

Answer on Question #63679 - Chemistry - Organic Chemistry

Question

A 26.4-g iron rod, initially at 19.6°C, is submerged into an unknown mass of water at 68.2°C, in an insulated container. The final temperature of the mixture upon reaching thermal equilibrium is 64.6°C. What is the mass of the water?

Solution:

$$Q_1 = c_{\text{Fe}} * m_{\text{Fe}} * \Delta T_1$$

$$Q_2 = c_{\text{H}_2\text{O}} * m_{\text{H}_2\text{O}} * \Delta T_2$$

$$Q_1 = -Q_2$$

$$m_{\text{H}_2\text{O}} = -(c_{\text{Fe}} * m_{\text{Fe}} * \Delta T_1) / (c_{\text{H}_2\text{O}} * \Delta T_2) = -(444 * 26.4 * 10^{-3} * 45) / (4187 * (-3.6)) = 35 * 10^{-3} \text{ kg} = 35\text{g}$$

Answer: 35g

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