Answer on Question #67877 – Chemistry – General Chemistry

10.08 g of ethane dioic acid (oxalic acid) crystals $H_2C_2O_4 \times xH_2O$ made up of 1 dm^3 of solution. 25 cm^3 of this solution completely neutralized by 20 cm^3 of 0.2 M sodium hydroxide solution. Calculate the

a) molarity of acid

b) number of moles of water of crystallization in 1 mole of the acid

Solution:

$H_2C_2O_4 + 2NaOH \rightarrow Na_2C_2O_4 + 2H2O$

$n(NaOH) = M \times V = 0.2 \times (20/1000) = 0.004$ mole

1 mole $H_2C_2O_4$ – 2 mole NaOH

x mole $H_2C_2O_4$ – 0.004 mole NaOH

x = 0.002 mole $H_2C_2O_4$

a) $C_M(H_2C_2O_4) = n(H_2C_2O_4)/V(solution) = 0.002/0.025 = 0.08$ M

b) $M(H_2C_2O_4) = 90$ g/mole

$n(H_2C_2O_4) = m(H_2C_2O_4)/M(H_2C_2O_4) = (10.08 - y)/90 = 0.08$ mole

y = 2.88 g H_2O

$(90 + x \times 18)$ g $H_2C_2O_4 \times xH_2O - (x \times 18)$ g H_2O

10.08 g $H_2C_2O_4 \times xH_2O - 2.88$ g H_2O

$181.44x = 259.2 + 51.84x$

$129.6x = 259.2$

x = 2

$H_2C_2O_4 \times 2H_2O$

Answer: a) $C_M(H_2C_2O_4) = 0.08$ M

b) $H_2C_2O_4 \times 2H_2O$