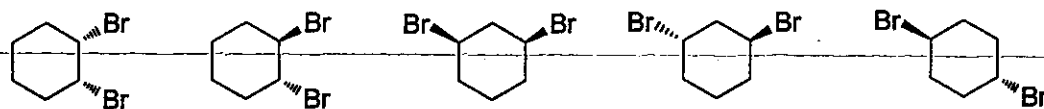


※注意：請於試卷上「選擇題作答區」依序作答。

第一部份：單選題 (3pts each)

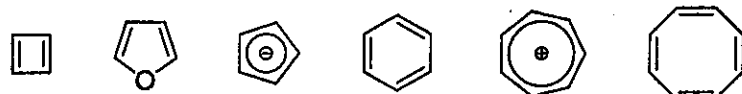
- Which of the following species can serve as a **nucleophile**?  
(a)  $H^+$  (b) MeOH (c)  $BF_3$  (d)  $Ph_3P$  (e)  $Et_3N$   
(A) abcde (B) bcde (C) ade (D) bde (E) bcd
- Which of the following species can serve as a **Lewis acid**?  
(a)  $Et_2O$  (b)  $AlBr_3$  (c)  $BF_3$  (d)  $FeCl_3$  (e)  $Et_3N$   
(A) abcde (B) bcd (C) abc (D) bce (E) ace
- Which of the following nitrogen-containing compound is **most basic**?  
(A) acetamide (B) pyridine (C) triethylamine (D) aniline (E) pyrrole
- How many of the following compound(s) can be **deprotonated** by lithium diisopropylamide (LDA)?  
(a) 1-hexene (b) 1-hexyne (c) cyclohexanone (d) cyclohexanol (e) cyclohexene  
(A) 1 (B) 2 (C) 3 (D) 4 (E) 5

- How many of the following compounds are **chiral**?



- (A) 1 (B) 2 (C) 3 (D) 4 (E) 5

- How many of the following species are **aromatic**?



- (A) 2 (B) 3 (C) 4 (D) 5 (E) 6

- Which of the reagents(s) listed can complete the following reaction?

- (a)  $KMnO_4$ , heat (b) DMSO,  $(COCl)_2$ ,  $-60^\circ C$ , then  $Et_3N$   
(c)  $O_3$ ,  $CH_2Cl_2$ ,  $-78^\circ C$ , then  $Me_2S$  (d) Jones reagent  
(e) PCC,  $CH_2Cl_2$



- (A) abcde (B) abde (C) ade (D) be (E) ad

- Which of the reagent(s) listed can **NOT** generate any alcohol-containing product from the following reaction?

- (a)  $KMnO_4$ , heat (b)  $Br_2$ ,  $H_2O$  (c) aqueous  $H_2SO_4$   
(d)  $BH_3$ , THF, then  $H_2O_2/OH^-$  (e) MCPBA



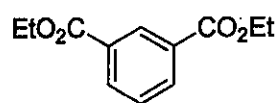
- (A) abcde (B) bcde (C) ae (D) bcd (E) none, all generate alcohol

見背面

題號： 50  
科目：有機化學

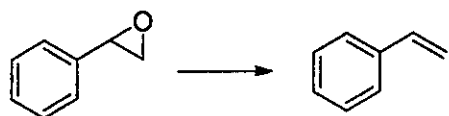
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9. In a typical  $^{13}\text{C}$  NMR spectrum, how many  $^{13}\text{C}$  signals can you observe in the following molecule?



(A) 7 (B) 8 (C) 9 (D) 10 (E) 12

10. Which of the reagent can complete the following transformation?



(A)  $(\text{C}_6\text{H}_5)_3\text{P}$  (B)  $\text{MnO}_2$  (C)  $\text{HBr}$  (D)  $\text{NaOEt}$  (E)  $\text{H}_2\text{O}_2$

11. Which of the following reaction(s) can afford a meso compound as the major product?

- (a) Cyclohexene reacts with MCPBA.  
(b) Cyclohexene reacts with  $\text{Br}_2$ .  
(c) Cyclohexene reacts with  $\text{KMnO}_4$  in a cold basic solution.  
(d) Cyclohexene reacts with  $\text{H}_2$  in the presence of Pd catalyst.  
(e) Cyclohexene reacts with aqueous  $\text{H}_2\text{SO}_4$  solution.

(A) ac (B) abc (C) acd (D) bde (E) abcde

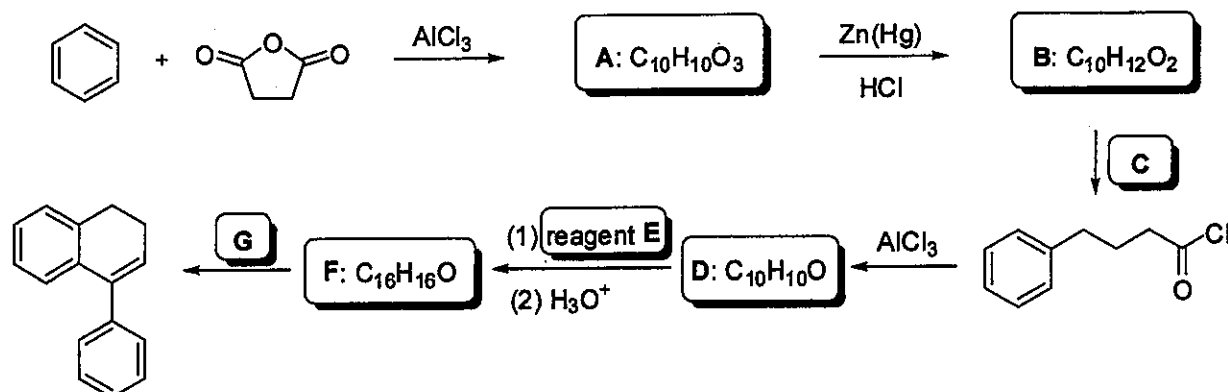
12. In the reaction between sodium cyanide and (R)-2-bromopentane in a certain solvent, which of the following statement is correct? (PS:  $[A]$  = concentration of A)

- (A) The reaction is faster at  $25^\circ\text{C}$  than at  $100^\circ\text{C}$ .  
(B) The reaction is independent of [sodium cyanide].  
(C) The reaction is faster when [(R)-2-bromopentane] is increased.  
(D) The major product also has the R configuration.  
(E) The reaction is faster in MeOH solvent than in DMSO solvent.

※注意：請於試卷上「非選擇題作答區」標明題號並依序作答。

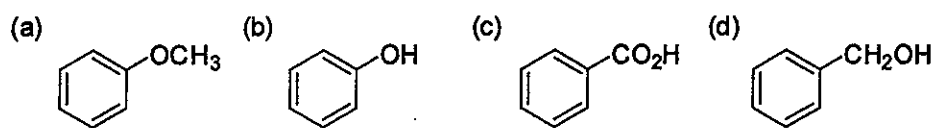
第二部份：問答題

13. Provide the reagent C, E, G and major product A, B, D, F to complete the following synthetic scheme. (3pts each)

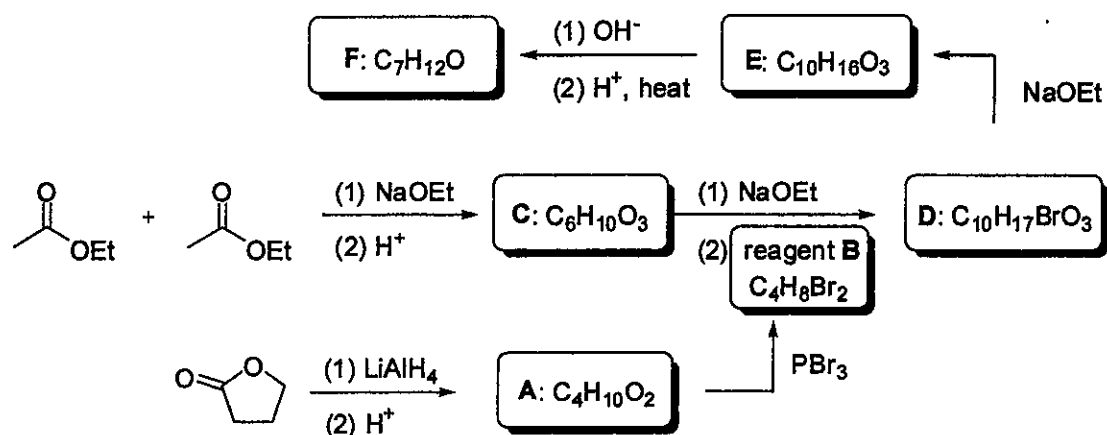


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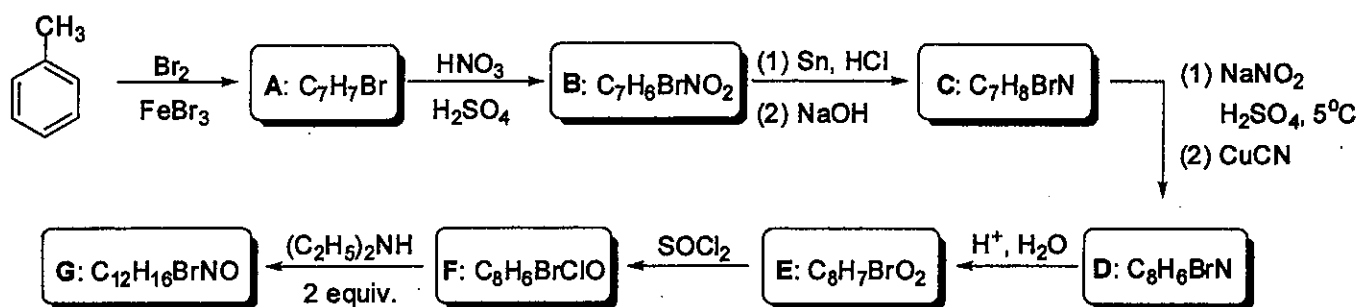
14. Rank the following compounds from the **most acidic** to the **least acidic**. (4pts)



15. Provide the **major** product A to F to complete the following synthetic scheme. (3pts each)



16. Provide the **major** product A to G to complete the following synthetic scheme. (3pts each)



(Hint: The NMR spectrums of compound A are shown here)

$^1\text{H NMR}$  ( $\text{CDCl}_3$ )  $\delta$  (ppm): 7.378 (doublet, 2H), 7.050 (doublet, 2H), 2.311 (singlet, 3H)

$^{13}\text{C NMR}$  ( $\text{CDCl}_3$ )  $\delta$  (ppm): 136.73, 131.22, 130.79, 119.05, 20.88 (five peaks)

試題隨卷繳回