**Marks
2**
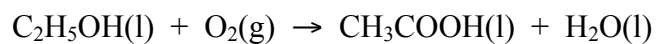
• Good wine will turn to vinegar if it is left exposed to air because the alcohol is oxidised to acetic acid. The equation for the reaction is

$$C_2H_5OH(l) + O_2(g) \rightarrow CH_3COOH(l) + H_2O(l)$$

Calculate $\Delta S°$ for this reaction in $J\ K^{-1}\ mol^{-1}$.

Data:

	$\Delta S°$ $(J\ K^{-1}\ mol^{-1})$
$C_2H_5OH(l)$	161
$O_2(g)$	205.0
$CH_3COOH(l)$	160
$H_2O(l)$	69.96

Using $\Delta_rS° = \sum S°(\text{products}) - \sum S°(\text{reactants})$:

$\Delta_rS° = ((160 + 69.96) - (161 + 205.0))\ J\ K^{-1}\ mol^{-1} = -136\ J\ K^{-1}\ mol^{-1}$

Answer: **-136 J K⁻¹ mol⁻¹**