

國立臺北科技大學 111 學年度碩士班招生考試

系所組別：3710 分子科學與工程系有機高分子碩士班甲組

第一節 有機化學 試題

第 1 頁 共 1 頁

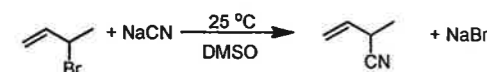
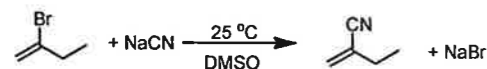
注意事項：

1. 本試題共一大題，共 100 分。
2. 不必抄題，作答時請將試題題號及答案依照順序寫在答案卷上。
3. 全部答案均須在答案卷之答案欄內作答，否則不予計分。

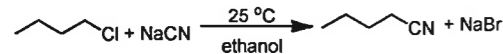
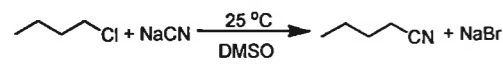
一、簡答題 (共 100 分)

(1) Circle the reaction in each pair that would be faster. (共 25 分，每小題 5 分)

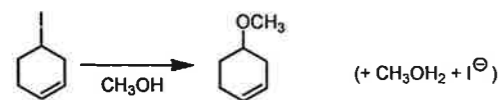
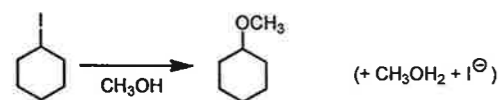
(a)



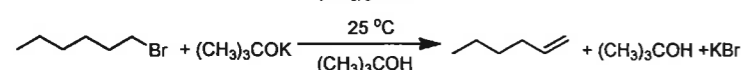
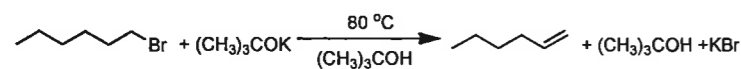
(b)



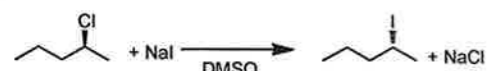
(c)



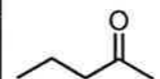
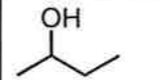
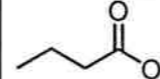
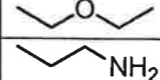
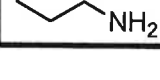
(d)



(e)



(2) What functional group (FG) is present in each of the following molecules? (共 10 分，每小題 2 分)

Structure	FG
	(a)
	(b)
	(c)
	(d)
	(e)

(3) Draw 5 of the 7 constitutional isomers of $\text{C}_4\text{H}_{10}\text{O}$. Be careful not to duplicate structures. (共 10 分)

(4) (共 25 分)

(a) Draw the four π -molecular orbitals of 1,3-butadiene. Show electrons in the orbitals that are filled. Label the HOMO and the LUMO. (10 分)

(b) Do the same for the two π -molecular orbitals of ethene. (10 分)

(c) Would a reaction involving the HOMO of 1,3-butadiene and the LUMO of ethene be symmetry allowed? (Yes/NO) (5 分)

(5) When a mixture containing one mole each of the three dimethylbenzenes (*o*-, *m*-, and *p*-xylene) is treated with one mole of chlorine in the presence of a Lewis acid catalyst, one of the three hydrocarbons is monochlorinated in 100% yield, whereas the other two remain completely unreacted. (共 30 分，每小題 10 分)

(a) Which isomer reacts?

(b) Briefly explain why only that isomer reacts.

(c) Provide a mechanism for the main product of the reaction assuming that AlCl_3 is the Lewis acid catalyst.