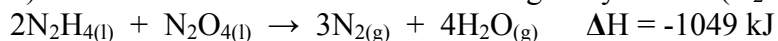
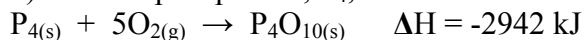


Enthalpy Practice Problems

1) How much heat evolves when 10.0 g of hydrazine (N_2H_4) react according to the following reaction?

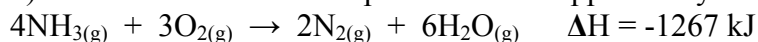


2) White phosphorus, P_4 , burns in an excess of oxygen to form tetraphosphorus decoxide:



What is the heat evolved per gram of phosphorus burned?

3) Ammonia burns in the presence of a copper catalyst to form nitrogen gas:



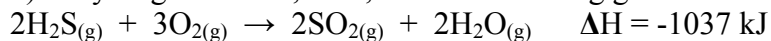
What is the enthalpy change to burn 25.6 g of ammonia?

4) Nitric oxide, NO, is formed whenever a mixture of nitrogen and oxygen gases is heated:



Calculate the heat absorbed per gram of nitrogen reacted.

5) Hydrogen sulfide, H_2S , is a foul-smelling gas. It burns to form sulfur dioxide:



Calculate the enthalpy change to burn 36.9 g hydrogen sulfide.

6) You wish to heat water to make coffee. How much heat (in J) must be used to raise the temperature of 0.180 kg of tap water (enough for one cup of coffee) from 15°C to 96°C (near the ideal brewing temperature)? Assume the specific heat is that of pure water, $4.184 \text{ J/g}\cdot^\circ\text{C}$

Enthalpy Practice Problems

7) When a 6.50 g sample of solid sodium hydroxide dissolves in 100.0 g of water in a coffee-cup calorimeter, the temperature rises from 21.6°C to 37.8°C. Calculate Change in H (in kJ/mol NaOH) for the solution process $\text{NaOH}_{(s)} \rightarrow \text{Na}^+_{(aq)} + \text{OH}^-_{(aq)}$

Assume that the specific heat of the solution is the same as that of pure water.

8) When a 4.25 g sample of solid ammonium nitrate dissolves in 60.0 g of water in a coffee-cup calorimeter, the temperature drops from 22.0°C to 16.9°C. Calculate Change in H (in kJ/mol of NH_4NO_3) for the solution process



Assume that the specific heat of the solution is the same as that of pure water.

9) The specific heat of toluene, C_7H_8 is 1.13 J/g•C°. How many joules of heat are needed to raise the temperature of 40.0 g of toluene from 10.4° C to 28.0°C?

10) When steam condenses to liquid water (a physical change of state), 2.26 kJ of heat is released per gram. The heat from 124 g of steam is used to heat a room containing 6.44 x 10⁴ g of air (20ft. x 12ft. x 8ft.). The specific heat of air at normal pressure is 1.015 J/g•C°. What is the change in air temperature, assuming the heat from the steam is all absorbed by the air?

11) An iron skillet weighing 1.51 kg is heated on a stove to 178°C. Suppose the skillet is cooled to room temperature, 21°C. How much heat energy (in kJ) is must be removed to effect this cooling? The specific heat of iron is 0.450 J/g•C°