Answers to 2009 lecture test 1, questions V, VI, VII.

V. 50.0 mL of 1.00 molar HCl is 0.0500 moles, which would produce 0.0250 moles of CO2, which is 1.10 grams. Since only 1.00 gram was produced, the % yield is 1.00/1.10 times 100 %, or a 90.9 % yield.

B. The spectator ion is Cl- only.

VI. 8.8 grams is 0.200 moles of CO2 3.60 grams is 0.200 moles of H2O, which contains 0.400 moles of H. The mass of 0.200 moles of carbon is 2.40 grams, while the mass of 0.400 moles of H is 0.400 grams. That means that the oxygen must have had a mass of 3.60 -2.40-.400 = 0.800 grams. 0.800 grams of O is 0.0500 moles of O.

The moles of C, H, and O are .200, .400, and 0.0500. Divide them all by 0.0500 to get

C4H8O.

VII. .200 mole of Fe(OH)3 reacts with 0.600 mole of H+ ,  so you need 0.600 mole of HNO3. 0.600 mol divided by the molarity, 0.200 moles per liter, gives 3.00 liters, or 3,000 mL. (3.00 x 103 mL)

Extra Credit. The answer is the same no matter what volume unit you use.

H2SO4 + 2 NaOH → Na2SO4 + 2 H2O.

Pretend that the 25.00 ounces is 25.00 liters. Then 25.00 liters times 0.800 molar

is 20.0 moles of NaOH, which requires only half as many moles, or 10.0 moles of H2SO4.

10.0 moles divided by 0.200 moles per liter is 50.0 liters. But the problem was in ounces, so the answer is 50.0 ounces.

Or, M x V (H+) = M x V (OH-) Since the sulfuric acid has two H+ per molecule, you need to multiply the left side of the equation by 2. So you get

2 ( 0.200)( X) = (25.00)(.800) And X = 50.0 ounces.

Rutherford is from New Zealand