

## 1210 Review Quiz

Name: Kery

## Question 1

Give the number of protons, electrons, and neutrons in each atom or ion

	$e^-$	$p^+$	$n$
$^{27}\text{Al}$	13	13	14
$^{127}\text{I}^-$	54	53	74
$^{40}\text{Ca}^{2+}$	18	20	20

## Question 2

A coffee-cup calorimeter contains 150.0 g of pure water. When 5.75 g of ammonium nitrate are added to the water, they dissolve and the solution temperature drops by 2.83 °C. What is the enthalpy of solvation for ammonium nitrate?

$$M_{\text{NH}_4\text{NO}_3} = 80.043 \text{ g/mol}$$

$$\frac{5.75 \text{ g NH}_4\text{NO}_3}{80.043 \text{ g NH}_4\text{NO}_3 \text{ mol}^{-1}} = 0.07184 \text{ mol NH}_4\text{NO}_3$$

$$q_{\text{cal}} = m C_s \Delta T = 155.75 \text{ g} \cdot 4.184 \text{ J/g}^\circ\text{C} \cdot -2.83^\circ\text{C} = -1,844 \text{ J}$$

$$q_{\text{sys}} = -q_{\text{cal}} = 1.844 \text{ kJ}$$

$$\Delta H_{\text{solv}} = \frac{q_{\text{sys}}}{n} = \frac{1.844 \text{ kJ}}{0.07184 \text{ mol}} = 25.7 \text{ kJ/mol}$$

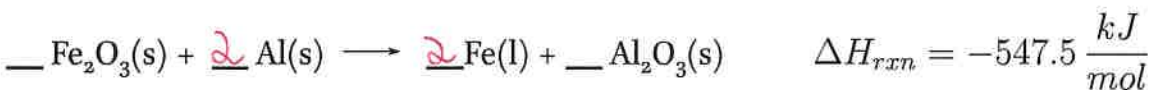
## Question 3

Give the name or formula for each of the following compounds. For molecular compounds, draw the correct Lewis structure:

Name	Formula	Lewis Structure
Calcium Phosphate	<u><math>\text{Ca}_3(\text{PO}_4)_2</math></u>	
<u>Manganese(III) Sulfide</u>	$\text{Mn}_2\text{S}_3$	
Dinitrogen Trioxide	<u><math>\text{N}_2\text{O}_3</math></u>	
<u>Sulfur hexafluoride</u>	$\text{SF}_6$	
Nitric acid	<u><math>\text{HNO}_3</math></u>	
<u>Sulfurous acid</u>	$\text{H}_2\text{SO}_3$	

**Question 4**

Consider the thermite reaction:



Note the very exothermic enthalpy of this reaction, which leads to the iron product being molten.

o First, balance this reaction

o If 2.5 g of Al react with 5.0 g of  $\text{Fe}_2\text{O}_3$ , how many g of molten iron will be produced?

$$\begin{array}{c|c|c|c} 2.5 \text{ g Al} & 1 \text{ mol Al} & 2 \text{ mol Fe} & 55.85 \text{ g Fe} \\ \hline & 26.98 \text{ g Al} & 2 \text{ mol Al} & 1 \text{ mol Fe} \end{array} = 5.175 \text{ g Fe}$$

$$\begin{array}{c|c|c|c} 5.0 \text{ g Fe}_2\text{O}_3 & 1 \text{ mol Fe}_2\text{O}_3 & 2 \text{ mol Fe} & 55.85 \text{ g Fe} \\ \hline & 159.69 \text{ g Fe}_2\text{O}_3 & 1 \text{ mol Fe}_2\text{O}_3 & 1 \text{ mol Fe} \end{array} = 3.497 \text{ g Fe}$$

$$3.5 \text{ g Fe}$$

o How many J of heat will be released?

$$\begin{array}{c|c|c} 5.0 \text{ g Fe}_2\text{O}_3 & 1 \text{ mol Fe}_2\text{O}_3 & 547.5 \text{ kJ} \\ \hline & 159.69 \text{ g Fe}_2\text{O}_3 & 1 \text{ mol Fe}_2\text{O}_3 \end{array} = 17 \text{ kJ of heat}$$

**Question 5**

Predict the products and write a balanced chemical equation for the reaction between sulfuric acid and aqueous calcium hydroxide.

