

## 國立台灣科技大學九十六學年度碩士班招生試題

系所組別： 高分子工程系碩士班乙組

科 目： 高分子科學

共 11 大題，總分 100 分；請於答案卷內依序作答。

1. (10%) Please draw the chemical structures of the following polymers:
  - a. polystyrene
  - b. poly(ethyl methacrylate)
  - c. poly(tetrafluoroethylene) Teflon
  - d. cis-1,4-polyisoprene (natural rubber)
  - e. polyisobutylene
2. (6%) Please compare the differences between chain polymerization and step polymerization in terms of
  - a. monomer concentration during polymerization.
  - b. molecular weight build-up during polymerization
  - c. reactive species in the polymerization system
3. (8%) (a) Please specify one example for atom transfer radical polymerization (ATRP). (b) What is the uniqueness of ATRP?
4. (6%) Please finish the following reactions via ring opening metathesis polymerization (ROMP).



5. (10%) (a) Please derive the copolymer composition equation (by free radical mechanism)

$$\gamma = \frac{1 + r_1([M_1]/[M_2])}{1 + r_2([M_2]/[M_1])}$$

Where

 $r_i$  is the monomer reactivity ratio of monomer  $i$ , $M_i$  is the concentration of monomer  $i$ , $\gamma$  is the ratio of the number of  $M_1$  molecules to the number of  $M_2$  molecules in the copolymer.

- (b) Please explain two extreme cases, in which perfect alternating copolymers and homopolymers are formed.

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6. 請說明結晶化溫度與結晶化速度之間的關係。(10%)
7. 說明影響 Polymer chain 之 Flexibility 的因素。(10%)
8. 解釋名詞：(每項 2%，共 10%)
  - (a) 特性粘度 $[\eta]$
  - (b) MI (Melting index)
  - (c) 介電常數
  - (d) 雙折射率
  - (e) 自由體積
9. 試述 LDPE 與 LLDPE 在製程及其分枝構造的差異 (10%)。
10. 試述射出成型機的構造及其運作原理。(10%)
11. 試述塑化劑在高分子加工程序之角色。(10%)