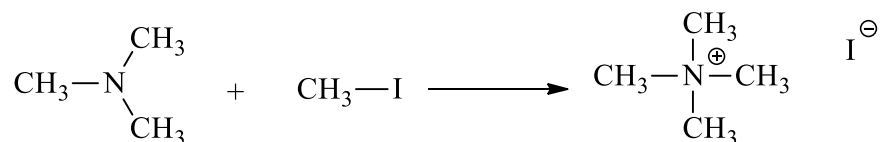
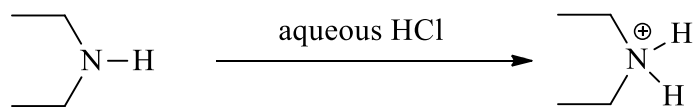


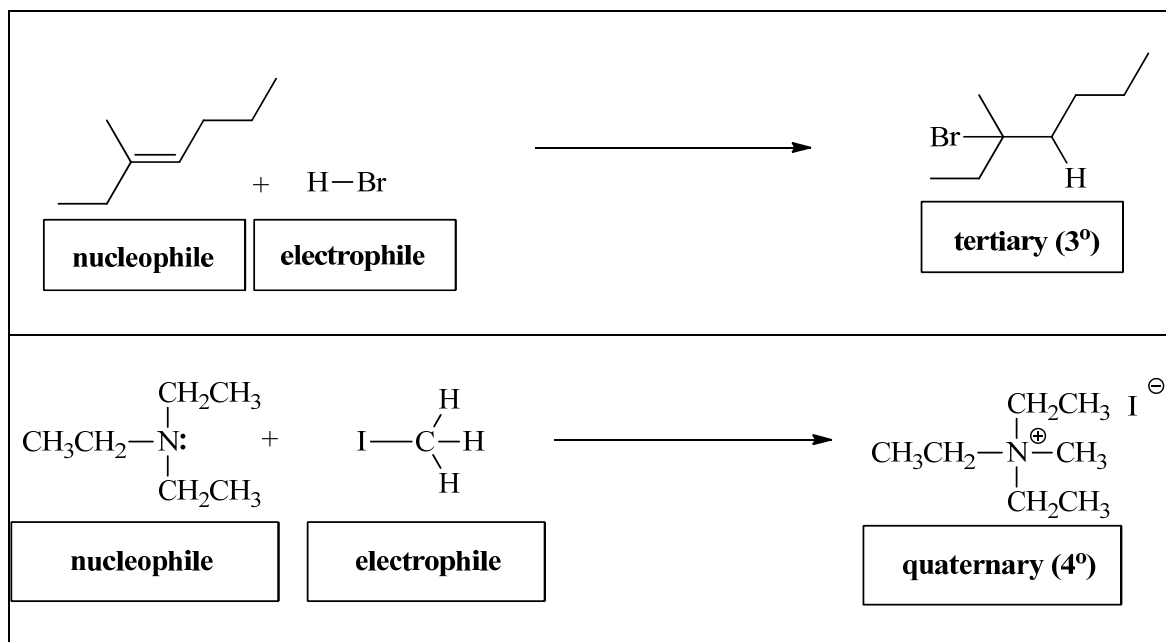
Marks
2

- Give the major organic product(s) from the following reactions. Pay particular attention to the stereochemistry and/or the correct ionic form where relevant.



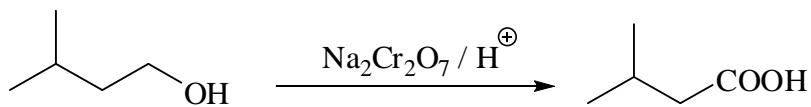
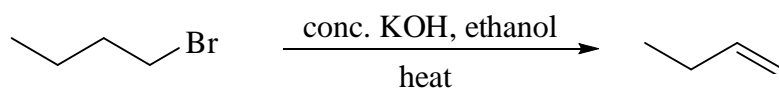
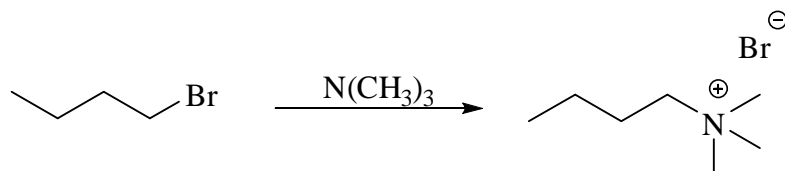
Marks
5

- Classify the starting materials for each of the following reactions as nucleophile or electrophile in the boxes provided. Classify the products of the reactions as primary (1°), secondary (2°), tertiary (3°) or quaternary (4°) in the boxes provided.



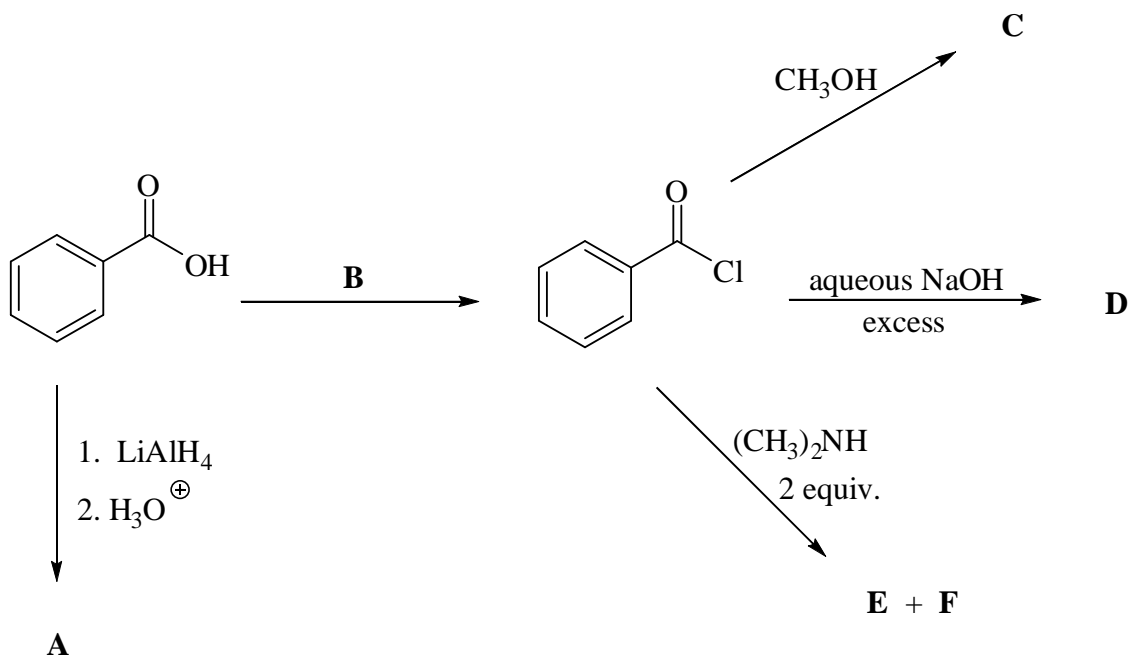
Marks
5

- Give the name of the starting material where indicated and the constitutional formula of the major organic product formed in each of the following reactions.

**Name: 3-methyl-1-butanol****Name: 1-bromobutane**

Marks
6

- Consider the following reaction sequence.

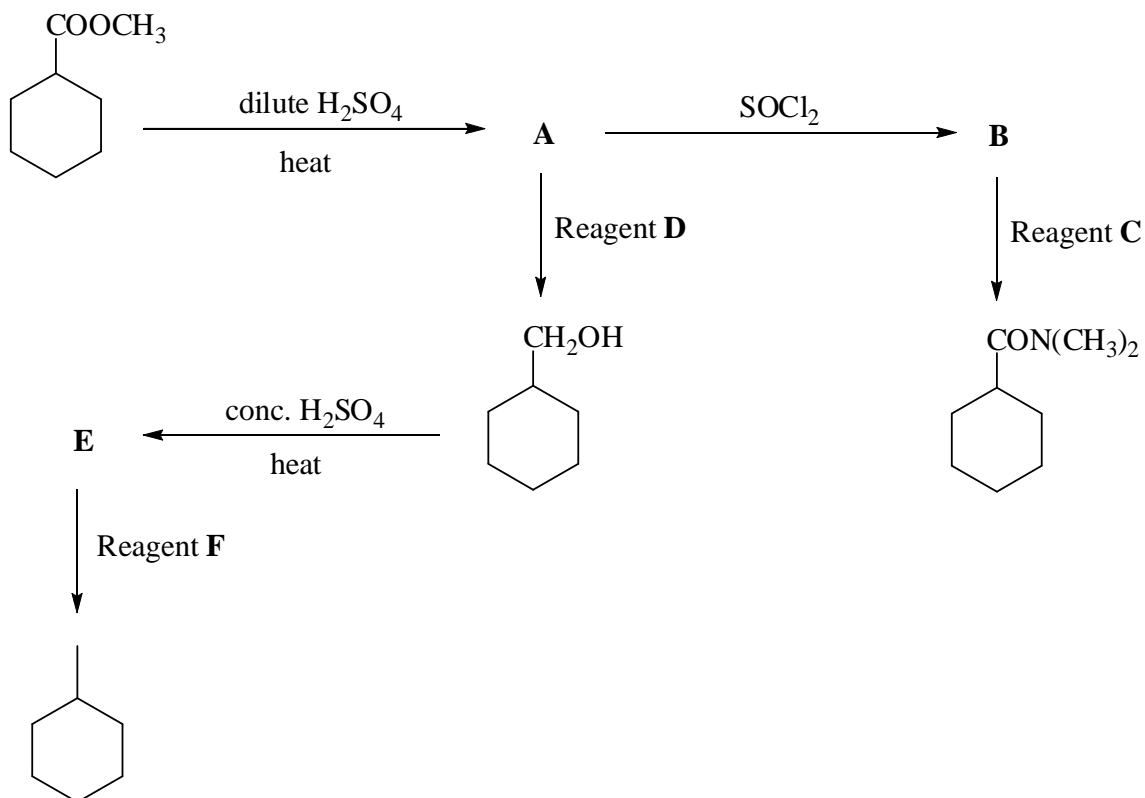


Give the reagent **B** and draw the constitutional formulas of the major organic products, **A**, **C**, **D**, **E** and **F**, formed in these reactions.

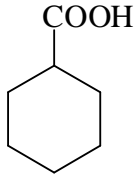
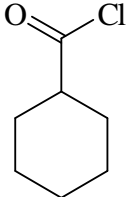
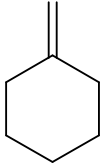
<p>A</p>	<p>D</p>
<p>B</p> <p>SOCl_2</p>	<p>E</p>
<p>C</p>	<p>F</p>

Marks
6

- Consider the following reaction sequence.



Give the reagents **C**, **D** and **F** and draw the structures of the major organic products, **A**, **B** and **E**, formed in these reactions.

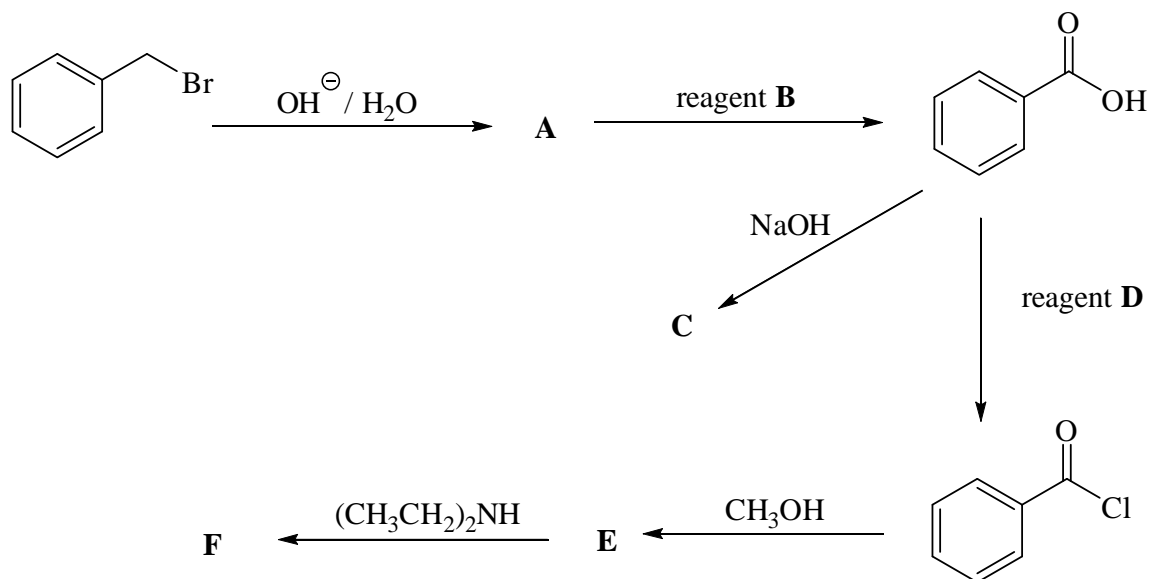
<p>A</p>  <p>(Hydrolysis of an ester to a carboxylic acid).</p>	<p>D</p> <p>(1). LiAlH_4 / dry ether (2). H^+ / H_2O</p> <p>(Reduction of carboxylic acid to primary alcohol).</p>
<p>B</p>  <p>(Formation of an acid chloride from a carboxylic acid).</p>	<p>E</p>  <p>(Acid catalysed elimination of H-OH (“dehydration”) to form C=C).</p>

ANSWER CONTINUES ON THE NEXT PAGE

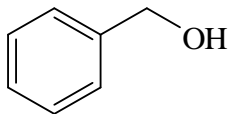
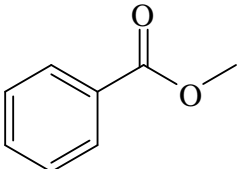
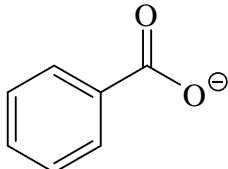
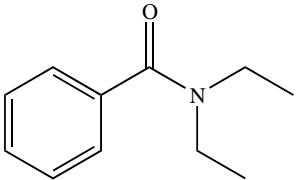
<p>C</p> $\begin{array}{c} \text{CH}_3 \\ \\ \text{H}-\text{N} \\ \\ \text{CH}_3 \end{array}$ <p>(Formation of amide from acid chloride).</p>	<p>F</p> <p>H₂ / Pd/C</p> <p>(Reduction of alkene to alkane).</p>
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Marks
6

- Consider the following reaction sequence.

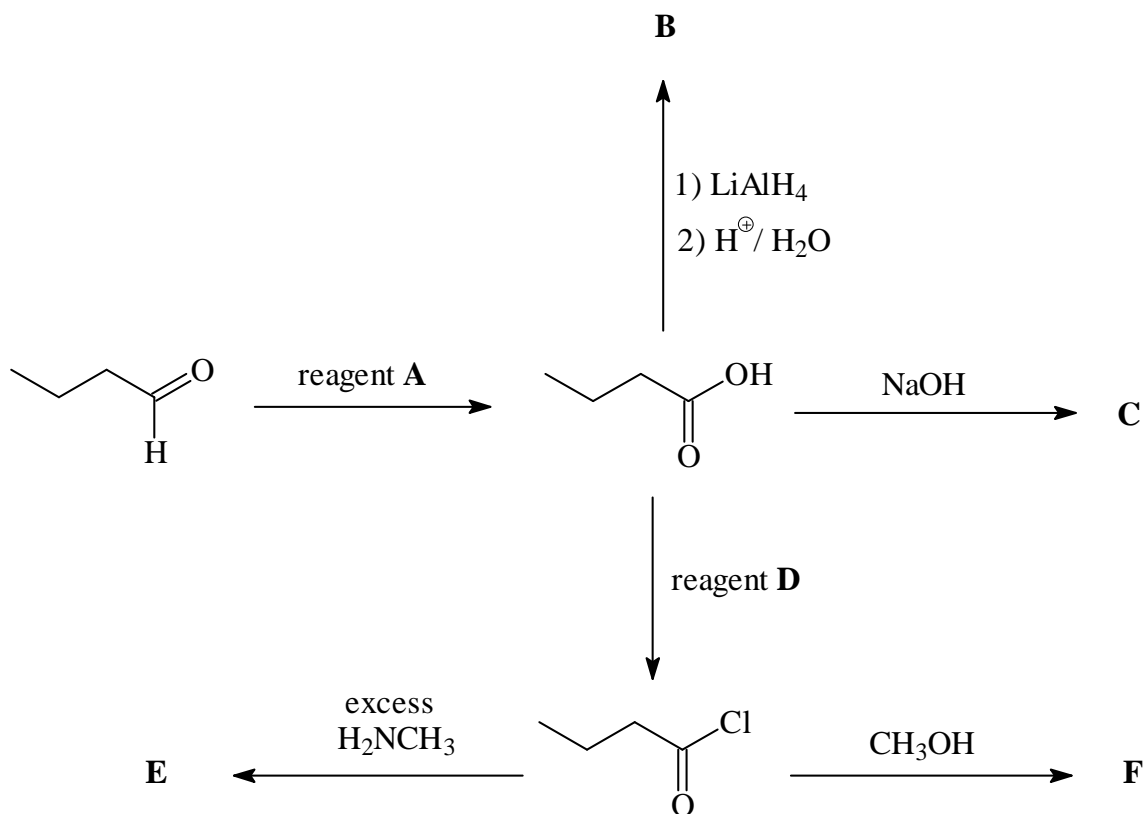


Give the reagents **B** and **D** and draw the structures of the major organic products, **A**, **C**, **E** and **F**, formed in these reactions.

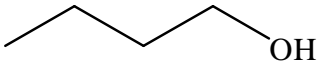
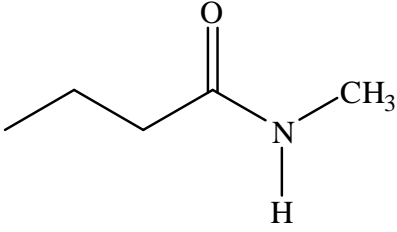
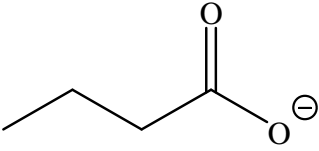
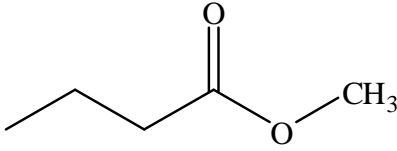
A 	D $\text{SOCl}_2 / \text{heat}$
B $\text{Cr}_2\text{O}_7^{2-} / \text{H}^+$	E 
C 	F  CH_3OH

Marks
6

- Consider the following reaction sequence.

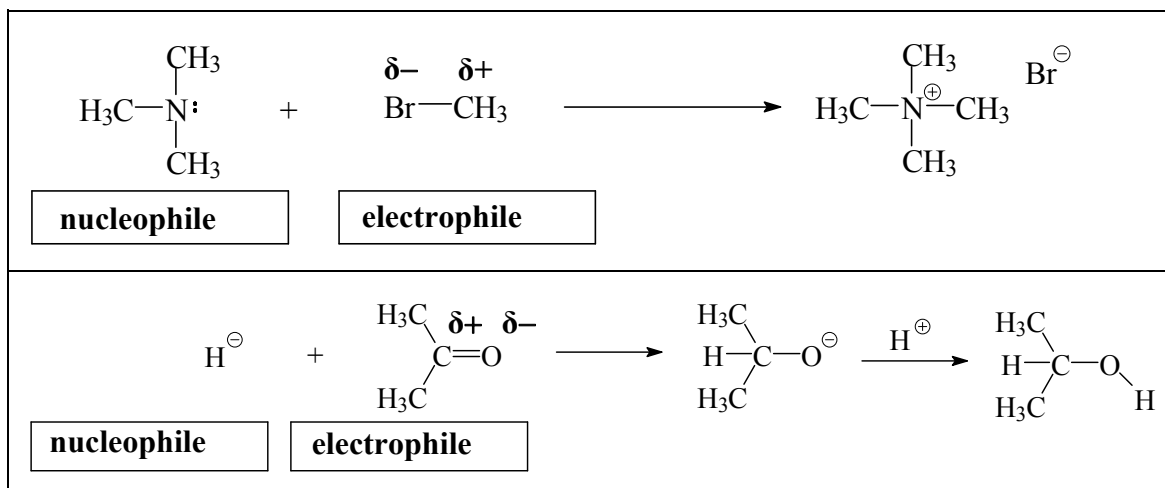


Give the reagents **A** and **D** and draw the structures of the major organic products, **B**, **C**, **E** and **F**, formed in these reactions.

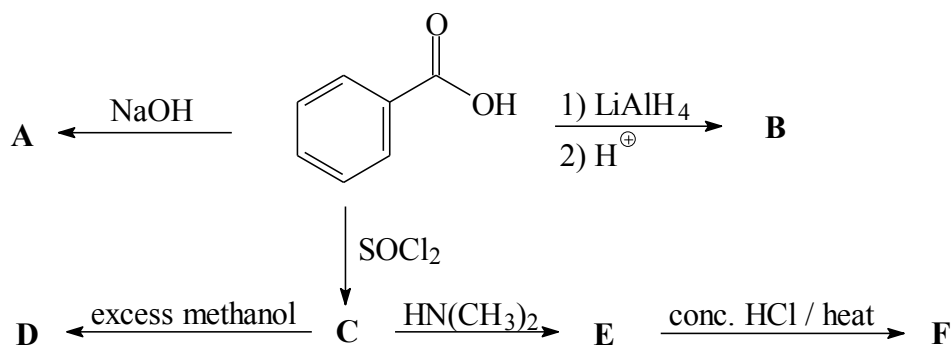
<p>A</p> <p style="text-align: center;">$\text{Cr}_2\text{O}_7^{2-} / \text{H}^+$</p>	<p>D</p> <p style="text-align: center;">SOCl_2</p>
<p>B</p> 	<p>E</p> 
<p>C</p> 	<p>F</p> 

Marks
4

- Classify the starting materials of the following reactions as nucleophile or electrophile and indicate with δ^{\oplus} and δ^{\ominus} the polarisation of the C–Br and C=O bonds.


6

- Consider the following reaction sequence.



Draw the structures of the major organic products, A-F, formed in these reactions.

