**Name: Period: Seat#:**

**Worksheet #7**

**MOLAR HEATS**

|  |
| --- |
| 1. How much energy does it take to heat a 3.45 mole sample of silver from 15°C to 120°C if the specific heat of silver  is 0.240 J/g°C? *9378.18 J* |
| 1. If the temperature of a 50.0 gram block of aluminum increases by 10.9K when heated by 500 Joules, calculate the specific heat of the aluminum block and the molar heat capacity of the aluminum block. *0.917 J/g°C, 24.8 J/mol°C* |
| 1. The specific heat of gold is 0.128 J/g•K. Calculate the molar heat capacity. *25.21 J/mol•K* |
| 1. Calculate the amount of heat necessary to melt 27 grams of ice if the molar heat of fusion of ice is 6.009 kJ/mol. Use the molar heat value given here (not regular latent heat in grams), and get your answer in kJ. *9.01 kJ* |
| 1. If the molar heat capacity of Magnesium is 24.89 J/mol•K, calculate the energy required to heat 35 grams of magnesium from 30°C to 55°C. *895.9 J* |

**HEATS OF REACTION**

|  |  |
| --- | --- |
| 1. B2O3 + 3H2O 🡪 3O2 + B2H6 ∆H = +2035 kJ    1. Is this reaction endo or exothermic?    2. Rewrite the equation with the heat written as a reactant or a product based on your answer to part A    3. How much energy is involved when 15 grams of B2O3 is reacted, and is it absorbed or released? *436.6 kJ* | |
| 1. If the ∆Hrxn for the combustion of tetracarbon decahydride is -5756 kJ/molrxn, how much energy is released when 50 grams of the fuel is combusted? *-2475.9 kJ* | |
| 1. CH4 + 2O2 🡪 CO2 + 2H2O ∆H° = -890.4 kJ/molrxn a. How much energy is given off when 2.50 mol of CH4 are burned? *-2226 kJ*   b. How much energy is released when 22.4 g of O2 are consumed while excess CH4 is burned? *-311.64 kJ* | |
| 1. Sometimes you don’t know what the heat of reaction is for a given equation. BUT if you know how much energy it takes to FORM each of the chemicals in the reaction, then you can figure out what the heat of reaction is for the equation you are interested in! **∆H°*rxn* = ∆H°*formation* Products - ∆H°*formation* Reactants** *Don’t forget you want to take into account the number of moles of each product and reactant in the balanced equation!*     1. Calculate the ∆H°*rxn* for the combustion of methane using the “Heats of Formation” given below. *-890.36 kJ*   CH4 + 2O2 🡪 CO2 + 2H2O     * 1. What do you notice about your answer to #9 and the ∆H° value you were given for the combustion of methane in #8 ? | |
| 1. Ethanol is used as an additive in many fuels today. What is the ∆H°rxn for the combustion of ethanol? *-2470. kJ*   2C2H5OH + 6O2 🡪 4CO2 + 6H2O | |
| 1. What would ∆H° be for the reverse of the reaction below?  SrO (s) + CO2 (g) 🡪 SrCO (s) ∆H° = -234 kJ/mol | 1. What would ∆H° be for double the reaction below?  SrO (s) + CO2 (g) 🡪 SrCO (s) ∆H° = -234 kJ/mol |
| 1. Find ∆H° for the reaction below, using the steps provided. *-58 kJ* 2 NO2 (g) 🡪 N2O4 (g) 2. N2 (g) + 2 O2 (g) 🡪 2 NO2 (g)) ∆H° = 67.7 kJ 3. N2 (g) + 2 O2 (g) 🡪 N2O4 (g) ∆H° = 9.7 kJ | |
| 1. Find ∆H° for the reaction below, using the steps provided. *15.3 kJ* 2C (s) + 2 H2O (g) 🡪 CH4 (g) + CO2 (g) 2. C (s) + H2O (g) 🡪 CO (g) + H2 (g) ∆H° = 131.3 kJ 3. CO (g) + H2O (g) 🡪 CO2 (g) + H2 (g) ∆H° = -41.2 kJ 4. CH4 (g) + H2O (g) 🡪 3H2 (g) + CO (g) ∆H° = 206.1 kJ | |
| 1. Find ∆H° for the reaction below, using the steps provided. *-30 kJ* A + B 🡪 C 2. 2A 🡪 2D∆H° = 110 kJ 3. D + B 🡪 C∆H° = -85 kJ | |

**BOND ENERGIES – use this table to perform any calculations.**

|  |  |  |
| --- | --- | --- |
|  | | 1. Fill in the blanks.   It \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  energy to break bonds  It \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ energy to form bonds  Breaking bonds is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  Forming bonds is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  Breaking bonds has a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ algebraic sign for ∆H°    Forming bonds has a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ algebraic sign for ∆H° |
| 1. Find ∆H° for the formation of water. 2 H2 + O2 🡪 2 H2O *-482 kJ*   H – H H – O – H  + O = O 🡪  H – H H – O – H | |
| 1. Find ∆H° for the combustion of methane. CH4 + 2O2 🡪 CO2 + 2H2O *-808 kJ*   How to determine the Lewis dot structure for methane - Quora  O = O H – O – H  + 🡪 O = C = O +  O = O H – O – H | |
| 1. Find the ∆H° for the reaction: CH4 + Cl2 🡪 CH3Cl + HCl *-104 kJ* | |
| 1. Find the ∆H° for the reaction: *-208 kJ*  \_\_\_\_\_\_CH4 + \_\_\_\_\_\_Cl2 🡪 \_\_\_\_\_\_CH2Cl2 + \_\_\_\_\_HCl | |

