PLI Worksheet #8
Monday, 14 June 2021

1. **Suppose a piece of iron (specific heat capacity = 0.449 J/g*K) with a mass of 21.5 g at a temperature of 100.0°C is dropped into an insulated container of water. The mass of the water is 132.0 g and its temperature before adding the iron is 20.0°C. What will be the final temperature of the system once thermal equilibrium is reached? (specific heat capacity of water = 4.184 J/g*K)**

2. **What mass of ice can be melted with the same quantity of heat as required to raise the temperature of 3.50 mol H 2 O (l) by 50.0 ° C? ($D_H$fusion for H_2O (s) = 6.01 kJ mol^{-1})**

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3. **Menthol, the substance we can smell in mentholated cough drops, is composed of C, H, and O. A 0.1005-g sample of menthol is combusted, producing 0.2829 g of CO_2 and 0.1159 g of H_2O. What is the empirical formula for menthol? If menthol has a molar mass of 156 g/mol, what is its molecular formula?**

4. **It takes 83 mL of a 0.45 M NaOH solution to neutralize 235 mL of an HCl solution. What is the concentration of the HCl solution?**

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5. **A solution of 100.0 mL of 0.200 M KOH is mixed with a solution of 200.0 mL of 0.150 M $NiSO_4$**

    a. **Write the balanced chemical equation for the reaction that occurs.**

    b. **What precipitate forms? Write the net ionic equation**

    c. **How many grams of this precipitate form?**

    d. **What is the concentration of each ion that remains in solution?**

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6.

a. **You have a stock solution of 14.8 M NH_3. How many milliliters of this solution should you dilute to make 1000.0 mL of 0.250 M NH_3?**

b. **If you take a 10.0-mL portion of the stock solution and dilute it to a total volume of 0.500 L, what will be the concentration of the final solution?**