Answer on Question #62392, Chemistry / General Chemistry

Problem 3.84 (Chapter 4)

The distinctive odor of vinegar is due to acetic acid, CH_3COOH, which reacts with sodium hydroxide in the following fashion:

$CH_3COOH(aq)+NaOH(aq) \rightarrow H_2O(l)+NaC_2H_3O_2(aq)$

1) If 3.50 mL of vinegar needs 45.0 mL of 0.110 M NaOH to reach the equivalence point in a titration, how many grams of acetic acid are in a 1.90 qt sample of this vinegar?

Solution:

0.045 liters x 0.110 M = 0.00495 moles of NaOH
0.00495 moles of NaOH = 0.00495 moles of acetic acid

1 quart = 32 fl oz
1 fl oz = 29.57 mL

1.90 quarts x 32 fl oz/qt x 29.57 mL/fl oz = 1797.9 mL
0.00495 moles / 3.50 mL = 1.414×10^{-3} moles/mL

1.414×10^{-3} mol/mL x 1.7979×10^{3} mL = 2.54 mol
2.54 mol x 60.05 g/mol = 152.5 g

152.5 g CH_3COOH per 1.90 quarts
Answer: 152.5 g