1. (3 points) Find the oxidation number of the underlined element in each of the following species.

\[
\text{NH}_4^+ \quad +3 \\text{P} \quad +5 \\text{H}_3\text{PO}_4 \quad +5
\]

2. (2 points) A particular substance has a specific heat capacity of 2.0 J/mol·°C. How much heat would have to be added to a 10.0-g sample to increase its temperature from 25.0 °C to 35.0 °C?

\[
Q = C_s \times m \times \Delta T = 2.0 \times \frac{J}{mol \cdot ^\circ C} \times 10.0 \, g \times (35.0 - 25.0) \, ^\circ C = 200 \, J
\]

3. (3 points) A particular substance has a specific heat capacity of 2.0 J/mol·°C. If 40 J of heat were added to a 10.0-g sample of this substance, how much would the temperature change?

\[
\Delta T = \frac{Q}{C_s \times m} = \frac{40 \, J}{2.0 \times \frac{J}{mol \cdot ^\circ C} \times 10.0 \, g} = 2 ^\circ C
\]

4. (2 points) Which one of the following represents a formation reaction used to define the standard enthalpy of formation? Circle the correct answer.

a. \(2 \text{ P(s) + 3 Cl}_2 \text{(g) \rightarrow 2 PCl}_3 \text{(g)}\)

b. \(\text{HCl(aq) + AgNO}_3 \text{(aq) \rightarrow HNO}_3 \text{(aq) + AgCl (s)}\)

c. \(3 \text{ Ba(s) + N}_2\text{(g) \rightarrow Ba}_3\text{N}_2 \text{(s)}\)

d. \(\text{P}_2\text{O}_5 \text{(g) \rightarrow 2 P(s) + 5/2 O}_2 \text{(g)}\)

\[
q = C_s \times m \times \Delta T
\]
CHEM 1364  
Thursday Quiz #10  
April 4, 2013  
Spring 2013 (Buckley)

1. (3 points) Find the oxidation number of the underlined element in each of the following species.

\[ \text{NH}_4^+ \quad 3 \qquad \text{P}_4 \quad 3 \qquad \text{H}_3\text{PO}_4 \quad 3 \]

2. (2 points) A particular substance has a specific heat capacity of 3.0 J/mol·°C. How much heat would have to be added to a 20.0-g sample to increase its temperature from 25.0 °C to 35.0 °C?

\[ Q = C \times m \times \Delta T = 3.0 \text{J/mol·°C} \times 20.0 \text{g} \times (35.0 - 25.0)°C \]

\[ = 600 \text{J} \]

3. (3 points) A particular substance has a specific heat capacity of 3.0 J/mol·°C. If 90 J of heat were added to a 10.0-g sample of this substance, how much would the temperature change?

\[ \Delta T = \frac{Q}{C \times m} = \frac{90 \text{J}}{3.0 \text{J/mol·°C} \times 10.0 \text{g}} \]

\[ = 3 \text{°C} \]

4. (2 points) Which one of the following represents a formation reaction used to define the standard enthalpy of formation? Circle the correct answer.

- a. \( 3 \text{ Ca(s) + N}_2\text{(g) \rightarrow Ca}_3\text{N}_2 \text{(s)} } \)
  
- b. \( \text{HBr(aq) + AgNO}_3 \text{(aq) \rightarrow HNO}_3 \text{(aq) + AgBr(s) } \)
  
- c. \( 2 \text{ As(s) + 3 Br}_2 \text{(g) \rightarrow 2 AsBr}_3 \text{(g) } \)
  
- d. \( \text{P}_2\text{O}_5 \text{(g) \rightarrow 2 P(s) + 5/2 O}_2 \text{(g) } \)

\[ q = C \times m \times \Delta T \]
1. (3 points) Find the oxidation number of the underlined element in each of the following species.

\[
\text{NO}_3^- \quad \text{+5} \\
\text{Ni}^3 \quad \text{+3} \\
\text{H}_2\text{CO}_3 \quad \text{+4}
\]

2. (2 points) A particular substance has a specific heat capacity of 4.0 J/mol°C. How much heat would have to be added to a 10.0-g sample to increase its temperature from 25.0 °C to 35.0 °C?

\[
Q = C \times m \times \Delta T = 4.0 \text{ J/mol°C} \times 10.0 \text{ g} \times (35.0 °C - 25.0 °C) = 400 \text{ J}
\]

3. (3 points) A particular substance has a specific heat capacity of 4.0 J/mol°C. If 200 J of heat were added to a 10.0-g sample of this substance, how much would the temperature change?

\[
\Delta T = \frac{Q}{C \times m} = \frac{200 \text{ J}}{4.0 \text{ J/mol°C} \times 10.0 \text{ g}} = 5.0 °C
\]

4. (2 points) Which one of the following represents a formation reaction used to define the standard enthalpy of formation? Circle the correct answer.

a. \( \text{P}_2\text{O}_5 (g) \rightarrow 2 \text{ P(s)} + \frac{5}{2} \text{ O}_2 (g) \)

b. \( 3 \text{ Sr(s)} + \text{ N}_2(g) \rightarrow \text{ Sr}_3\text{N}_2 (s) \)

c. \( \text{HI(aq)} + \text{ AgNO}_3 (aq) \rightarrow \text{ HNO}_3 (aq) + \text{ AgI (s)} \)

d. \( 2 \text{ P(s)} + 5 \text{ Cl}_2 (g) \rightarrow 2 \text{ PCl}_5 (g) \)

\[ q = C_s \times m \times \Delta T \]
1. (3 points) Find the oxidation number of the underlined element in each of the following species.

\[ \text{NO}_2^- \quad +3 \quad \text{AsI}_3 \quad +3 \quad \text{H}_2\text{SO}_4 \quad +6 \]

2. (2 points) A particular substance has a specific heat capacity of 5.0 J/mol·°C. How much heat would have to be added to a 10.0-g sample to increase its temperature from 25.0 °C to 35.0 °C?

\[ q = C_s \times m \times \Delta T = 5.0 \frac{J}{mol \cdot ^\circ C} \times 10.0 \text{ g} \times (35.0 ^\circ C - 25.0 ^\circ C) = 500 \text{ J} \]

3. (3 points) A particular substance has a specific heat capacity of 5.0 J/mol·°C. If 100 J of heat were added to a 10.0-g sample of this substance, how much would the temperature change?

\[ \Delta T = \frac{q}{C_s \times m} = \frac{100 \text{ J}}{5.0 \frac{J}{mol \cdot ^\circ C} \times 10.0 \text{ g}} = 2.0 ^\circ C \]

4. (2 points) Which one of the following represents a formation reaction used to define the standard enthalpy of formation? Circle the correct answer.

a. \( \text{P}_2\text{O}_5 (g) \rightarrow 2 \text{ P(s) } + \frac{5}{2} \text{ O}_2 (g) \)

b. \( \text{HBr(aq) } + \text{AgNO}_3 (aq) \rightarrow \text{HNO}_3 (aq) + \text{AgBr (s)} \)

c. \( 2 \text{ P(s) } + 3 \text{ Cl}_2 (g) \rightarrow 2 \text{ PCl}_3 (g) \)

d. \( 3 \text{ Mg(s) } + \text{N}_2(g) \rightarrow \text{Mg}_3\text{N}_2 (s) \)

\[ q = C_s \times m \times \Delta T \]