**Hess's Law Worksheet** Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Calculate H for the reaction 4 NH3 (g) + 5 O2 (g) 🡪 4 NO (g) + 6 H2O (g), from the following data.

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| N2 (g) + O2 (g) 2 NO (g) | H = -180.5 kJ |
| N2 (g) + 3 H2 (g) 2 NH3 (g) | H = -91.8 kJ |
| 2 H2 (g) + O2 (g) 2 H2O (g) | H = -483.6 kJ |

1. Find H° for the reaction 2H2(g) + 2C(s) + O2(g) 🡪 C2H5OH(l), using the following thermochemical data.

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| C2H5OH (l) + 2 O2 (g) 2 CO2 (g) + 2 H2O (l) | H = -875 kJ |
| C (s) + O2 (g) CO2 (g) | H = -394.51 kJ |
| H2 (g) + ½ O2 (g) H2O (l) | H = -285.8 kJ |

1. Calculate H for the reaction CH4 (g) + NH3 (g) 🡪 HCN (g) + 3 H2 (g), given:

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| N2 (g) + 3 H2 (g) 2 NH3 (g) | H = -91.8 kJ |
| C (s) + 2 H2 (g) CH4 (g) | H = -74.9 kJ |
| H2 (g) + 2 C (s) + N2 (g) 2 HCN (g) | H = +270.3 kJ |

# Heat of Formation Worksheet

Use a standard enthalpies of formation table to determine the change in enthalpy for each of these reactions. 

a) NaOH(s) + HCl(g) ----> NaCl(s) + H2O(g)

1. 2 CO(g) + O2(g) ---> 2 CO2(g)
2. CH4(g) + 2 O2(g) ---> CO2(g) + 2 H2O(l)
3. 2 H2S(g) + 3 O2(g) ---> 2 H2O(l) + 2 SO2(g)

e) 2 NO(g) + O2(g) ---> 2 NO2(g)

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| --- | --- | --- | --- |
| Compound | Hf (kJ/mol) | Compound | ΔHf (kJ/mol) |
| CH4(g) | -74.8 | HCl(g) | -92.3 |
| CO2(g) | -393.5 | H2O(g) | -241.8 |
| NaCl(s) | -411.0 | SO2(g) | -296.1 |
| H2O(l) | -285.8 | NH4Cl(s) | -315.4 |
| H2S(g) | -20.1 | NO(g) | +90.4 |
| H2SO4(l) | -811.3 | NO2(g) | +33.9 |
| MgSO4(s) | -1278.2 | SnCl4(l) | -545.2 |
| MnO(s) | -384.9 | SnO(s) | -286.2 |
| MnO2(s) | -519.7 | SnO2(s) | -580.7 |
| NaCl(s) | -411.0 | SO2(g) | -296.1 |
| NaF(s) | -569.0 | SO3(g) | -395.2 |
| NaOH(s) | -426.7 | ZnO(s) | -348.0 |
| NH3(g) | -46.2 | ZnS(s) | -202.9 |