

Answer on Question #56492 – Chemistry - General Chemistry

Question:

- a) in an experiment involving the exothermic dissolution of a salt, the salt did not dissolve completely how would this affect the calculated heat of solution
- b) after ensuring all the product had precipitated out the beakers containing the precipitate were heated on a hotplate for 20 minutes. What is this process called and why is it used?
- c) A student used 15.37 ml of 0.1055 M NaOH to reach the end point. If he used 5 ml of vinegar in this titration calculate the mass % of acetic acid in vinegar. Assume the density of vinegar to be 1.00 g/ml.
- d) If 32.7 cal of heat is removed from 17.8 g of copper, the temp decreased to 15.2°C. What was the initial temp of the copper. The specific heat of copper is 0.0908 cal/gC.

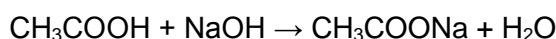
Answer:

- a) Heat output from dissolution process will be lower than the calculated one.
- b) Precipitate heat treatment is the most widespread technique to increase the yield of precipitate. The process is called "precipitate hardening".

$$c) v = \frac{m}{M}$$

$$C_M = \frac{v}{V}$$

$$\rho = \frac{m}{V}$$



$$v(\text{NaOH}) = C_M V = 0.1055 \cdot 15.37 = 1.62 \text{ mmol}$$

According to the reaction, $v(\text{NaOH}) = v(\text{CH}_3\text{COOH})$

$$m(\text{CH}_3\text{COOH}) = v(\text{CH}_3\text{COOH}) \cdot M(\text{CH}_3\text{COOH})$$

$$M(\text{CH}_3\text{COOH}) = 48.04 \text{ g/mol}$$

$$m(\text{CH}_3\text{COOH}) = 0.00162 \cdot 48.04 = 0.08 \text{ g}$$

$$\%(\text{CH}_3\text{COOH}) = \frac{m(\text{CH}_3\text{COOH})}{m(\text{solution})} \cdot 100$$

$$\%(\text{CH}_3\text{COOH}) = \frac{0.08}{5 \cdot 1.00} \cdot 100 = 1.6\%$$

$$d) Q = mC\Delta T$$

$$32.7 = 17.8 \cdot 0.0908 \cdot (x_1 - 15.2)$$

$$x_1 = \frac{32.7}{17.8 \cdot 0.0908} + 15.2 = 35.5^\circ\text{C}$$