

Enthalpy of Reaction

- Calculate the enthalpy change for each of the reactions below.
 - $2 \text{CO(g)} + \text{O}_2\text{(g)} \rightarrow 2 \text{CO}_2\text{(g)}$
 - $\text{Cu(s)} + 2 \text{H}_2\text{SO}_4\text{(aq)} \rightarrow \text{CuSO}_4\text{(s)} + \text{SO}_2\text{(g)} + 2 \text{H}_2\text{O(l)}$
 - $\text{N}_2\text{(g)} + 3 \text{H}_2\text{(g)} \rightarrow 2 \text{NH}_3\text{(g)}$
 - $\text{Fe}_2\text{O}_3\text{(s)} + 3 \text{CO(g)} \rightarrow 2 \text{Fe(s)} + 3 \text{CO}_2\text{(g)}$
 - $2 \text{SO}_2\text{(g)} + \text{O}_2\text{(g)} \rightarrow 2 \text{SO}_3\text{(g)}$
 - $4 \text{NH}_3\text{(g)} + 5 \text{O}_2\text{(g)} \rightarrow 4 \text{NO(g)} + 6 \text{H}_2\text{O(l)}$
 - $2 \text{NO(g)} + \text{O}_2\text{(g)} \rightarrow 2 \text{NO}_2\text{(g)}$
 - $\text{Ca(s)} + 2 \text{H}_2\text{O(l)} \rightarrow \text{Ca(OH)}_2\text{(s)} + \text{H}_2\text{(g)}$
- Calculate the amount of heat released when 15.0 g of methanol burns. The standard enthalpy of formation of methanol is -238.6 kJ/mol .
- Calculate the mass of ethanol that must be burned in order to produce 20.0 kJ.
- One teaspoon of sugar has a mass of 5.00g.
 - Calculate the energy change when a person consumes 2.00 teaspoons of sugar.
 - Energy obtained from food is often reported in food calories, or Calories. $1 \text{ Calorie (1 Cal)} = 1 \text{ kilocalorie (1 kcal)} = 1000 \text{ calories (1000 cal)} = 4.18 \text{ kJ}$. Calculate the number of food calories contained in 2.00 teaspoons of sugar.
 - A 150.0 lb person walking at a moderate speed will burn 40.0 Cal while walking for 15.0 minutes. How long would this person have to walk to burn the Calories in 2.00 teaspoons of sugar?
- Which sugar compound is more stable, glucose or sucrose? Explain.
- What mass of hydrogen gas should be burned (under standard conditions) to heat 1.00 L of water from 10.0°C to 80.0°C ?
- What would be the final temperature of 885 g water, initially at 25.0°C , if it were heated by the burning of 20.0 g of sulfur in excess oxygen to produce sulfur dioxide?
- When 4.00 g of ammonium chloride is formed from its elements, 23.5 kJ of energy is released.
 - Write the thermochemical equation showing the formation of ammonium chloride.
 - Calculate the standard heat of formation for ammonium chloride.
- What volume of water would be needed to absorb the energy released in burning 1.00 g of magnesium and show a temperature increase (of the water) of 10.0°C ?

Hess' Law

