

5.1 EXERCISE 1 – CALCULATING APPROXIMATE ENTHALPY CHANGES

1. Given the following data:

bond	$\Delta H_b/\text{kJmol}^{-1}$		
C-H	+413	C-Cl	+328
C-Br	+285	H-F	+565
H-Br	+366	C-F	+425
Br-Br	+193	F-F	+158
C-C	+347	C=O	+805
C=C	+611	O-H	+464
H-H	+435	O=O	+498
Cl-Cl	+242	H-Cl	+428

Substance	$\Delta H_{at}/\text{kJmol}^{-1}$		
C(graphite)	+713		

Calculate approximate enthalpy changes for the following reactions:

- i) $\text{CH}_4 + 2\text{O}_2 \rightarrow \text{CO}_2 + 2\text{H}_2\text{O}$
 - ii) $\text{C}_2\text{H}_6 + 7/2\text{O}_2 \rightarrow 2\text{CO}_2 + 3\text{H}_2\text{O}$
 - iii) $\text{C}_2\text{H}_4 + \text{Br}_2 \rightarrow \text{C}_2\text{H}_4\text{Br}_2$
 - iv) $\text{CH}_4 + \text{Cl}_2 \rightarrow \text{CH}_3\text{Cl} + \text{HCl}$
 - v) $2\text{C(s)} + 3\text{H}_2\text{(g)} \rightarrow \text{C}_2\text{H}_6\text{(g)}$
2. Given that the enthalpy of atomisation of SiH_4 is $+1272 \text{ kJmol}^{-1}$, that the enthalpy of atomisation of hydrogen is $+218 \text{ kJmol}^{-1}$, and that the atomisation of silicon is $+456 \text{ kJmol}^{-1}$, calculate the enthalpy of formation of SiH_4 .