

國立臺北科技大學 102 學年度碩士班招生考試

系所組別：3711、3712、3713 有機高分子研究所甲組

第一節 有機化學 試題

第一頁，共三頁

注意事項：

1. 本試題共 2 部份，配分共 100 分。
2. 請標明大題、子題編號作答，不必抄題。
3. 全部答案均須在答案卷之答案欄內作答，否則不予計分。

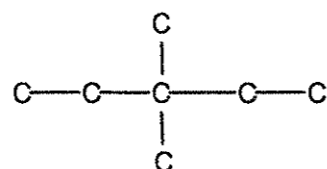
Organic exam

Two Parts: Part A (選擇題 90 points; 3 pt each), Part B (問答題 10 points)

Please write your answer on the answer sheet(s). 答案請寫在答案紙上

Part A (90 points; 3 pt each)

1. How many *different* secondary alcohols can be made from the carbon skeleton shown below?
a. 0 b. 1 c. 2 d. 3 e. 4



2. In the first step of oxidation of alcohols, primary alcohols produce _____, secondary alcohols produce _____, and tertiary alcohols produce _____.
- a. aldehydes; ketones; no reaction
 - b. aldehydes; no reaction; ketones
 - c. ketones; aldehydes; no reaction
 - d. ketones; no reaction; aldehydes
 - e. no reaction; aldehydes; ketones
3. A primary alcohol oxidizes in two stages to produce a(n) _____. This same product can also be obtained by oxidation of a(n) _____.
- a. tertiary alcohol ; secondary alcohol
 - b. aldehyde; secondary alcohol
 - c. carboxylic acid ; aldehyde
 - d. aldehyde; ketone
 - e. carboxylic acid ; ketone
4. The functional group in which the carbon atom at one end of the molecule has a double bond to oxygen and a single bond to hydrogen is the _____ functional group.
- a. secondary alcohol
 - b. primary alcohol
 - c. tertiary alcohol
 - d. aldehyde
 - e. ketone

5. Which of these functional groups contains a carbon atom doubly bonded to an oxygen atom?
a. aldehyde b. ketone c. alcohol d. both a and b e. both b and c
6. How many of these functional groups contain either a carbon atom doubly bonded to an oxygen atom, a hydrogen atom singly bonded to an oxygen atom, or both: alcohol, aldehyde, carboxylic acid, ketone?
a. 0 b. 1 c. 2 d. 3 e. 4
7. Consider three molecules of similar molecular weight, one a hydrocarbon, another a primary alcohol, and the third a carboxylic acid. In *decreasing* order, their boiling points are
a. acid, alcohol, hydrocarbon b. acid, hydrocarbon, alcohol c. alcohol, acid, hydrocarbon
d. hydrocarbon, acid, alcohol e. hydrocarbon, alcohol, acid
8. If a polymer is said to be thermoplastic, this means that it
a. will never become fluid upon heating. b. will become fluid only once upon heating.
c. will not be brittle even at very low temperatures. d. will become fluid repeatedly upon heating.
e. will not decompose at any temperature.
9. A polymer that returns to its original size and shape after being stretched is said to be
a. copolymerized b. elastomeric c. polyesterified d. rubberized e. vulcanized
10. "Polyester" (poly(ethylene terephthalate)) is produced by a(n) _____ reaction between terephthalic acid and _____.
- a. addition; ethylene
 - b. condensation; ethylene glycol
 - c. addition; ethylene diamine
 - d. disproportionation; ethylene glycol
 - e. condensation; ethylene
11. The method used to rearrange straight-chain hydrocarbons into branched or aromatic hydrocarbons which burn better in internal combustion engines is called
a. simple distillation. b. pyrolysis. c. fractional distillation. d. catalytic reforming.
e. catalytic cracking.
12. Reformulated gasolines
a. eliminate pollution caused by lead in other gasoline formulations.
b. contain oxygenated compounds.
c. contain more aromatic compounds than other gasoline formulations.
d. have both properties a and b above.
e. have both properties a and c above.
13. Which of these pollutants are associated with gasoline and its combustion?
a. carbon monoxide b. nitrogen oxides c. ozone d. hydrocarbons
e. all of the above

注意：背面尚有試題

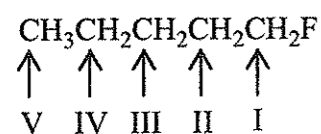
14. Which of the following is a component of natural gas?

- a. benzene b. butane c. butanol d. octane e. propanol

15. The first stage in extracting aromatic hydrocarbons from coal is called

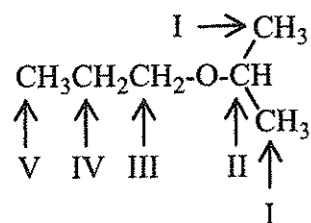
- a. catalytic cracking. b. catalytic reforming. c. combustion. d. fractional distillation.
e. pyrolysis.

16. If all the protons of 1-fluoropentane could be discerned, which would you expect to be at the lowest field in the ^1H NMR spectrum of this compound?



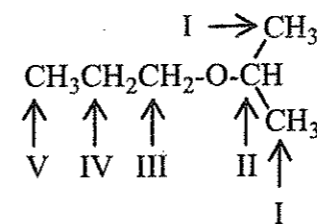
- a. Protons on carbon I
b. Protons on carbon II
c. Protons on carbon III
d. Protons on carbon IV
e. Protons on carbon V

17. Which proton(s) of the compound below would appear as a septet in the ^1H NMR spectrum?



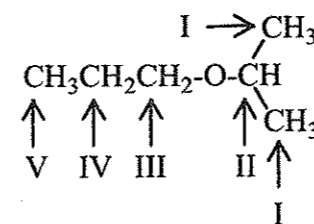
- a. The protons on carbon I
b. The proton on carbon II
c. The protons on carbon III
d. The protons on carbon IV
e. The protons on carbon V

18. Which proton(s) of the compound below would appear as a doublet in the ^1H NMR spectrum?



- a. The protons on carbon I
b. The protons on carbon II
c. The protons on carbon III
d. The protons on carbon IV
e. The protons on carbon V

19. Which proton(s) of the compound below would appear as a triplet in the ^1H NMR spectrum?



- a. The protons on carbon II
b. The protons on carbon I and V
c. The protons on carbon III and V
d. The protons on carbon III and IV
e. The protons on carbon V

20. How many signals would you expect to find in the ^1H NMR spectrum of $\text{CH}_3\text{OCH}_2\text{CH}_2\text{OCH}_3$?

- a. 1
b. 2
c. 3
d. 4
e. 5

21. Which of the following processes remove carbon dioxide from the atmosphere?

- I Combustion II Dissolving in water III Photosynthesis IV Respiration

- a. I and II b. III and IV c. I and IV d. II and III e. all four