

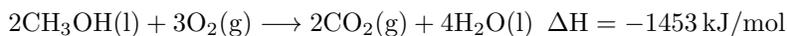
# Non Sibi High School

Andover's Chem 250: Introductory/Basic Chemistry

Chapter 13, Review Quiz 1

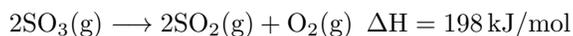
## 1

If 125 kilograms of methanol,  $\text{CH}_3\text{OH}$ , is burned according to the combustion equation below, how much heat will be released?



## 2

If 3.55 kJ of heat are absorbed during the decomposition reaction below, how many milliliters of sulfur trioxide gas, measured at  $22^\circ\text{C}$  and 712 mmHg, will decompose?

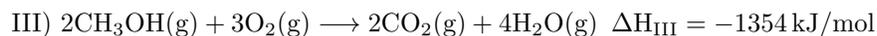
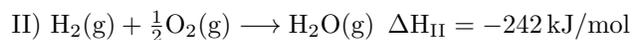
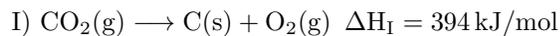


## 3

For the reaction  $2\text{C}_3\text{H}_7\text{OH}(g) + 9\text{O}_2(g) \longrightarrow 6\text{CO}_2(g) + 8\text{H}_2\text{O}(g)$ , estimate  $\Delta H$  using average bond energies.

## 4

Calculate  $\Delta H$  for the reaction  $\text{C}(s) + 2\text{H}_2(g) + \frac{1}{2}\text{O}_2(g) \longrightarrow \text{CH}_3\text{OH}(g)$  using the following three reactions:



## 5

Write the balanced formation reaction, including physical states, for solid sodium iodate,  $\text{NaIO}_3$ .

## 6

Calculate  $\Delta H^\circ$  for the reaction  $2\text{NO}(\text{g}) + \text{O}_2(\text{g}) \longrightarrow 2\text{NO}_2(\text{g})$  using the following information:

Compound	$\Delta H_f^\circ$ (kJ/mol)
$\text{NO}(\text{g})$	90.
$\text{NO}_2(\text{g})$	33

## 7

The specific heat of magnesium metal is  $1.05 \text{ J/g}\cdot^\circ\text{C}$ . How much heat in kilojoules is lost when a 225 gram sample of magnesium metal is cooled from  $625^\circ\text{C}$  to  $125^\circ\text{C}$ ?

## 8

In an insulated calorimeter, a 475 gram piece of tin metal originally at  $132^\circ\text{C}$  was added to 135 grams of water originally at  $19^\circ\text{C}$ . The final temperature of the tin-water mixture was  $36^\circ\text{C}$ . Determine the specific heat of tin.

## 9

The specific heat of tungsten metal is  $0.13 \text{ J/g}\cdot^\circ\text{C}$ . In an insulated calorimeter, a 955 gram piece of tungsten metal originally at  $375^\circ\text{C}$  was added to 725 grams of water originally at  $18^\circ\text{C}$ . Determine the final temperature of the tungsten-water mixture.

## 10

In an insulated calorimeter, 18.2 grams of solid cesium hydroxide at  $22.3^\circ\text{C}$  was dissolved in 135.7 grams of water also at  $22.3^\circ\text{C}$ , after which the final temperature of the mixed solution was  $36.9^\circ\text{C}$ . If the specific heat of the mixed solution was  $3.87 \text{ J/g}\cdot^\circ\text{C}$ , determine  $\Delta H$  for the dissolving process  $\text{CsOH}(\text{s}) \longrightarrow \text{CsOH}(\text{aq})$  in kJ/mol  $\text{CsOH}$ .

## 11

In an insulated calorimeter, 55.7 mL of 1.91 M acetic acid was mixed with 62.6 mL of 1.83 M sodium hydroxide, with both solutions originally at 18.2°C. The final temperature of the mixed solutions was 30.1°C. The density of the mixed solutions was 1.03 g/mL and the specific heat of the mixed solutions was 3.96 J/g·°C. Write a balanced molecular equation, including physical states, and determine  $\Delta H$  for the neutralization reaction in kJ/mol of water formed.

## 12

Consider the following data for methanol, CH<sub>3</sub>OH:

melting point = -98°C  
boiling point = 65°C  
 $\Delta H_{\text{fusion}} = 3.2 \text{ kJ/mol}$   
 $\Delta H_{\text{vaporization}} = 38 \text{ kJ/mol}$   
specific heat of liquid methanol = 2.5 J/g·°C  
specific heat of methanol vapor = 1.7 J/g·°C

Sketch a heating curve that depicts solid methanol at -98°C being heated to 88°C and then calculate the total amount of heat in kilojoules absorbed when 77 grams of methanol undergoes this process.



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