The stoichiometry of an oxidation-reduction reaction essay sample

Science, Chemistry

Purpose: To find number of moles of Fe+3 which react with one mole of NH3OH+ in order to partially balance the equation: NH3OH+ + 2Fe+3 “” ? + 2Fe+2 and to find the missing product.

Procedure: H2C2O4 and H2SO4 were titrated with potassium permanganate. The molarity of the permanganate was then found because the molarity of the H2C2O4 and H2SO4 were already known. Then hydroxylammonium chloride and ferric sulfate and water was titrated with known potassium permanganate to get the molarity of the hydroxylammonium chloride and ferric sulfate solution, and that was used to find the number of moles of Fe+3 which reacts with one mole of NH3OH+ to find the missing part of the equation.

Calculations: 0. 103 moles/1000 mL = . 00103 moles/10 mL

. 00103 x (2/5) = . 000412/16 mL = . 0256 M

. 0256 moles/1000 mL = 1. 95 x 10-4 moles / 7. 6 mL

(1. 95 x 10-4) x 5 = 9. 75 x 10-4 moles = moles of Fe+2

. 05 moles/1000 mL = . 0005 moles/10 mL = moles of hydroxylammonium chloride

Ratio of Fe+2 to NH3OH+ = 2: 1

2e- + 2Fe+3 –> 2Fe+2 so transfer of 2 electrons

NH3OH+ –> something + 2e-

Oxidation number of N in NH3OH+ is -1, therefore the oxidation number for N on the product side must be +1 because it gains 2 electrons.

N2O has an oxidation number of +1 for N, so that would work.

Data: Equation 1: NH3OH+ + 2Fe+3 –> something + 2Fe+2

Equation 2: 8H+ + 5Fe+2 + MnO4- –> 5Fe+3 + Mn+2 + 4H2O

Equation 3: 6H+ + 2MnO4- + 5H2C2O4 –> 2Mn+2 + 10CO2 + 8H2O

Conclusion: Therefore the concluded reaction would be:

NH3OH+ + 2Fe+3 –> N2O + 2Fe+2

This was obtained by using stoichiometry half reactions the product of that reaction was determined to be N2O. Some systematic errors could be if the wrong molarity was determined for the permanganate because then that would though off the calculations for the Fe+2 and the rest of the equations, if equations weren’t balanced properly, if some solutions spilled, if the buret wasn’t rinsed, or if the flask was dirty. Some random errors would be the precision of the instruments used like the calculator, the buret, and the flask.