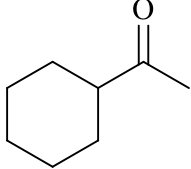


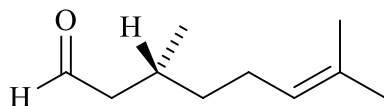
Marks
1

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

| STARTING MATERIAL | REAGENTS/ CONDITIONS | CONSTITUTIONAL FORMULA(S) OF MAJOR ORGANIC PRODUCT(S) |
|---|---|---|
|  | 1. LiAlH ₄ 2. H ⁺ / H ₂ O | |

Marks
4

- The structure of (+)-citronellal, a widely occurring natural product, is shown below.

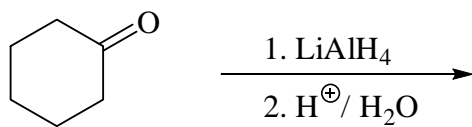


Give the constitutional formula of the organic product formed from (+)-citronellal in each of the following reactions.

| Reagents / Conditions | Constitutional Formula of Product |
|--|-----------------------------------|
| 1. LiAlH_4 in dry ether (solvent) 2. $\text{H}^+ / \text{H}_2\text{O}$ | |
| HBr in CCl_4 (solvent) | |
| $\text{Na}_2\text{Cr}_2\text{O}_7$ in aqueous acid | |
| $\text{H}_2 / \text{Pd-C}$ catalyst | |

Marks
1

- Give the name of the starting material where indicated and the constitutional formula(s) of the major organic product(s) formed in each of the following reactions. NB: if there is no reaction, write "no reaction".



Marks
5

- Compound **X** is known to have the molecular formula C_3H_8O . Draw the constitutional formulas of the three possible isomers that could be compound **X**.

| | |
|--|--|
| | |
|--|--|

Compound **X** reacts with acidified potassium dichromate solution to give compound **Y**. Give the possible structure(s) of compound **Y**.

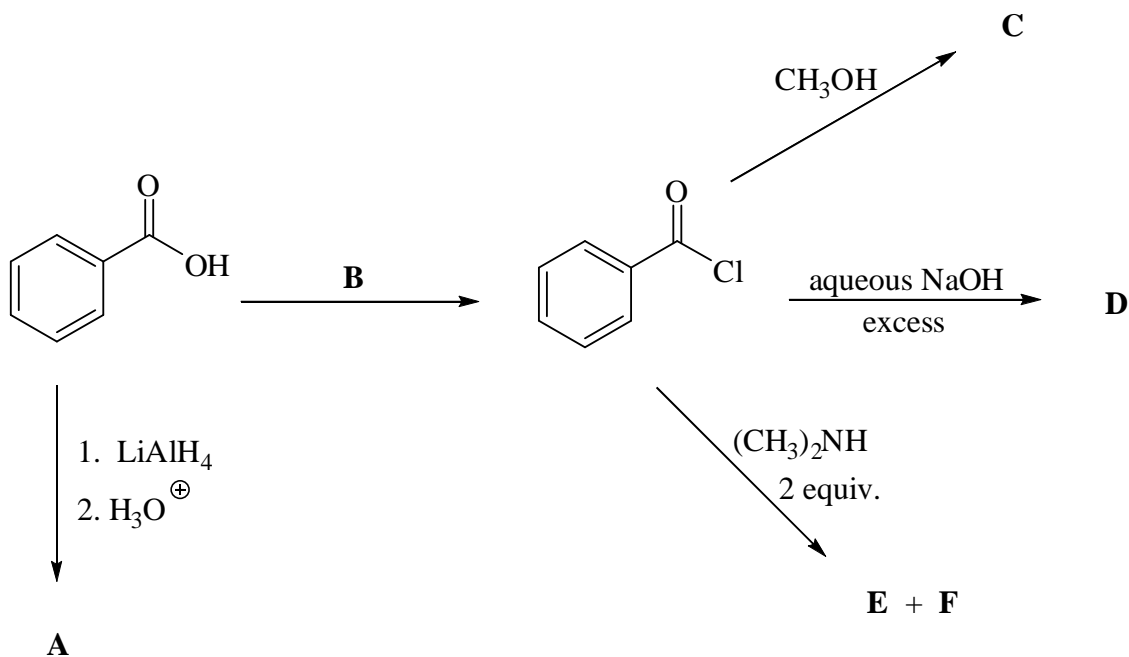
| | |
|--|--|
| | |
|--|--|

Describe a simple **chemical test** that could be used to identify compound **Y**. Give the reagent(s) used and any expected observation(s).

| | |
|--|--|
| | |
|--|--|

Marks
6

- Consider the following reaction sequence.

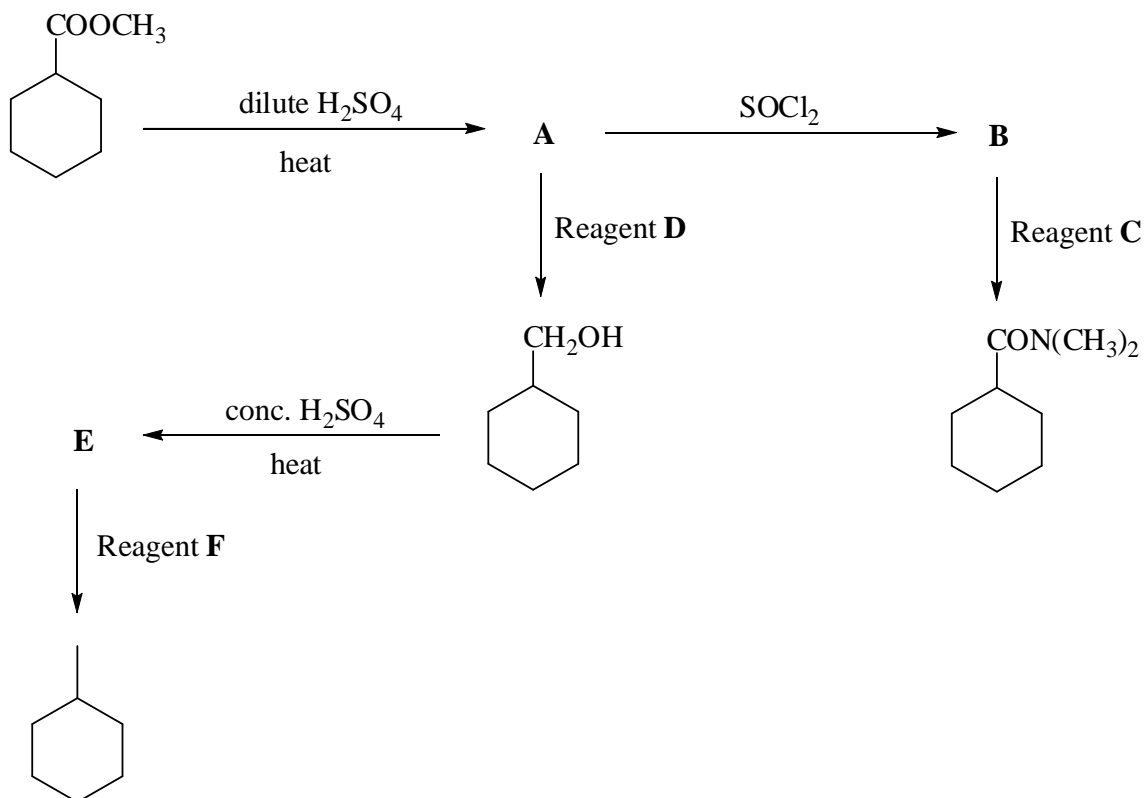


Give the reagent **B** and draw the constitutional formulas of the major organic products, **A**, **C**, **D**, **E** and **F**, formed in these reactions.

| | |
|----------|----------|
| A | D |
| B | E |
| C | F |

Marks
6

- Consider the following reaction sequence.

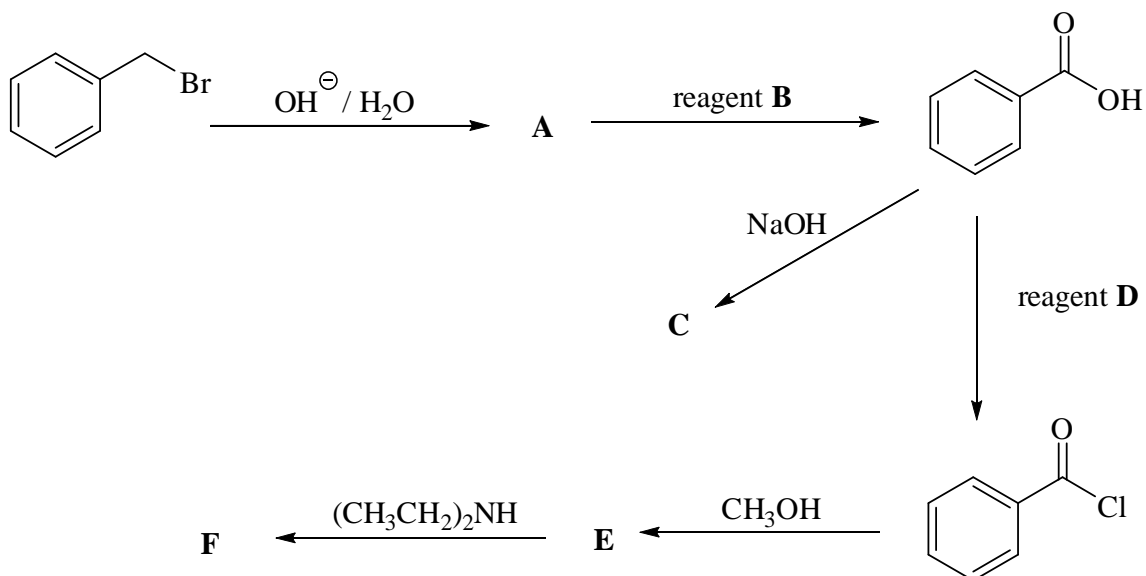


Give the reagents **C**, **D** and **F** and draw the structures of the major organic products, **A**, **B** and **E**, formed in these reactions.

| | |
|----------|----------|
| A | D |
| B | E |
| C | F |

Marks
6

- Consider the following reaction sequence.

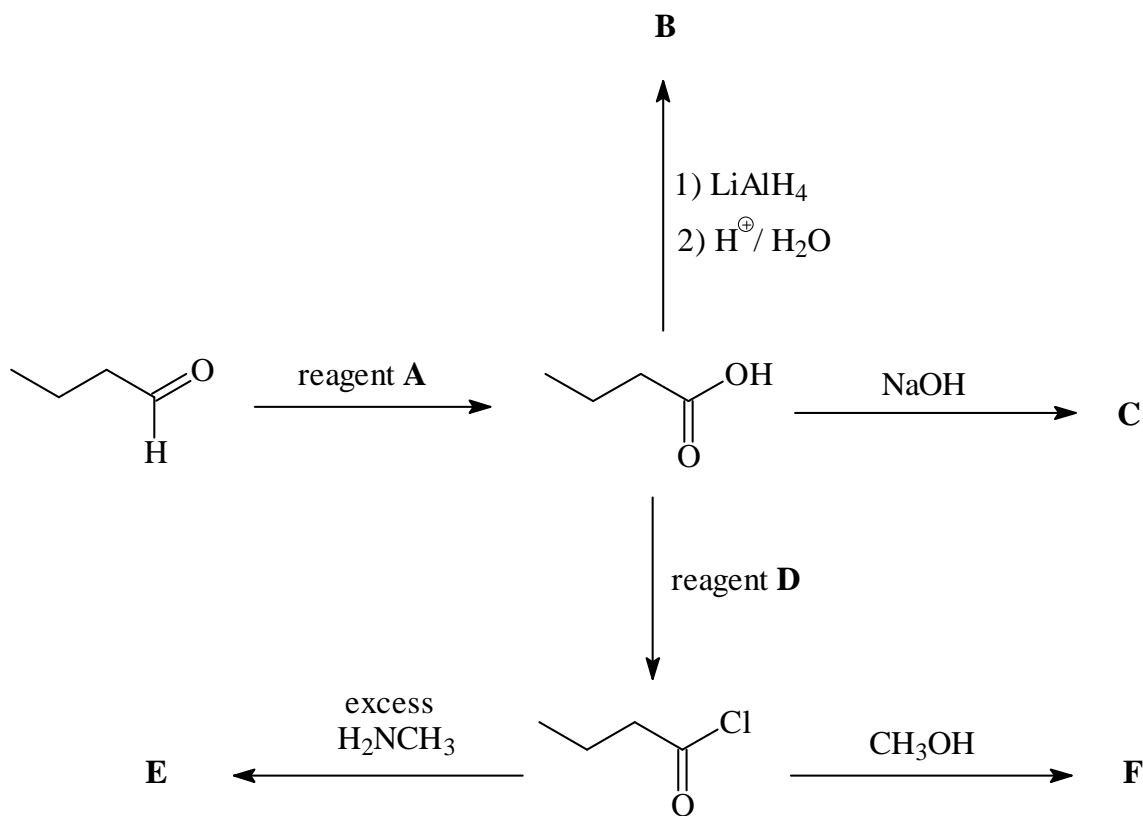


Give the reagents **B** and **D** and draw the structures of the major organic products, **A**, **C**, **E** and **F**, formed in these reactions.

| | |
|----------|----------|
| A | D |
| B | E |
| C | F |

Marks
6

- Consider the following reaction sequence.

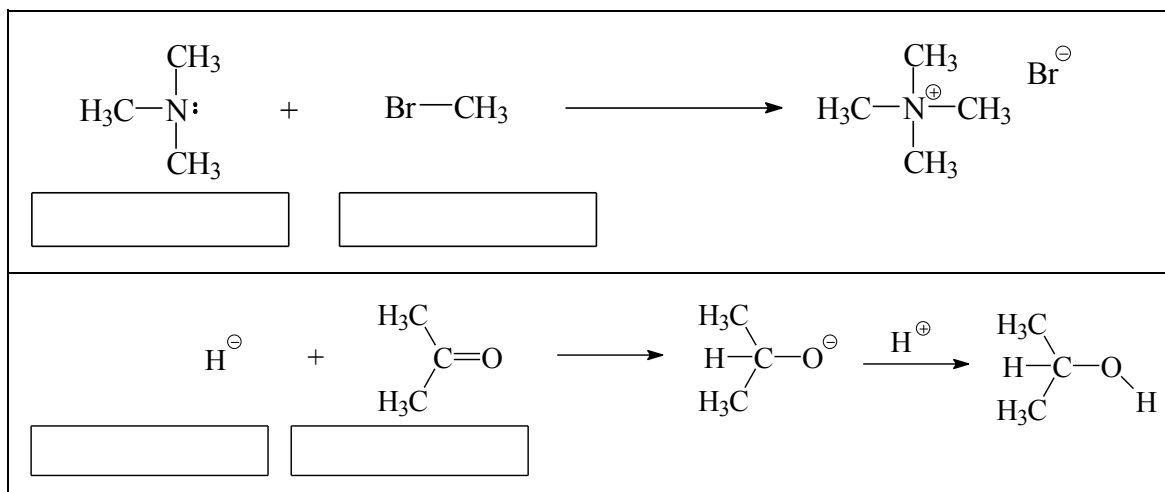


Give the reagents **A** and **D** and draw the structures of the major organic products, **B**, **C**, **E** and **F**, formed in these reactions.

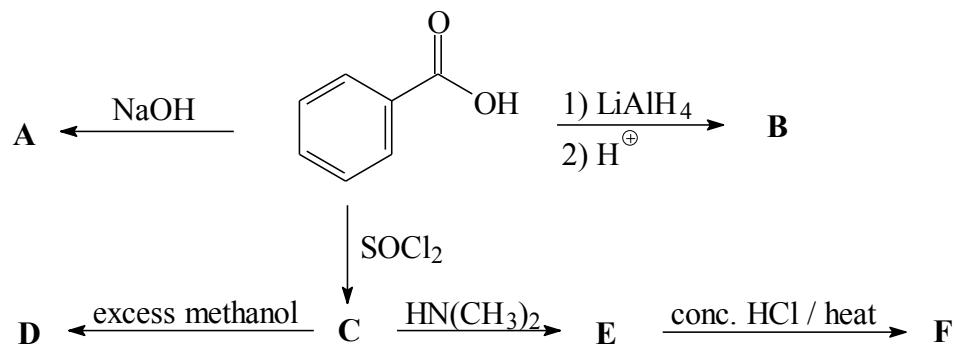
| | |
|----------|----------|
| A | D |
| B | E |
| C | F |

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.

| | |
|----------|----------|
| A | D |
| B | E |
| C | F |