Refer Unit V Section 27.2 (pages 26 – 28)

(ii) # To form activated complex, which will reduce activation energy. Therefore rate of vulcanization is fast (or time of vulcanization low)

# With the decrease of Activation energy, rate constant K increases, Therefore temperature of vulcanization is reduced.