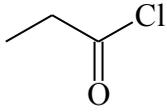
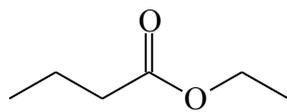
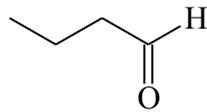
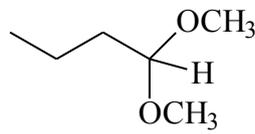
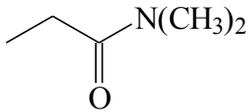
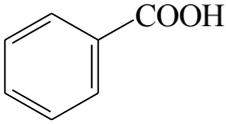
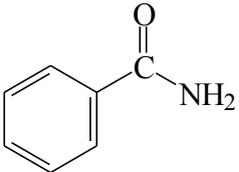
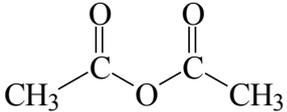
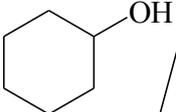


- Complete the following table.

STARTING MATERIAL NAME (where required)	REAGENTS/ CONDITIONS	CONSTITUTIONAL FORMULA(S) OF MAJOR ORGANIC PRODUCT(S)
	excess $(\text{CH}_3)_2\text{NH}$	
 Name:	3 M HCl / heat	
		

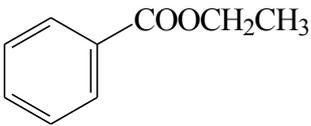
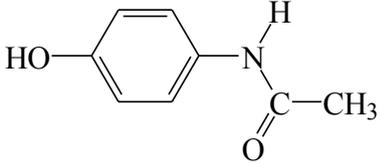
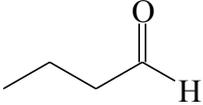
**Marks**  
**13****1**

- Complete the following table. Make sure you complete the name of the starting material where indicated.

STARTING MATERIAL NAME (where required)	REAGENTS/ CONDITIONS	CONSTITUTIONAL FORMULA(S) OF MAJOR ORGANIC PRODUCT(S)
	conc. HCl / heat	
		
	 / $\text{H}^+$ catalyst	

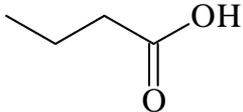
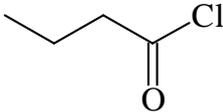
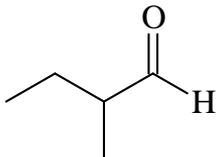
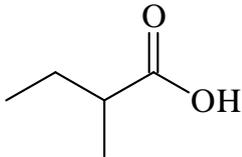
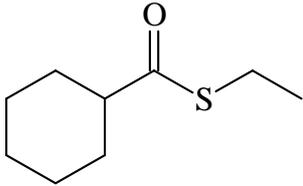
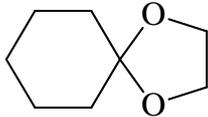
**Marks**  
**5**

- Complete the following table. Make sure you complete the name of the starting material where indicated.

STARTING MATERIAL NAME (where required)	REAGENTS/ CONDITIONS	CONSTITUTIONAL FORMULA(S) OF MAJOR ORGANIC PRODUCT(S)
$\text{CH}_3\text{CH}_2\text{CH}_2-\overset{\text{O}}{\parallel}{\text{C}}-\text{CH}_3$ <p><b>Name:</b></p>	1. $\text{LiAlH}_4$ / dry ether 2. $\text{H}^+$ / $\text{H}_2\text{O}$	
	3 M $\text{NaOH}$ / heat	
	conc. $\text{HCl}$ / heat	
	$[\text{Ag}(\text{NH}_3)_2]^+$ / dil. $\text{OH}^-$	

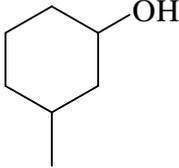
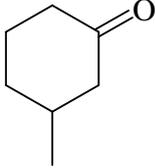
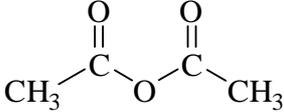
**Marks**  
**8**

- Complete the following table. Make sure you complete the name of the starting material where indicated.

STARTING MATERIAL NAME (where required)	REAGENTS/ CONDITIONS	CONSTITUTIONAL FORMULA(S) OF MAJOR ORGANIC PRODUCT(S)
 <b>Name:</b>		
 <b>Name:</b>		
	3 M NaOH / heat	
	1 M HCl / heat	

**Marks**  
**8**

- Complete the following table. Make sure you complete the name of the starting material or major product where indicated.

STARTING MATERIAL	REAGENTS/ CONDITIONS	CONSTITUTIONAL FORMULA(S) OF MAJOR ORGANIC PRODUCT(S)
CH <sub>3</sub> CH <sub>2</sub> CHO		CH <sub>3</sub> CH <sub>2</sub> CH <sub>2</sub> OH
		 <b>Name:</b>
$\text{CH}_3-\overset{\text{O}}{\parallel}{\text{C}}-\text{OCH}_2\text{CH}_2\text{CH}_3$ <b>Name:</b>	3 M NaOH / heat	
	excess CH <sub>3</sub> CH <sub>2</sub> NH <sub>2</sub>	

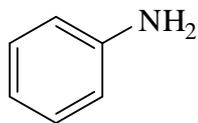
**Marks**  
**5**

- Complete the following table. Make sure you indicate any relevant stereochemistry.

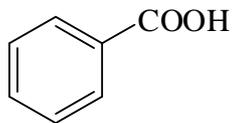
STARTING MATERIAL	REAGENTS/ CONDITIONS	CONSTITUTIONAL FORMULA(S) OF MAJOR ORGANIC PRODUCT(S)
$\text{CH}_3\text{CH}_2\text{COOH}$	1. $\text{SOCl}_2$ 2. $\text{CH}_3\text{CH}_2\text{OH}$	
$\begin{array}{c} \text{OCH}_2\text{CH}_3 \\   \\ \text{H}_3\text{C}-\text{C}-\text{CH}_3 \\   \\ \text{OCH}_2\text{CH}_3 \end{array}$	dilute $\text{H}^+$	
$\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{OH}$	$\begin{array}{c} \text{O} \quad \text{O} \\    \quad    \\ \text{CH}_3-\text{C}-\text{O}-\text{C}-\text{CH}_3 \end{array}$ conc. $\text{H}_2\text{SO}_4$ catalyst	
$\begin{array}{c} \text{O} \\    \\ \text{CH}_3-\text{C}-\text{Cl} \end{array}$	$\text{H}_2\text{O}$	

- Aniline, benzoic acid and benzamide are all insoluble in water, but soluble in ether. Explain how, by using simple laboratory reagents and equipment, each compound could be separated and recovered from a mixture of all three.

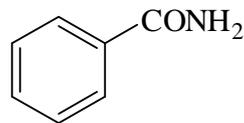
**Marks**  
**5**



aniline



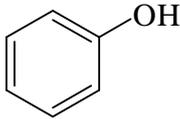
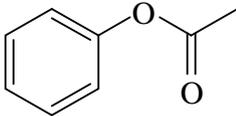
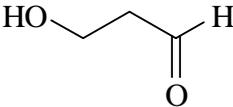
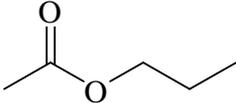
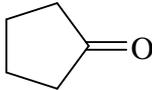
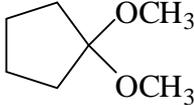
benzoic acid



benzamide

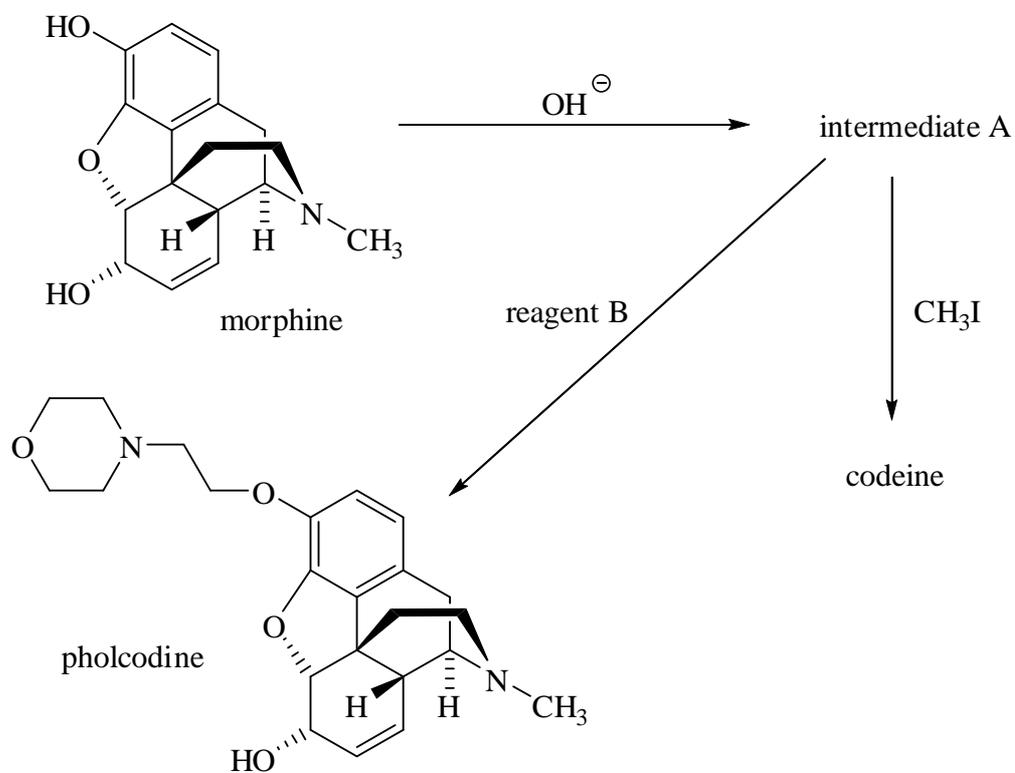
**Marks**  
**6**

- Complete the following table. Make sure you complete the name of the starting material or major product where indicated.

STARTING MATERIAL	REAGENTS/ CONDITIONS	CONSTITUTIONAL FORMULA(S) OF MAJOR ORGANIC PRODUCT(S)
		 <b>Name:</b>
	$[\text{Ag}(\text{NH}_3)_2]^{\oplus} / \text{OH}^{\ominus}$	
	3 M NaOH / heat	
 <b>Name:</b>		

**Marks**  
7

- Morphine is the principal active agent in opium and is a highly potent analgesic drug. Its structure and conversion into codeine (a moderate analgesic) and pholcodine (a cough suppressant) are shown below.



Give the molecular formula of morphine.

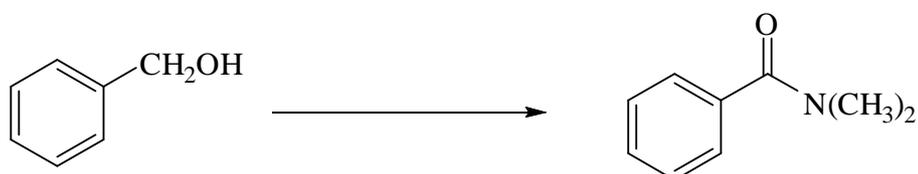
Identify the functional groups present in morphine.

Draw the structures of codeine and reagent B.

codeine	reagent B

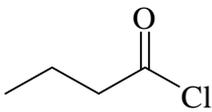
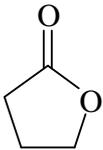
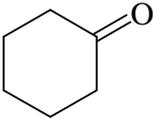
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**6**

- Show clearly the reagents you would use to carry out the following chemical conversions. Note that more than one step is required and you should indicate all necessary steps and the constitutional formulas of any intermediate compounds.



**Marks**  
**6**

- Complete the following table. Make sure you complete the name of the starting material where indicated.

STARTING MATERIAL	REAGENTS/ CONDITIONS	CONSTITUTIONAL FORMULA(S) OF MAJOR ORGANIC PRODUCT(S)
	excess $\text{CH}_3\text{NH}_2$	
	$\text{H}^{\oplus} / \text{H}_2\text{O} / \text{heat}$	
 <b>Name:</b>		