Chemistry 141 Name -

Dr. Cary Willard

Quiz 8A (20 points) March 17, 2011

1. (4 points) The standard molar enthalpy of formation ofliquid methanol, CH3OH is -238.7 kJ/mol. Write a balanced equation representing the reaction this Hfo describes.

C(s) + 2 H2(g) + ½ O2(g) 🡪 CH3OH(l)

1. (10 points) The first step in the production of nitric acid from ammonia involves the oxidation of NH3.

4 NH3(g) + 5 O2(g) 🡪 4 NO(g) + 6 H2O(g)

* 1. Using enthalpies of formation, determine the heat of reaction for this process.

|  |  |
| --- | --- |
|  | Hfo (kJ/mol) |
| NH3(g) | -46.11 |
| NH3(aq) | -80.29 |
| NO(g) | 90.25 |
| H2O(l) | -285.8 |
| H2O(g) | -241.8 |

* 1. Is this process endothermic or exothermic?

exothermic

* 1. Calculate the energy change when 25.0 grams of ammonia are converted to nitrogen monoxide.

1. (6 points) Estimate the heat of reaction for the reaction below using bond energies.



Bonds broken

1 C≡C + 837 kJ

2 Br-Br 2 (192 kJ) = + 384 kJ

Total + 1221 kJ

Bonds formed

1 C-C - 347 kJ

4 C-Br 4(- 276 kJ) = -1104 kJ

Total - 1451 kJ

Estimated heat of reaction - 230 kJ

Chemistry 141 Name -

Dr. Cary Willard

Quiz 8B (20 points) March 17, 2011

1. (4 points) The standard molar enthalpy of formation of ethanol, CH3CH2OH is -277.7 kJ/mol. Write a balanced equation representing the reaction this Hfo describes.

2 C(s) + 3 H2(g) + ½ O2(g) 🡪 CH3CH2OH(l)

1. (10 points) The first step in the production of nitric acid from ammonia involves the oxidation of NH3.

4 NH3(g) + 5 O2(g) 🡪 4 NO(g) + 6 H2O(g)

* 1. Using enthalpies of formation, determine the heat of reaction for this process.

|  |  |
| --- | --- |
|  | Hfo (kJ/mol) |
| NH3(g) | -46.11 |
| NH3(aq) | -80.29 |
| NO(g) | 90.25 |
| H2O(l) | -285.8 |
| H2O(g) | -241.8 |

* 1. Is this process endothermic or exothermic?

exothermic

* 1. Calculate the energy change when 15.0 grams of ammonia are converted to nitrogen monoxide.

1. (6 points) Estimate the heat of reaction for the reaction below using bond energies.



Bonds broken

1 C≡C + 837 kJ

2 Cl-Cl 2 (243 kJ) = + 486 kJ

Total + 1323 kJ

Bonds formed

1 C-C - 347 kJ

4 C-Cl 4(- 330 kJ) = -1320 kJ

Total - 1667 kJ

Estimated heat of reaction - 344 kJ