

Answer on Question#62393 - Chemistry - General Chemistry

A fertilizer railroad car carrying 32400 gallons of commercial aqueous ammonia (30% ammonia by mass) tips over and spills. The density of the aqueous ammonia solution is 0.88 g/cm³.

1)What mass of citric acid, C(OH)(COOH)(CH₂COOH)₂, (which contains three acidic protons) is required to neutralize the spill? 1 gallon = 3.785 L.

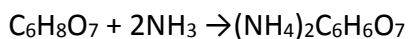
Answer:

First we should calculate the mass of the aqueous ammonia solution.

$$32400 \times 3.785 = 122634 \text{ L} \quad 122634 \times 0.88 = 107918 \text{ g}$$

$$\text{mass of the non aqueous ammonia} = 107918 \times 0.3 = 32375 \text{ g} = 1904 \text{ mol}$$

Mass of the citric acid required for the neutralization of the ammonia can be calculated from the molecular equation:



$$192 \text{ g} \quad 34 \text{ g}$$

$$x \text{ g} \quad 32375 \text{ g}$$

$$x = 182823 \text{ g}$$