Grossmont College Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Chemistry 141 Quiz 4 (24 points) March 11. 2016

1. (8 points) Calculate the heat of formation of MnO2(s) by using Hess’s law and the following reaction data:

Formation Equation for MnO2 (s) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. 2 MnO(s) 🡪 2 Mn(s) + O2(g) ΔH = 770.4 kJ
2. 2 MnO(s) + O2(g) 🡪 2 MnO2(s) ΔH = −269.7 kJ
3. For the balanced reaction

2 CH3OH (l) + 3 O2 (g) 🡪 2 CO2 (g) + 4 H2O (l)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Compound | ∆Hf° (kJ/mol) |  | Compound | ∆Hf° (kJ/mol) |
| CH3OH (aq) | -238.4 |  | CH3CH2OH (aq) | -277.7 |
| CO2 (aq) | -393.5 |  | H2O (l) | -285.8 |
| H2O (g) | -241.8 |  |  |  |

1. (4 points) Using heat of formation data from the table compute the standard enthalpy change (in kJ) for the reaction. Is the reaction endothermic or exothermic, and how can you tell?

1. (4 points) What mass of O2 (g) would you have to burn to get an enthalpy change of -555 kJ?

1. (8 points) A calorimeter is to be calibrated: 72.55 g of water at 71.6 °C added to a calorimeter containing 58.85 g of water at 22.4 °C. After stirring and waiting for the system to equilibrate, the final temperature reached 47.3 °C. Calculate the heat capacity of the calorimeter. (The specific heat capacity of water is 4.184 J g-1 ºC-1).