**Marks 5**

- Stearic acid, $C_{18}H_{36}O_2$, is a fatty acid common in animal fats and vegetable oils and is a valuable energy source for mammals. The net reaction for its metabolism in humans is:

$$C_{18}H_{36}O_2(s) + 26O_2(g) \rightarrow 18CO_2(g) + 18H_2O(l)$$

Calculate $\Delta H°$ for this reaction given the following heats of formation.

$\Delta H_f^o$ ($C_{18}H_{36}O_2(s)$) = –948 kJ mol$^{-1}$, $\Delta H_f^o$ ($CO_2(g)$) = –393 kJ mol$^{-1}$ and $\Delta H_f^o$ ($H_2O(l)$) = –285 kJ mol$^{-1}$

Answer:

If the combustion of stearic acid is carried out in air, water is produced as a vapour. Calculate the $\Delta H°$ for the combustion of stearic acid in air given that

$$H_2O(l) \rightarrow H_2O(g) \qquad \Delta H° = +44 \text{ kJ mol}^{-1}$$

Answer:

Will $\Delta S$ be different for the two oxidation reactions? If so, how will it differ and why?

Calculate the mass of carbon dioxide produced by the complete oxidation of 1.00 g of stearic acid.

Answer: