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Lab 4 Report

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**Procedure**

First, a 50mL beaker was obtained. The empty beaker was then weighed, and the mass was recorded. The assigned recipe was Recipe C, so one gram of solid nickel (II) chloride hexahydrate (NiCl2⋅6H2O) was added to the weighed beaker. The mass of the solid was calculated by subtracting the total mass obtained and the mass of the empty beaker. The solid was then dissolved in 5mL of deionized water. Afterwards, a graduated cylinder was obtained. Since Recipe C was being used, 5mL of 25% ethylenediamine solution (H2NCH2CH2NH2) was measured out in the cylinder. The exact volume measured was then recorded. Next, the ethylenediamine solution was slowly poured into the aqueous nickel (II) chloride hexahydrate solution and the reaction mixture was stirred. This reaction created triethylenediamine nickel (II) chloride, which is soluble with water. In order to begin to recover the product, 25 mL of acetone was slowly added to the product and stirred continuously. Next, a larger beaker was obtained and filled partially with ice. The beaker containing the product was then placed in the larger, ice-filled beaker for approximately 10 minutes. While the beaker was sitting in ice, a sheet of filter paper was obtained and weighed. The filter paper was then folded into the shape of a cone and placed in a funnel that was placed in an empty beaker. In order for the filter paper to stick to the funnel, it was lightly wetted with deionized water. After 10 minutes, the beaker was removed from the ice and the product was slowly poured into the filter paper cone in the funnel. The empty beaker was then washed off with acetone and dumped into the funnel, in order to transfer the entire product. A new, empty beaker was then obtained and weighed. The mass of the beaker was then recorded. Next, the filter paper holding the product was transferred to the new beaker. Afterwards, the beaker, filter paper, and product was weighed. The filter paper and beaker mass was then subtracted from the total mass in order to obtain the mass of the product. This mass was the actual yield. After the experiment itself, the theoretical yield was determined by multiplying the moles of the limiting reactant, 4.21x10-3 moles NiCl2⋅6H2O, with the molar mass of the product, 309.89g, which made the theoretical yield 1.3046g. Finally, the actual yield, 1.375g was divided by the theoretical yield and that answer was multiplied by 100 to determine a percent yield of 105.44%.

**Conclusion**

This experiment was conducted to find the percent yield of triethylenediamine nickel (II) chloride in a reaction between ethylenediamine and nickel (II) chloride hexahydrate. The theoretical yield of triethylenediamine nickel (II) chloride was 1.3046g, while the actual yield was 1.375g. From this, we could conclude that the percent yield was 105.44%. With this yield being so high, we can predict that the product could possibly have been contaminated by water, or other various substances. In addition, all measurements and recordings made in the experiment could’ve possibly not been 100% correct. These results reiterate the importance of using stoichiometry as well as an experiment to find the percent yield in an experiment, as 100% accuracy is not always promised due to various confounding variables. These results are relevant because when the percent yield is over 100%, it can be concluded that there was an error in the experiment, since the theoretical yield represents the greatest amount of the product you can get. Having a percent yield over 100% means that the actual yield was higher than the theoretical yield.