This print-out should have 13 questions. Multiple-choice questions may continue on the next column or page – find all choices before answering.

**Heat propane**

001 10.0 points

The value of $\Delta H$ for the reaction

$$C_3H_8(g) + 5 O_2(g) \rightarrow 3 CO_2(g) + 4 H_2O(\ell)$$

is $-2220$ kJ/mol rxn. How much heat is given off when 11.0 g of propane gas ($C_3H_8$) is burned at constant pressure?

1. 25.96 kJ
2. 555.0 kJ
3. 50.5 kJ
4. 22420.0 kJ
5. 2220.0 kJ
6. 6660.0 kJ
7. 1665.0 kJ

**Calor of X**

004 10.0 points

When 0.399 g of compound X is burned completely in a bomb calorimeter containing 3000 g of water, a temperature rise of 0.464°C is observed. What is $\Delta U_{rxn}$ for the combustion of compound X? The hardware component of the calorimeter has a heat capacity of 3.85 kJ/°C. The specific heat of water is 4.184 J/g·°C, and the MW of X is 56.0 g/mol.

Answer in units of kJ/mol

**ChemPrin3e 06 54**

005 10.0 points

In the manufacture of nitric acid by the oxidation of ammonia, the first product is nitric oxide. The nitric oxide is then oxidized to nitrogen dioxide:

$$2 NO(g) + O_2(g) \rightarrow 2 NO_2(g)$$

Calculate the standard reaction enthalpy for the reaction above (as written) using the following data:

$$N_2(g) + O_2(g) \rightarrow 2 NO(g) \quad \Delta H^\circ = 180.5 \text{ kJ}$$

$$N_2(g) + 2 O_2(g) \rightarrow 2 NO_2(g) \quad \Delta H^\circ = 66.4 \text{ kJ}$$

1. $-100.3 \text{ kJ/mol rxn}$
2. $-520.2 \text{ kJ/mol rxn}$
3. $-114.1 \text{ kJ/mol rxn}$
4. $-975.0 \text{ kJ/mol rxn}$
5. $-128.2 \text{ kJ/mol rxn}$
6. $-252.4 \text{ kJ/mol rxn}$

**ChemPrin3e 06 46**

002 10.0 points

For a certain reaction at constant pressure, $\Delta U = -50$ kJ, and 42 kJ of expansion work is done by the system. What is $\Delta H$ for this process?

Answer in units of kJ

**Msci 15 0403**

003 10.0 points

A 1.00 g sample of $n$-hexane ($C_6H_{14}$) undergoes complete combustion with excess $O_2$ in a bomb calorimeter. The temperature of the 1502 g of water surrounding the bomb rises from 22.64°C to 29.30°C. The heat capacity of the hardware component of the calorimeter (everything that is not water) is 4042 J/°C. What is $\Delta U$ for the combustion of $n$-$C_6H_{14}$? One mole of $n$-$C_6H_{14}$ is 86.1 g. The specific heat of water is 4.184 J/g·°C.

1. $-4.52 \times 10^4 \text{ kJ/mol}$
2. $-1.15 \times 10^4 \text{ kJ/mol}$
3. $-7.40 \times 10^4 \text{ kJ/mol}$
4. $-9.96 \times 10^4 \text{ kJ/mol}$
5. $-5.92 \times 10^4 \text{ kJ/mol}$
7. \(-690.72 \text{ kJ/mol rxn}\)

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**Holt da 17 review 39**  
007 10.0 points

Consider the reaction

\[
4 \text{FeO(s)} + \text{O}_2(g) \rightarrow 2 \text{Fe}_2\text{O}_3(s)
\]

and heat-of-formation data

- \(\text{Fe} + \frac{1}{2} \text{O}_2(g) \rightarrow \text{FeO} \quad \Delta \text{H} = -272 \text{ kJ/mol}\)
- \(2 \text{Fe} + \frac{3}{2} \text{O}_2 \rightarrow \text{Fe}_2\text{O}_3 \quad \Delta \text{H} = -822 \text{ kJ/mol}\)

Find the change in enthalpy.
Your answer must be within \(\pm 0.1\%\)

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**Msci 15 0510**  
009 10.0 points

Consider the following substances:

- HCl(g)
- F\(_2\)(g)
- HCl(aq)
- Na(s)

Which response includes ALL of the substances listed that have \(\Delta H_f^0 = 0\)?

1. Na(s)
2. Na(s) and F\(_2\)(g)
3. HCl(g), Na(s), HCl(aq) and F\(_2\)(g)
4. HCl(g), Na(s) and F\(_2\)(g)
5. HCl(g) and Na(s)

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**Identify Metal**  
010 10.0 points

55 kJ of heat are added to 200 kg of a metal at 28.00°C and the temperature rises to 29.18°C. What was the metal?

1. tungsten (specific heat = 0.134 J/g·°C)
2. copper (specific heat = 0.385 J/g·°C)
3. silver (specific heat = 0.233 J/g·°C)
4. lead (specific heat = 0.127 J/g·°C)

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**CIC Specific Heat 1 W**  
011 10.0 points

Consider the following specific heats: copper, 0.384 J/g·°C; lead, 0.159 J/g·°C; water, 4.18 J/g·°C; glass, 0.502 J/g·°C. Which substance, once warmed, would be more likely to maintain its heat and keep you warm through a
long football game on a cold night?

1. water
2. lead
3. copper
4. glass

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**SPARKS FE 0012**

012  10.0 points

Substance A has a higher specific heat than Substance B. Equal mass samples of each of these substances start at the same temperature. If an equal amount of heat is added to each sample, which will have the higher final temperature? Assume a closed, insulated system and that neither substance undergoes a phase change.

1. Sample B
2. Sample A
3. Cannot tell from the information given
4. Both will have the same final temperature.

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**Msci 15 0908**

013  10.0 points

For the reaction

\[
\text{H}_2(\text{g}) + \text{Cl}_2(\text{g}) \rightarrow 2 \text{HCl}(\text{g})
\]

at constant temperature and pressure, we would expect

1. \(\Delta H > \Delta E\).
2. \(\Delta H = \Delta E\).
3. \(\Delta H \leq \Delta E\).
4. \(\Delta H < \Delta E\).
5. \(\Delta H \geq \Delta E\).