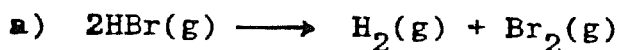


EXERCISE

CALORIMETER + BOND ENERGY
CALCS

1) Using bond energies, calculate ΔH for the following reactions:



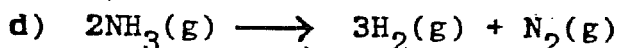
$\Delta H = +101 \text{ kJ}$



$\Delta H = +435 \text{ kJ}$



$\Delta H = -103 \text{ kJ}$



$\Delta H = +89 \text{ kJ}$

2) Given $\frac{1}{2}\text{H}_2\text{(g)} + \frac{1}{2}\text{F}_2\text{(g)} \longrightarrow \text{HF(g)}$ $\Delta H = -269 \text{ kJ}$

Calculate the bond energy of the F—F bond.

155 kJ

3) 5.61 g of potassium hydroxide was dissolved in $2.00 \times 10^2 \text{ mL}$ of water. The temperature of the water rose 7.0°C . What is the heat of reaction in kJ per mole of potassium hydroxide?

-59 kJ/mol

4) In an experiment, 4.80 g of lithium hydroxide was dissolved in $1.50 \times 10^2 \text{ mL}$ of water. This caused the temperature of the solution to rise from 20.0°C to 26.0°C . Calculate the heat of reaction in kJ per mole of lithium hydroxide.

-18.8 kJ/mol

5) How many grams of water could be heated from 0.00°C to $1.00 \times 10^2^\circ\text{C}$ by a reaction which releases 200.0 kJ ?

478 g

6) When 0.24 g of lithium hydroxide is dissolved in $1.00 \times 10^2 \text{ mL}$ of water, the temperature of the water rises from 21°C to 35°C . Calculate ΔH for the reaction in kJ per mole of lithium hydroxide.

$-5.8 \times 10^2 \text{ kJ/mol}$

7) The heat of combustion for ethane is -1559.3 kJ/mol . How many kilograms of water could be heated from 10°C to 50°C in a calorimeter by the reaction?

93 kg

8)a) How many J would be required to raise the temperature of 1.00 g of water through 10.0°C ?

41.8 J

b) How many J would be required to raise the temperature of 10.0 g of water through 10.0°C ?

418 J

c) How many J would be required to raise the temperature of 5.0 g of H_2O through 5.0°C ?

$1.0 \times 10^2 \text{ J}$

d) How much energy would be released in cooling 5.0 g of H_2O through 5.0°C ?

$1.0 \times 10^2 \text{ J}$

9) For each type of reaction carried out inside a calorimeter, indicate whether the water temperature will rise or fall: an exothermic reaction and an endothermic reaction.

rise, fall

10) When 5.6 g of solid KOH was added to 100 g of water, the solid dissolved completely. This was accompanied by a rise of 13°C in the water temperature. Calculate the heat of solution of KOH in kJ per mole of KOH .

-54 kJ/mol KOH

11) A 6.4 g sample of sulfur is introduced into a calorimeter containing 200 g of water. When the sulfur sample is burned completely to form sulfur dioxide, $\text{SO}_2\text{(g)}$, the water temperature is observed to rise by 71°C . Determine ΔH for the reaction in kJ per mole of sulfur.

$-3.0 \times 10^2 \text{ kJ/mol S}$

12) When a 20.0 g sample of NH_4NO_3 was added to 100.0 g of water in a calorimeter, the solid dissolved completely and the temperature of the water was lowered by 15°C . Calculate the heat of solution of NH_4NO_3 in kJ/mole.