Lab report

Synthesis of Tetramethylammonium Triiodide

TO

Ms. Patraphorn Sanguansat BY

Chonnipa Watcharatit
Kaewkawee Pleumcharoen
Phu-fah Nontamongkoltorn
Pattranith Pattanaanunsuk
Atitaya Jaroenpattanamongkol

AbstracT

In this experiment we will determine what will effect from the reaction and what the mole of the compound. The crystals, tetramethylammonium triiodide, were successfully synthesized from the reaction of tetramethylammonium iodide with iodide. The result of the solution we will know the weight of the compound after it's dry and know how to calculate the mole. The shape of the crystal is needle, the colour of it is a mixture of purple and dark green color. The limiting agent in the experiment is iodide. The percent yield is 61.68%

Introduction

Chemical equation is the symbolic representation of a chemical reaction in the form of symbols and formula, wherein the reactant are given on the left-hand side and the product on the right-hand side. In this experiment, the chemical equation is $^{\text{Me}_4\text{N}^*\text{I}^*+\text{I}_2}$ $^{\text{Me}_4\text{N}^*\text{I}_5}$. Mole is the unit of measurement. It is defined as the amount of a chemical substance that contains as many elementary entities such as atoms, molecules, ions, electrons, or photons, as there are atoms in 12 grams of carbon-12 (^{12}C), the isotope of carbon with relative atomic mass 12 by definition. This number is expressed by the Avogadro constant, which has a value of 6.022×10^{23} . Limiting agent is the reactant that used up first in a reaction. Percent yield is the describes of the proportion of the actual yield to the theoretical yield. Crystallization is a separation technique that is used to separate a solid that has dissolved in a liquid and made a solution. The purpose of this experiment is study and to form crystallization using tetramethylammonium iodide with iodine. To calculate the limiting reagent and % yield.

Objective

1.To study the crystallization, to study the mole calculation, to study the limiting agent identification, and to study the yield of experiment work calculation.

Materials

- Tetramethylammonium idodide
- Ethanol
- lodine

Instruments

Filter paperStirring rodFunnel

- Plate

- Fume Hood - Weight Balance

mETHODS

Add 0.5g of tetramethylammonium iodide to a 50 mL beaker. Use a stirring rod to break up clumps of $\rm Me_4N^+l^-_3$



Add 0.6g of iodine and 12 mL of 95% ethanol.



Heat the beaker on a hot plate with stirring in the fume hood until the tetramethylammonium iodide has dissolved

Heat at low tempearture to prevent crystallization



Remove the beaker from the hot plate and leave it to cool.

Agitating the solution may cause small crystal to form which made it more difficult to isolate and tend to occludue impurities

(Crystal should form during this time)



Once the beaker reach room temperature, place the beaker in to an ice bath for 10 minutes (only put the solution on ice if necessary). During this time, set up the apparatus for suction filtraton and washing of compound.



Using vacuum filtration, collect the crystals and wash them twice with hexanes (2'7 mL).



Air-dry the product and weigh.



Hand in a sample in a capped vial and labelled with your name, the name of compound and the date to the lab instructor.

Results



Weight of paper = 0.57g Weight of crystal+paper = 1.23g Weight of crystal only = 1.23-0.57 = 0.66g

Characteristic = It has a needle shape. The colour is a mixture of purple and dark green color.

Substance	Gram	Mole
Tetramethylammonium lodide	0.5	2.5×10 ⁻³
lodine	0.6	2.4×10 ⁻³
Tetramethylammonium Triiodide	0.66	1.5×10 ⁻³

DISCUssion

The chemical equation of this experiment is Me₄N⁺I⁺I₂ Me₄N⁺I₃ The reactants are tetramethylammonium iodide and iodine. The product are Tetramethylammonium Triiodide There are 1.1 g and 4.9 ×10⁻³ moles of reactants were used in the reaction. There are 0.66 g and 1.5×10⁻³ moles of products from the experiment. The Limiting reagent is the substance that is totally consumed when the chemical reaction is complete. In this experiment, the limiting reagent is iodine. We expected about 1.07 g of products from the experiment. But the results is less than our expectation. Because it is grouping together. The error may occur in the experiment because the weight of the object is not stable. We can improve and prevent the error by when we measure the weight, we must keep it accuracy. We should not place anything on the table while we measuring the weight.

0.5 g of	1 mol of	1 mol of	454.9
Tetramethylammonium	Tetramethylammoni	Tetramethylammoniu	Tetramethylammoniu
lodide	um lodide	m Triiodide	m Triiodide
	201.0 g	1 mol of Tetramethylammoniu m lodide	1 mol of Tetramethylammoniu m Triiodide

$$\frac{0.5 \times 1 \times 1 \times 454.9}{201.0 \times 1 \times 1} = 1.13 \text{ g}$$

0.6 g of lodide	1 mol of lodide	1 mol of Tetramethylammoniu m Triiodide	454.9 Tetramethylammoniu m Triiodide
	253.8 g of lodide	1 mol of lodide	1 mol of Tetramethylammoniu m Triiodide

$$\frac{0.6 \times 1 \times 1 \times 454.9}{253.8 \times 1 \times 1} = 1.07 \text{ g}$$

Percentage Yield

$$\frac{Actual\ Y\ ield}{Theological\ Y\ ield}\ x\ 100 = __\%$$

$$\frac{0.66 \, g}{1.07 \, g} \, x \, 100 = 61.68\%$$

Conclusion

The crystal have needle shape and its color is a mixture of purple and dark green color. The mole of tetramethyl lodide, lodide and Tetramethyl ammonium triiodide are 2.5×10^{-3} 2.4×10^{-3} and 1.5×10^{-3} respectively. The limiting reagent is lodide. The percentage yield in this experiment is 61.68.%

References

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