

Calculate the standard enthalpy change for the following reaction at 25 °C.  
 $\text{H}_2\text{O}(\text{g}) + \text{C}(\text{graphite})(\text{s}) = \text{H}_2(\text{g}) + \text{CO}(\text{g})$

**Solution:**

Take standard enthalpy of formation for all compounds at 25 °C from [1]:

$\text{H}_2\text{O}(\text{g})$ : -241.83 kJ/mol

$\text{C}(\text{graphite})(\text{s})$ : 0

$\text{H}_2(\text{g})$ : 0

$\text{CO}(\text{g})$ : -110.53 kJ/mol

Then, the change of standard enthalpy is equal to

$$\Delta H = (\sum \Delta H_{\text{right}}) - (\sum \Delta H_{\text{left}}) = (0 + (-110.53)) - (-241.83 + 0) = 131.3 \text{ kJ/mol},$$

where  $\sum \Delta H_{\text{right}}$  and  $\sum \Delta H_{\text{left}}$  – sum of standard enthalpy of formation of compounds on right and left side of chemical equation, respectively.

**Answer:** 131.3 kJ/mol

**Reference:**

1. David R. Lide, ed., CRC Handbook of Chemistry and Physics, 90th Edition (CD-ROM Version 2010), CRC Press/Taylor and Francis, Boca Raton, FL.