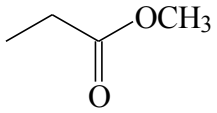
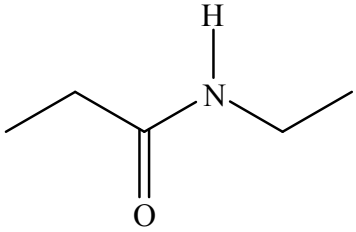
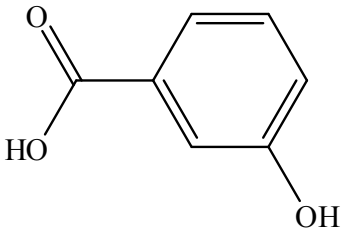
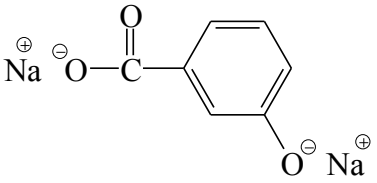
Marks 7

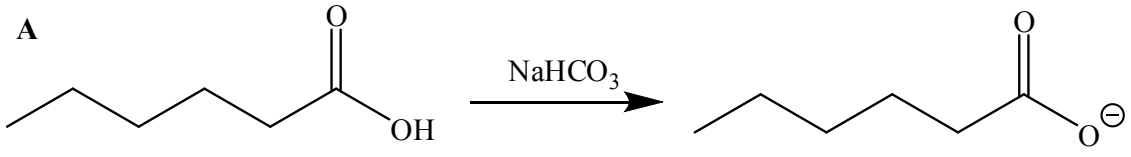
- Complete the following table.

STARTING MATERIAL	REAGENT/CONDITIONS	CONSTITUTIONAL FORMULA(S) OF MAJOR ORGANIC PRODUCT(S)
	excess $CH_3CH_2NH_2$	
	dilute NaOH	

Marks 2

- How would you distinguish between the following pairs of molecules by means of a simple chemical test? In each case, indicate what reagent would be added and any physical change observed. Write an equation for any reaction that occurs. Specify if no reaction occurs by writing "N.R.".

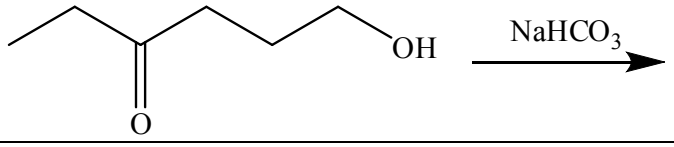
A



$Na^+ + CO_2$

Bubbles of CO_2 are observed

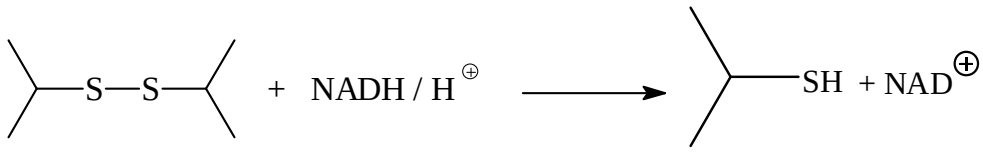
B

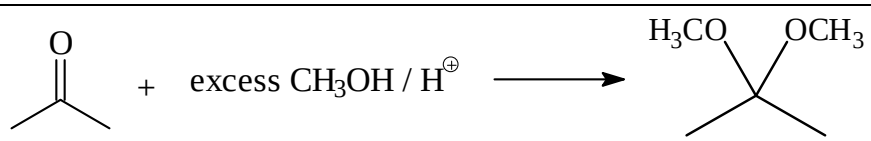


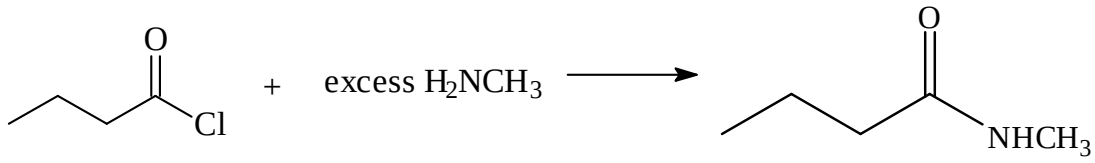
No reaction: alcohol group is not sufficiently acidic to react with a weak base like the hydrogencarbonate ion

Marks 2

- Draw the constitutional formula(s) of the major organic product(s) of the following reactions.

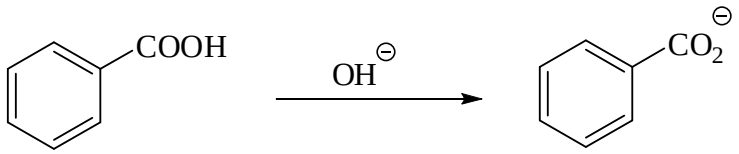






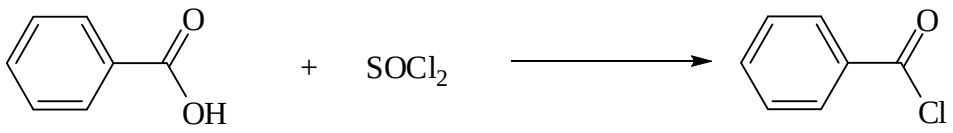
- Benzoic acid has a low solubility in water at pH 7, but is very soluble in aqueous solutions of greater pH. Explain this observation, using chemical equations where appropriate. **2**

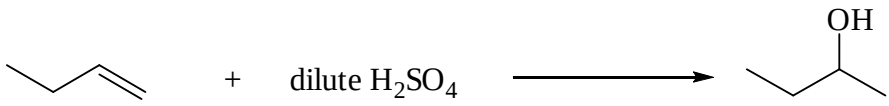
Benzoic acid has a low solubility in water because of the relatively large hydrophobic aromatic ring. It is a weak acid so exists primarily as the undissociated acid at pH 7. At high pH, it can react with OH^- ions to form the benzoate ion. This species is water soluble because it is charged and hence is easily solvated by the polar water molecules.

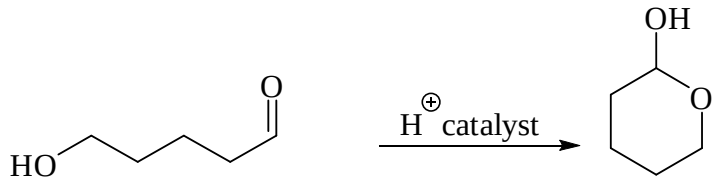


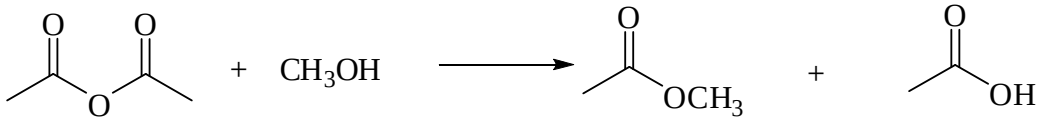
- Draw the constitutional formula(s) of the major organic product(s) of the following reactions.

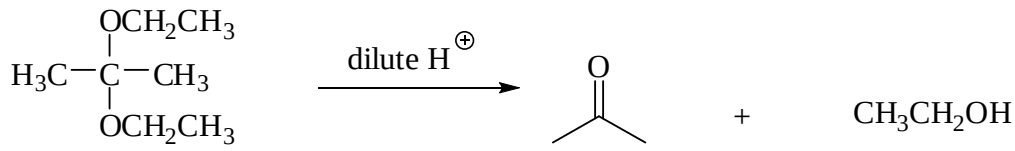
7



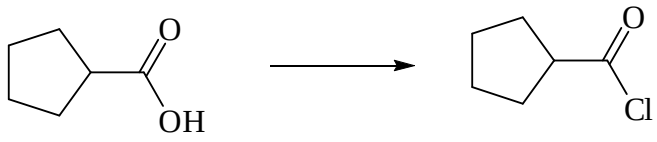
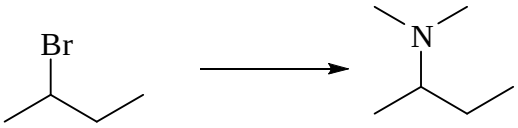
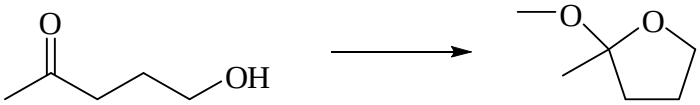




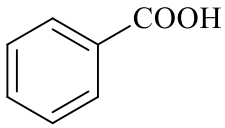
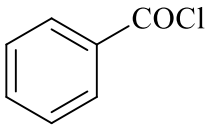
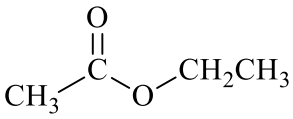
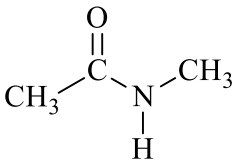




- Indicate the reagents used in the laboratory to effect the following transformations. **3**

Reaction	Reagent
	**$SOCl_2$**
	**$NaN(CH_3)_2$** **or** **(i) $HN(CH_3)_2$ (ii) OH^-**
	**excess CH_3OH / H^+** **catalyst / heat**

• Complete the following table. **Marks 4**

Starting material	Reagent / Conditions	Major organic products(s)
	**$SOCl_2$**	
$CH_3CH_2COOCH_2CH_3$	2 M NaOH heat	$CH_3CH_2CO_2^{\ominus}$ + CH_3CH_2OH
	NH_2CH_3	 + CH_3CH_2OH

THE REMAINDER OF THIS PAGE IS FOR ROUGH WORKING ONLY.

Marks
3

- 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.