

3 Propan-2-ol, $(\text{CH}_3)_2\text{CHOH}$, is sometimes added to fuel to help it burn.

Fig. 3.1 shows some reactions of propan-2-ol.

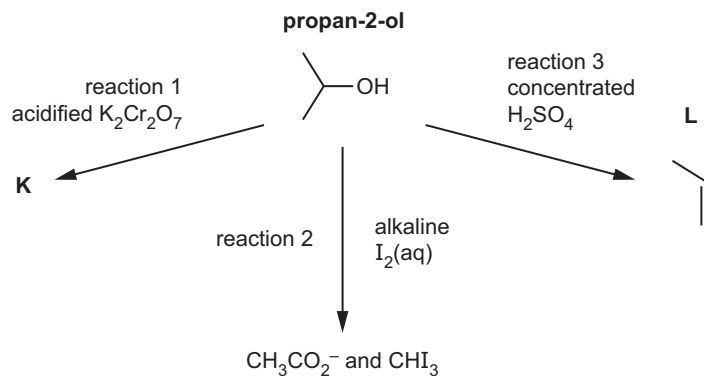


Fig. 3.1

(a) (i) Draw the structure of organic compound **K**.

[1]

(ii) State an observation you would make in reaction 2.

[1]

(iii) State the type of reaction that is shown in reaction 3.

[1]

(iv) Complete Fig. 3.2 to show the pi (π) bond in **L** that is formed from orbital overlap.

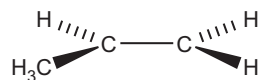


Fig. 3.2

[1]

(b) Propan-2-ol reacts with sodium to produce $(\text{CH}_3)_2\text{CH-O}^-$ anions.

These anions react with 2-bromopropane to form compound **N**, as shown in Fig. 3.3.

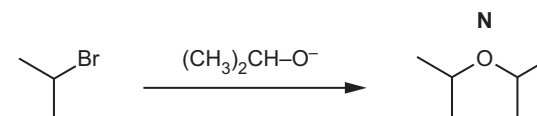


Fig. 3.3

(i) Write an equation for the reaction of propan-2-ol with sodium.

[1]

(ii) The reaction of 2-bromopropane with $(\text{CH}_3)_2\text{CH-O}^-$ anions follows an $\text{S}_{\text{N}}1$ mechanism.

Complete Fig. 3.4 to show this mechanism. Include charges, dipoles, lone pairs of electrons and curly arrows, as appropriate.

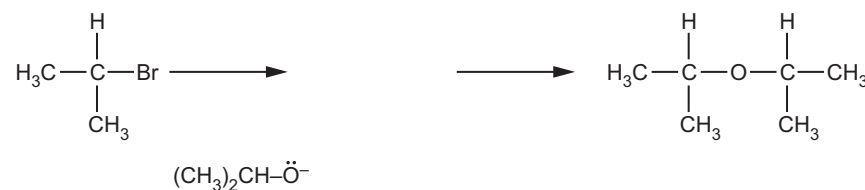


Fig. 3.4

[3]

(iii) Suggest how the rate of the $\text{S}_{\text{N}}1$ reaction would change, if at all, if 2-chloropropane were used instead of 2-bromopropane.

Explain your answer.

[2]

(iv) **N** is also added to petrol to make it burn more smoothly.

Construct an equation for the complete combustion of **N**, $\text{C}_6\text{H}_{14}\text{O}$.

$\text{C}_6\text{H}_{14}\text{O}$ [1]

[Total: 11]