

類 科：化學工程

科 目：有機化學概要

考試時間：1 小時 30 分

座號：_____

※注意：禁止使用電子計算器。

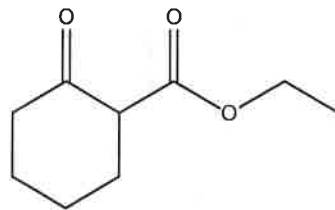
甲、申論題部分：(50 分)

(一)不必抄題，作答時請將試題題號及答案依照順序寫在申論試卷上，於本試題上作答者，不予計分。

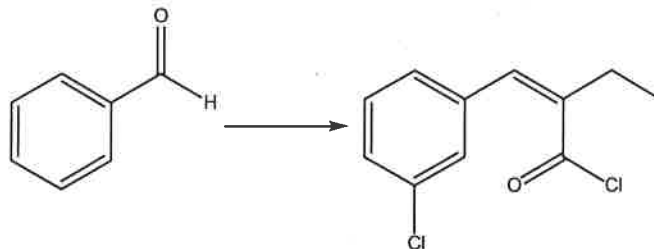
(二)請以藍、黑色鋼筆或原子筆在申論試卷上作答。

(三)本科目得以本國文字或英文作答。

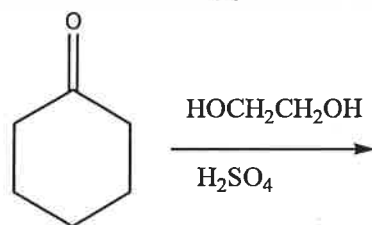
一、請以 cycloheptene 為起始物，設計數個步驟的反應，合成下列最終的產物。請列出反應所需的反應試劑及反應中間體。(10 分)



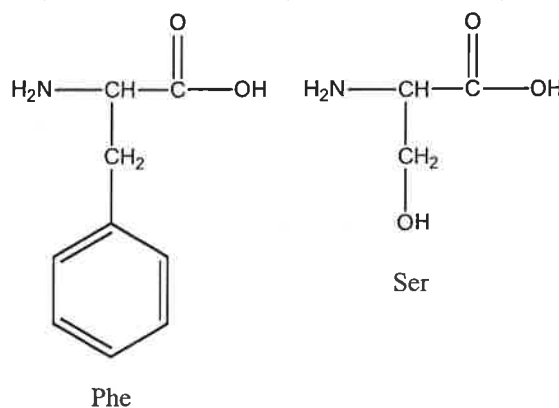
二、請設計下列數個步驟的反應，並列出反應所需的反應試劑及反應中間體。(10 分)



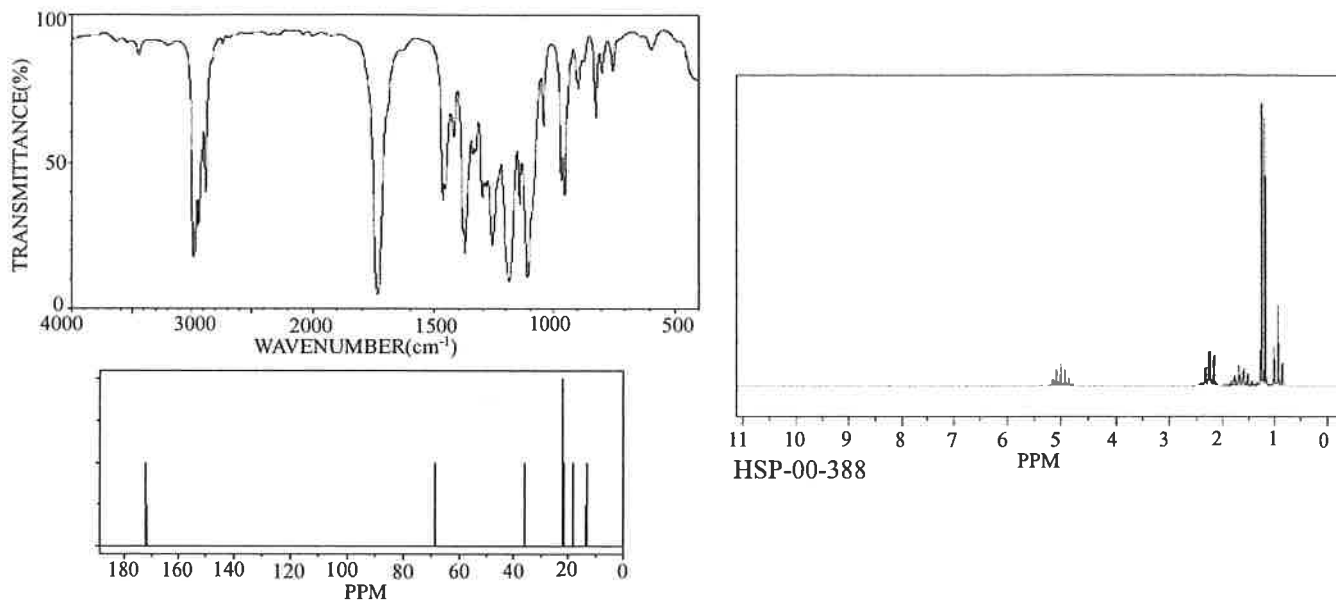
三、請針對下列反應，寫出詳細反應機轉。(10 分)



四、請以 Ser 及 Phe 胺基酸為起始物，設計數個步驟的反應，合成 Ser-Phe 二胜肽 (dipeptide)。請列出反應所需的反應試劑及反應中間體。(10 分)



五、某化合物的分子式為 $C_{11}H_{14}O$ ，其紅外光譜、氫-1 核磁共振光譜 (1H NMR spectrum)、質子去耦合 (proton-decoupled) 碳-13 核磁共振光譜 (^{13}C NMR spectrum) 如下，請根據這些光譜推測此化合物之結構。(10 分)



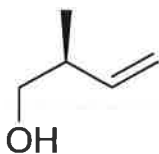
乙、測驗題部分：(50 分)

代號：2456

(一)本測驗試題為單一選擇題，請選出一個正確或最適當的答案，複選作答者，該題不予計分。

(二)共 25 題，每題 2 分，須用 2B 鉛筆在試卡上依題號清楚劃記，於本試題或申論試卷上作答者，不予計分。

1 何者是此化合物正確的 IUPAC 名稱：



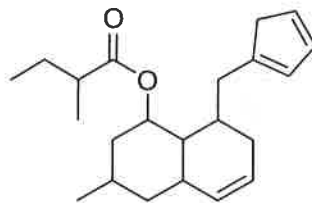
(A)(R)-3-methylbut-1-en-4-ol

(B)(S)-3-methylbut-1-en-4-ol

(C)(R)-2-methylbut-3-en-1-ol

(D)(S)-2-methylbut-3-en-1-ol

2 此化合物有幾個對掌中心 (chiral centers)：



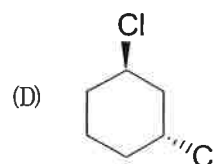
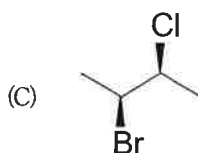
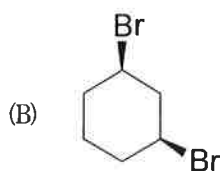
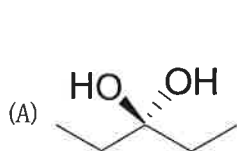
(A)4

(B)5

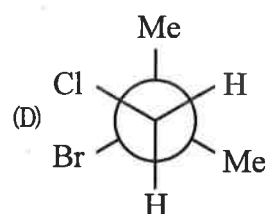
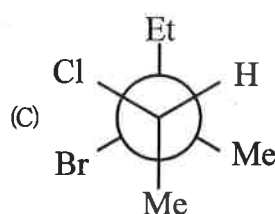
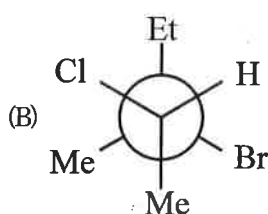
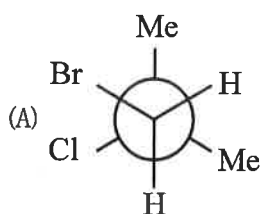
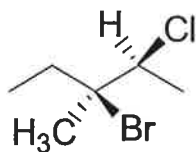
(C)6

(D)7

3 下列分子中那個是內消旋化合物 (meso compound)：



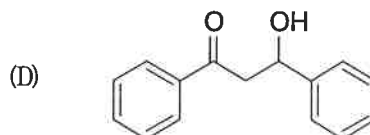
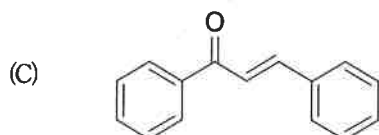
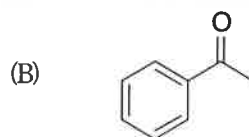
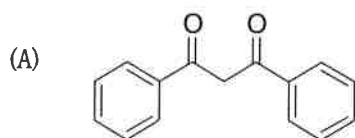
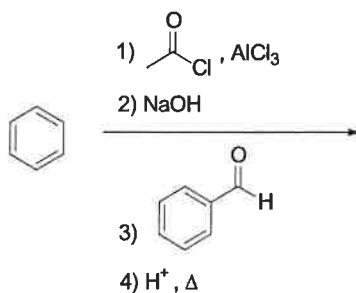
4 何者是此化合物正確的紐曼投影式 (Newman projection) :



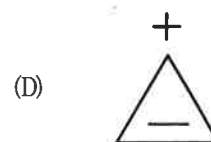
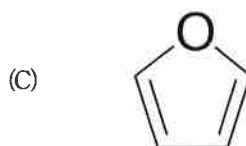
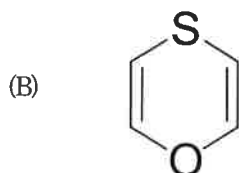
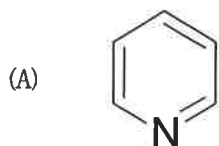
5 下列那個化合物可以被當作路易斯鹼 (Lewis base) :



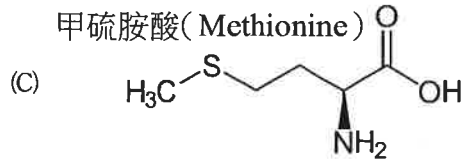
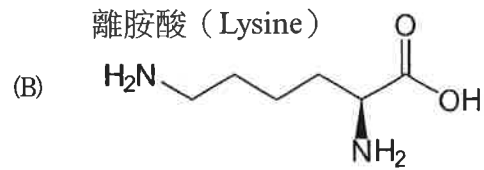
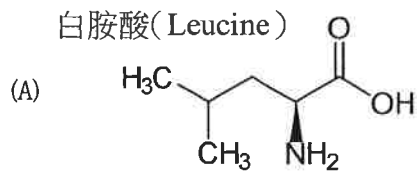
6 預測下列反應，主要產物的結構為：



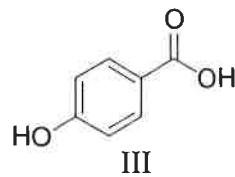
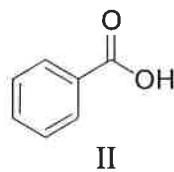
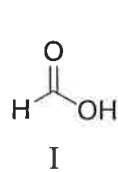
7 下列化合物何者不具芳香性 (Aromatic) :



8 下列胺基酸中，何者屬於鹼性胺基酸 (basic amino acid)：



9 請比較下列化合物的酸性，由強酸至弱酸排序：



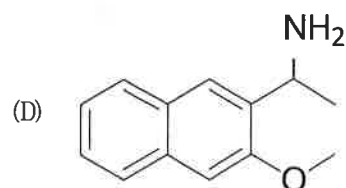
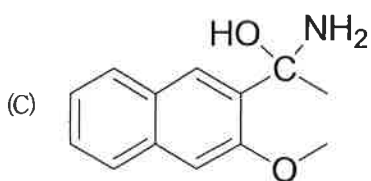
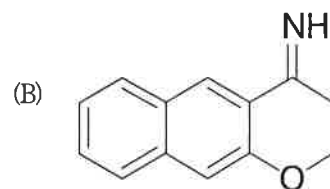
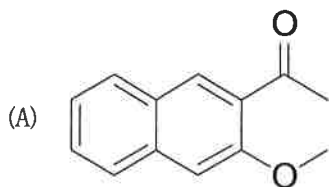
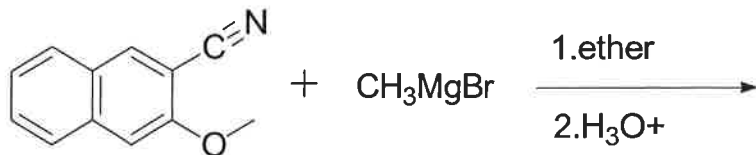
(A) III>II>I

(B) II>I>III

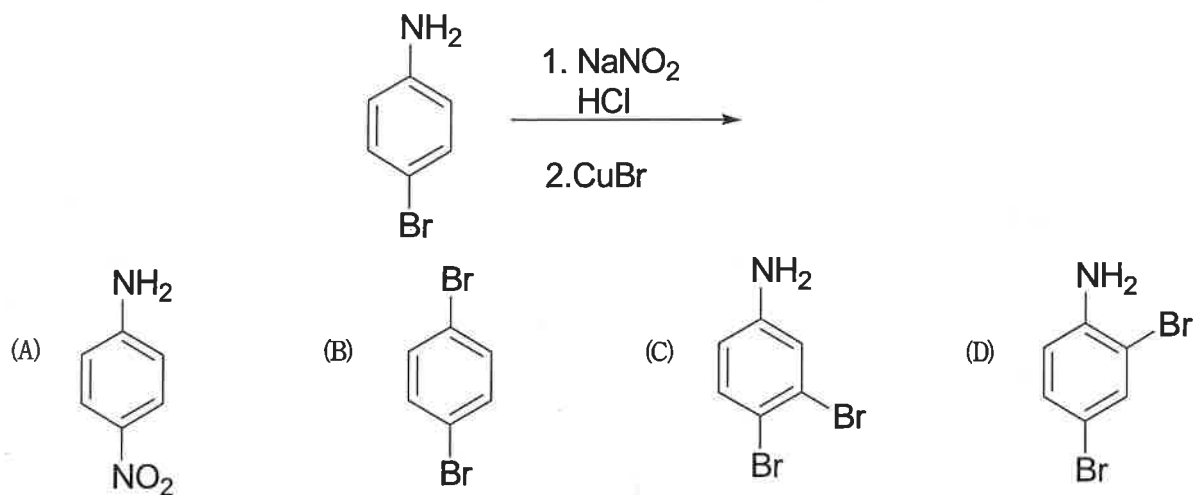
(C) II>III>I

(D) I>II>III

10 預測下列反應，主要產物的結構為：



11 預測下列反應，主要產物的結構為：



12 下列敘述總共有幾個聚合物？「橡膠、耐綸(Nylon)、達克綸(Dacron)、瑞德西韋(Remdesivir)、澱粉、寡糖、阿斯匹靈(Aspirin)」

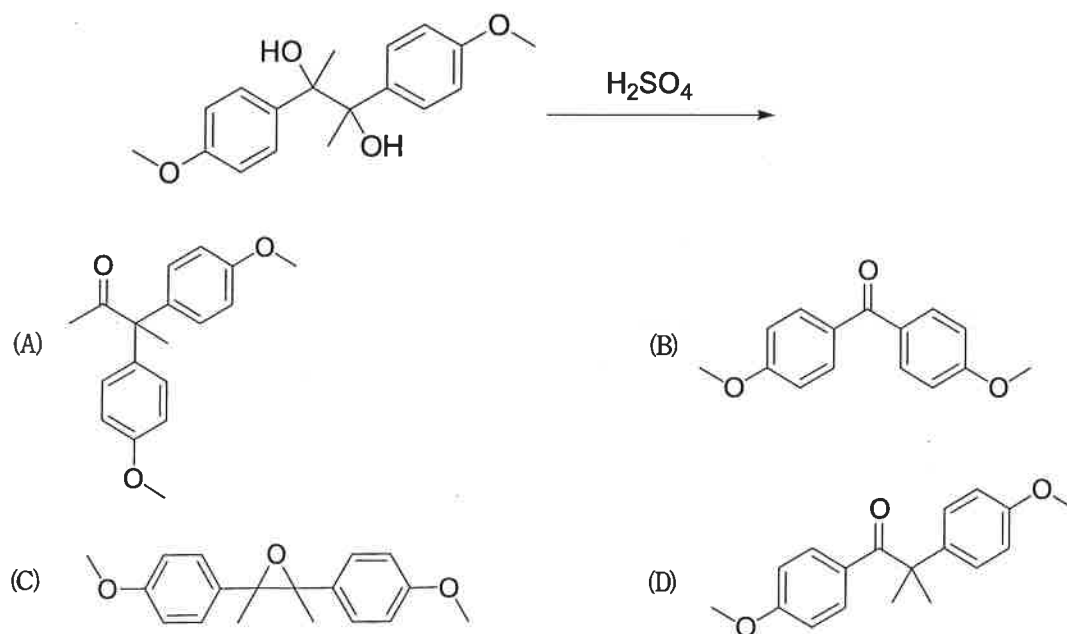
(A)4

(B)5

(C)6

(D)7

13 預測下列反應，主要產物的結構為：

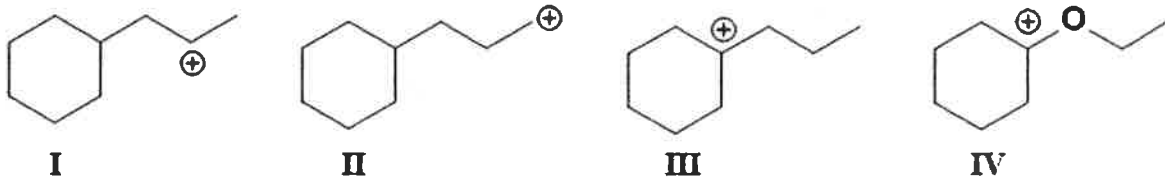


14 預測以下反應是經由那條反應路徑完成：

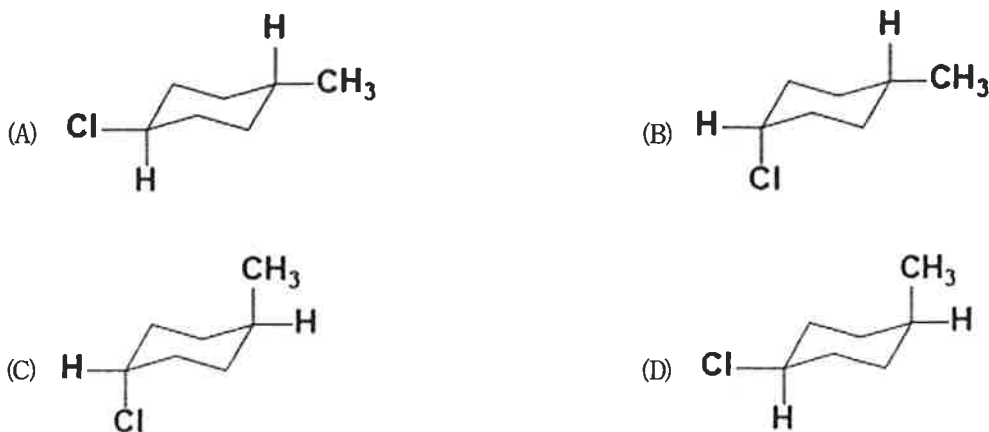


- (A) $\xrightarrow[\text{H}_2\text{SO}_4, -\text{H}_2\text{O}]{\text{HOCH}_2\text{CH}_2\text{OH}}$ $\xrightarrow{\text{LiAlH}_4}$ $\xrightarrow{\text{HCl, H}_2\text{O}}$ $\xrightarrow{\text{PCC}}$
- (B) $\xrightarrow[\text{H}_2\text{SO}_4, -\text{H}_2\text{O}]{\text{HOCH}_2\text{CH}_2\text{OH}}$ $\xrightarrow{\text{PCC}}$ $\xrightarrow{\text{HCl, H}_2\text{O}}$ $\xrightarrow{\text{LiAlH}_4}$
- (C) $\xrightarrow{\text{PCC}}$ $\xrightarrow[\text{H}_2\text{SO}_4, -\text{H}_2\text{O}]{\text{HOCH}_2\text{CH}_2\text{OH}}$ $\xrightarrow{\text{LiAlH}_4}$ $\xrightarrow{\text{HCl, H}_2\text{O}}$
- (D) $\xrightarrow{\text{LiAlH}_4}$ $\xrightarrow[\text{H}_2\text{SO}_4, -\text{H}_2\text{O}]{\text{HOCH}_2\text{CH}_2\text{OH}}$ $\xrightarrow{\text{HCl, H}_2\text{O}}$ $\xrightarrow{\text{PCC}}$

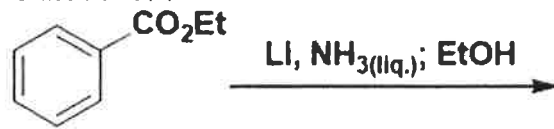
15 下列碳陽離子 (carbocation) 的穩定度大小順序排列為何：

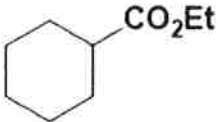
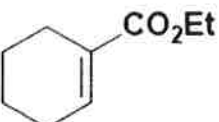
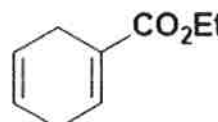
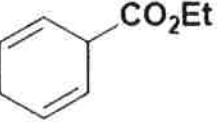


- (A) IV > III > II > I
- (B) III > IV > II > I
- (C) III > IV > I > II
- (D) IV > III > I > II
- 16 請問下列那個化合物具最穩定之構型：



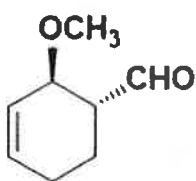
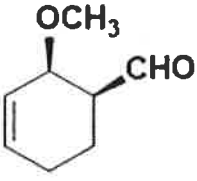
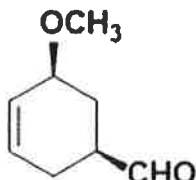
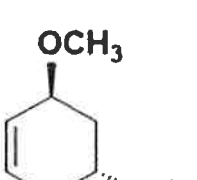
17 請問下列反應的主要產物為何：



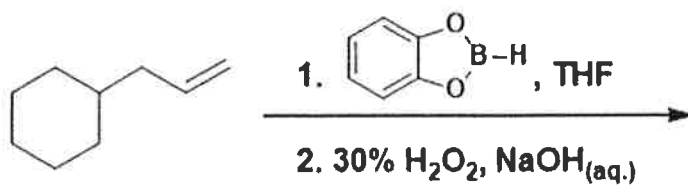
- (A)  (B) 
- (C)  (D) 

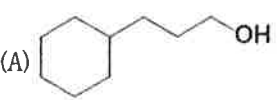
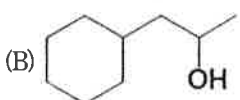
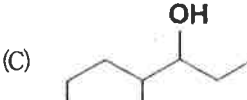
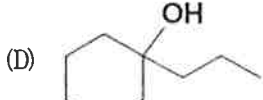
18 下列狄爾士-阿德 (Diels-Alder reaction) 反應的主要產物為何：



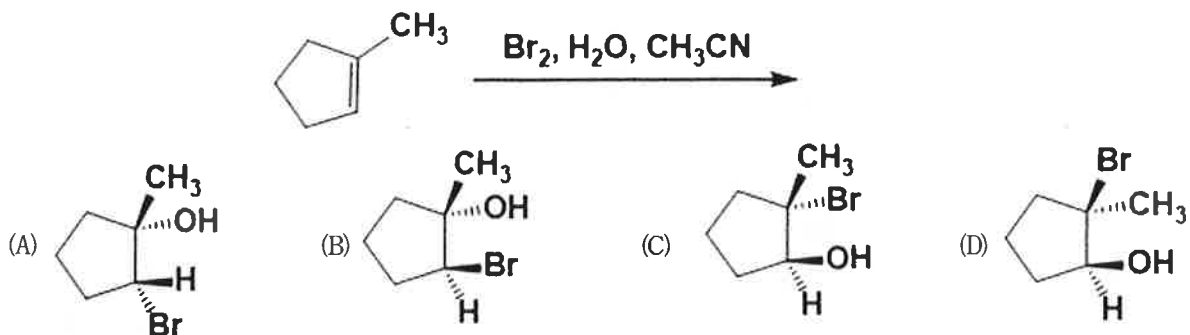
- (A)  (B) 
- (C)  (D) 

19 下列反應的主要產物為何：

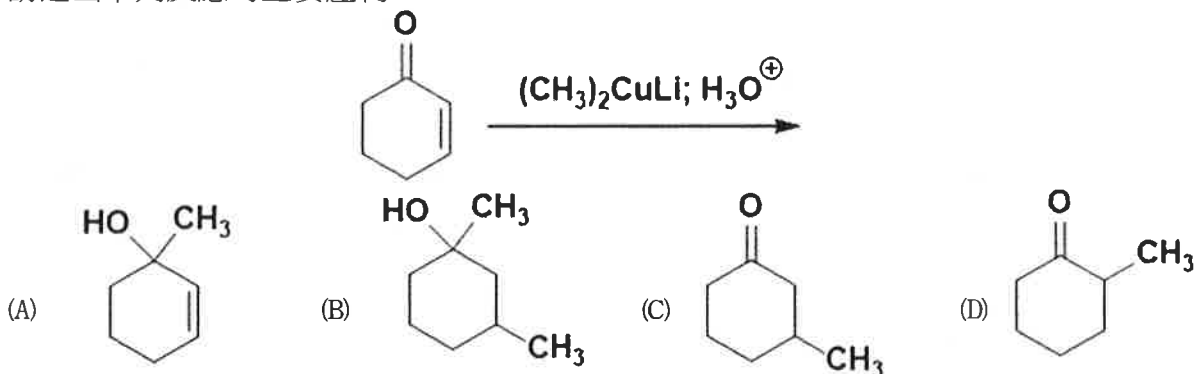


- (A)  (B)  (C)  (D) 

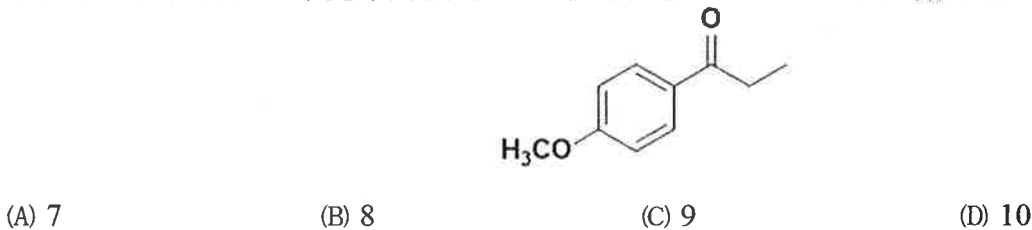
20 請選出下列反應的主要產物：



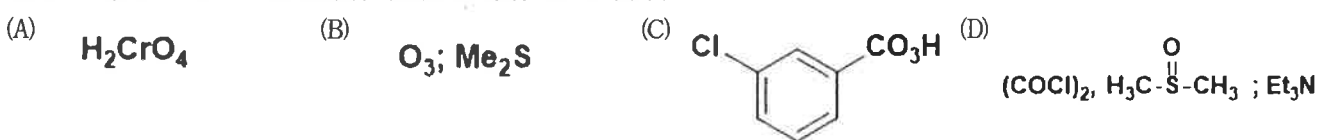
21 請選出下列反應的主要產物：



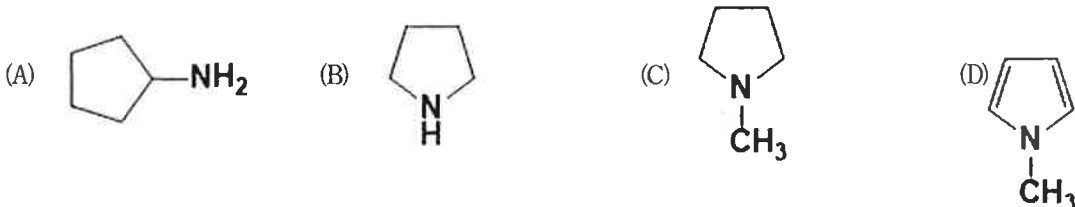
22 請問下列化合物在正常寬帶解耦的 C-13 核磁共振 ($^{13}\text{C-NMR}$) 光譜中會有幾組訊號產生：



23 請選出最適合將一級醇氧化成醛的氧化反應條件：



24 請問下列何種胺化合物與環己酮反應後可得到烯胺 (enamine)：



25 請問羧酸無法由下列那個反應方法製備生成：

