SI Worksheet

4/14/22

Agenda:

Worksheet

1. Suppose 40.00 J of energy is transferred by heat to a system, while the system does 10.00 J of work. Later, heat transfers 25.00 J out of the system, while 4.00 J is done by work on the system. What is the net change in the system’s internal energy?
2. A piece of unknown metal weighs 348 g. When the metal piece absorbs 6.64 kJ of heat, its temperature increases from 22.4 °C to 43.6 °C. Determine the specific heat of this metal and use the table below to determine the identity of the unknown metal.

|  |  |
| --- | --- |
| **Substance** | **Specific Heat (J/g\*C)** |
| Helium | 5.193 |
| Oxygen | 0.918 |
| Aluminum | 0.897 |
| Lead | 0.130 |

1. A 13.5 g sample of gold is heated, then places in a calorimeter containing 60.0 g of water. Temperature of water increases from 19.00 C to 20.00 C. The specific heat of gold is 0.130 J/gC. What was the initial temperature of the gold metal sample?
2. Given:

|  |  |
| --- | --- |
| N2O4 (g) → 2 NO2 (g) | ∆H°1= +58 kJ |
| NO (g) + ½ O2 (g) → NO2(g) | ∆H°2 = -56 kJ |

Calculate the standard enthalpy change for the following reaction:

**2 NO (g) + O2 (g) 🡪 N2O4 (g)**

1. Calculate the ΔH°rxn for the reaction:

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

from the following data:

|  |  |
| --- | --- |
| N2 (g) + O2 (g) 🡪 2 NO (g) | ΔH1 = − 180.5 kJ |
| N2 (g) + 3H2 (g) 🡪 2 NH3 | ΔH2 = − 91.8 kJ |
| 2 H2 (g) + O2 (g) 🡪 2 H2O (g) | ΔH3 = − 483.6 kJ |

1. If time…

Calculate the ΔH°rxn for the reaction:

**CH4 (g) + NH3 (g) 🡪 HCN (g) + 3H2 (g)**

from the following data:

|  |  |
| --- | --- |
| N2 (g) + 3H2 (g) 🡪 2 NH3 (g) | ΔH = − 91.8 kJ |
| C(s) + 2 H2 (g) 🡪 CH4 (g) | ΔH = − 74.9 kJ |
| H2 (g) + 2 C(s) + N2 (g) 🡪 2 HCN (g) | ΔH = + 270.3 kJ |