

ABSTRACT

The activity entitled, "Detection of Common Elements in Organic Compounds". The group of students' main goal is to be able to properly identify the compositions of organic compound and also the other compounds involved in the test. And to be able to write the balanced equation of the reaction between the tests performed and be able to assess what elements are present in the sample compound. In detecting common elements in organic compounds, the students conducted tests and had to detect for, first, Carbon, Hydrogen and Oxygen through the changes in the limewater solution. Second test was detecting Nitrogen by the change of color on the litmus paper and presence of odor of gas that evolved. Third, was to test for halogens by Beilstein's test and the Silver Nitrate test. And lastly is to test for Sulfur and Phosphorous. These tests were done on both organic compounds and drugs were used in the different tests that all produced different results depending on its content of specific organic element being tested for. For the first test which is Carbon, Hydrogen, and Oxygen, the results were yellow color solution and light purple solution. The second test is for Nitrogen, which resulted its presence through the red litmus paper changed to blue. While on the third test for Halogens, the results produced green, purple and orange flame color. And lastly, for the test of Sulfur and Phosphorus, we got a cloudy white precipitate and clear solution as results.

DETECTION OF COMMON ELEMENTS IN ORGANIC COMPOUNDS

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INTRODUCTION

Organic chemistry is everything that we see, even the DNA that controls our genetic heritage are all organic. Now, anyone who desires to know more about life must first understand organic chemistry. And knowing the basics should always be the first step. In this experiment, we'll be dealing with the fundamentals of organic chemistry, through familiarizing the properties and composition of most organic compounds. In determining an organic compound from the inorganic ones, a charring test was made to confirm the presence of carbon in every compound being tested. In finding out the composition of most organic compounds, various tests were made to confirm the presence of carbon, hydrogen, oxygen, nitrogen, sulfur, phosphorus and halogens in it. For carbon, oxygen and hydrogen, a small amount of Mefenamic acid with cupric oxide was heated in a test tube to transfer the vapor in other side of the bent tube that contain limewater. The test was repeated but now in another sample of Paracetamol. For Nitrogen, an Paracetamol was also used, but now added with an equal amount of soda lime. The mixture was also heated and the vapors were tested with a wet red litmus paper and turn to blue litmus paper. For the test for Sulfur and Phosphorus, a mixture of Sulfamerazine and in a test tube was heated till the Sulfamerazine dissolves in 1mL of Barium Chloride and 5 gtts of Ammonium molybdate with 5 gtts of Dilute Nitric acid were added into it. The test was repeated but now in another sample of Calcium Phosphate. Lastly, for the Halogens, a copper loop was heated in the outer portion of a non-luminous flame. It was cooled for a while, and afterwards the loop was dipped into an mL of chloroform, Carbon Tetrachloride and Iodoform then heated again. In order for us to be acquainted with the properties of most organic compounds, certain tests were made to check whether there were congruity and divergence in the properties of inorganic compounds.

EXPERIMENTAL PROCEDURES

A. Test for Carbon, Hydrogen, and Oxygen

1. In a mortar and pestle, mix 0.5g of Mefenamic acid and 1g of Cupric Oxide.
2. Transfer the mixture to a big test tube.
3. Clamp the test tube on the iron stand in a horizontal position.
4. Cover the test tube with a cork to which is attached a bent glass tube, its end dipped into a small test tube that contains 10ml of water.
5. Heat the mixture gently then strongly afterwards.
6. Observe and record what happens in the limewater solution.

B. Test for Nitrogen

1. In a mortar and pestle, mix 0.5g of potassium nitrate and 1g of soda lime.
2. Transfer the mixture in a test tube and place a red moistened litmus paper at the mouth of the test tube then heat.
3. Observe and record any changes on the color and odor.
4. Repeat the whole procedure but change the potassium nitrate to mefenamic acid.

C. Test for Halogens

C1. Beilstein Test

1. Prepare the Bunsen burner, copper wire, and chlorphenamine maleate.
2. Light up the Bunsen burner then heat the copper wire in a non-luminous flame until no further color is imparted to the flame.
3. Cool the wire and dip it in a few ml of chlorphenamine maleate.
4. Heat the moistened copper wire in the flame then observe and record the changes.
5. Repeat the test using Iodoform and Carbon Tetrachloride.

C2. Silver Nitrate Test

1. In a test tube, place 0.2g of Soda Lime then heat to redness.
2. Cool a little then add two drops of Chlorphenamine maleate.
3. Put it back to the heat then cool it again and add once more two drops of Chlorphenamine maleate.
4. Allow it to cool then add 5ml of dilute Nitric Acid.

5. Let it stand for a few minutes then using a dropper, remove the clear liquid and add three drops of Silver Nitrate Solution.
6. Observe and record what happens.

D. Test for Sulfur and Phosphorous

1. In a mortar and pestle, mix 0.2g of Egg Albumin, 0.5g of Potassium Nitrate, and 0.5g of Sodium Carbonate.
2. Transfer the mixture in a crucible and heat strongly until a gray or white ash is formed.
3. Allow to cool then dissolve in 20ml of water.
4. Acidify the solution with diluted Nitric Acid, then filter.
5. Divide the filtrate in two portions.

P1: (test for sulfate ion) Add 1ml of Barium Chloride solution then observe and record what happens.

P2: (test for phosphate ion) Add five drops of Ammonium Molybdate solution and five drops of dilute Nitric Acid. Warm gently then cool. Observe and record what happens.
6. Repeat the whole procedure but change Egg Albumin to Sulfamerizine and to Calcium Phosphate.

RESULTS AND DISCUSSIONS

Test	Sample	Reagent/s	Result
A. Carbon, Hydrogen and Oxygen	Control: Mefenamic Acid	1g Cupric oxide and limewater	Cloudy white precipitate
	Sample: Paracetamol	1g Cupric oxide and limewater	Light violet color solution

Table 1.0 Test for Carbon, Hydrogen and Oxygen

The test for carbon, hydrogen and oxygen, both the control and sample yielded positive results as illustrated in the table above. The positive control compound which is Mefenamic acid required weight was 0.5 grams added with 1 gram of cupric oxide that resulted to a cloudy white precipitate in the reagent, clear lime water solution.

As for the sample compound which is Paracetamol required weight was 0.5 grams added with 1 gram of cupric oxide and has a result of light violet color solution in the reagent, clear lime water solution.

Test	Sample	Reagent/s	Result
B. Nitrogen	Control: Potassium Nitrate	1g soda lime	Red to blue change in color of the litmus paper
	Sample: Paracetamol	1g soda lime	Red to blue change in color of the litmus paper

Table 2.0 Test for Nitrogen

The test for nitrogen had both the control and sample positive results as illustrated in the table above. The positive control compound which is Potassium nitrate required weight was 0.5 grams added 1 gram of soda lime that resulted to a change of color in the litmus paper which is red to blue. This indicates that Potassium nitrate is a base and has a pungent odor. As for the sample compound which is Paracetamol required weight was 0.5 grams added 2 drops of chloroform, 5 ml of dilute nitric acid and 3 drops of silver nitrate solution that resulted to a change of color in the litmus paper which is red to blue. This indicates that Paracetamol is a base and has a pungent odor.

Test	Sample	Result
C. Halogens c.1 Beilstein Test	Chloroform	Green Flame
	Iodoform	Purple Flame
	Carbon Tetrachloride	Orange Flame

Table 3.0 Beilstein Test

Beilstein Test or also known commonly as Flame test is used in detecting halogens in organic compounds, where a copper wire was heated first so that no other colors would impart in the flame and was dipped separately in each compounds. These compounds used in conducting the test were Chloroform, Iodoform and Carbon Tetrachloride which are illustrated in the table above. The results are the following: Chloroform resulted to a green flame, Iodoform resulted to a purple flame and Carbon Tetrachloride resulted to an orange flame.

Test	Sample	Reagent/s	Result
Halogen c.2 Silver Nitrate	Control: Soda Lime	2 gtts Chloroform + 5ml Dilute Nitric Acid + 3 gtts Silver Nitrate Solution	White precipitate
	Sample: Chlorpheniramine Maleate	2 gtts Chloroform + 5ml Dilute Nitric Acid + 3 gtts Silver Nitrate Solution	Clear solution

Table 3.1 Silver Nitrate Test

The test for silver nitrate is illustrated in the table above and yielded positive results in the control and sample compounds. The positive control compound which is Soda Lime required weight was 0.2 grams and the positive sample compound which is Chlorpheniramine maleate required weight was 0.2 grams. These compounds used dilute Nitric acid, Chloroform and Silver nitrate solution as reagents that give the positive control result to a white precipitate. And the sample compound resulted to a clear solution.

Test	Sample	Reagent/s	Result
D. Sulfur and Phosphorous	Control: Egg Albumin	a.) 1ml Barium Chloride b.) 5 gtts. Ammonium Molybdate + 5 gtts. Dilute Nitric Acid	a.) Cloudy White Precipitate b.) Clear Solution
	Sample 1: Sulfamerazine	a.) 1ml Barium Chloride b.) 5 gtts. Ammonium Molybdate + 5 gtts. Dilute Nitric Acid	a.) Cloudy White Precipitate b.) Yellow Color Solution
	Sample 2: Calcium Phosphate	a.) 1ml Barium Chloride b.) 5 gtts. Ammonium Molybdate + 5 gtts. Dilute Nitric Acid	a.) Clear Solution b.) Clear Solution

Table 4.0 Test for Sulfur and Phosphorous

The test for sulfur and phosphorous is illustrated in the table above. For the test of sulphur and phosphorous, the required weight of the control compound which is egg albumin and the two sample compounds which are sulfamerazine and calcium phosphate are 0.2 grams, added with 0.5 grams of potassium nitrate and 0.5 grams of sodium carbonate, which are mixed together and heated using a crucible until gray ash or white ash is formed and is then cooled and dissolved in 20 milliliters of water. Then the solution is then acidified with dilute nitric acid and filtered. The filtrate was divided into two portions: one portion is for the testing of sulfate ion and the second portion is for the test of phosphate ion.

In the test for the control compound which is egg albumin in 0.2 grams, added with 0.5 grams of potassium nitrate and 0.5 grams of sodium carbonate, the mixture was heated until a gray ash was formed and dissolved in 20 milliliters of water and cooled and acidified with dilute nitric acid then was filtered into two portions. The test for sulfate ion for the first portion, 1 milliliter of Barium chloride solution was added and a white cloudy precipitate was formed. The test for phosphate ion for the second portion, the addition of 5 drops of ammonium molybdate and solution and 5 drops of dilute nitric acid and was warmed gently and was cooled afterwards and a clear solution is the result.

In the test for the first sample which is sulfamerazine in 0.2 grams, added with 0.5 grams of potassium nitrate and 0.5 grams of sodium carbonate, the mixture was heated and produced a black ash and was dissolved in 20 milliliters of water and cooled and took time for the solution to acidify. After the confirmation that it has been acidified, it was filtered into two portions as well. The test for sulfate ion in the first portion, the addition of 1 milliliter of Barium chloride solution formed a white cloudy precipitate, same with the result of the control compound. The test for phosphate ion in the second portion, the result was a yellow color solution instead of a clear solution because the mixture was heated for too long and the result was not a gray ash but a

black ash and it is also because of neglect when it was placed to heat and had a difficulty in acidifying the dissolved solution.

In the test for the second sample which is calcium phosphate in 0.2 grams, added with 0.5 grams of potassium nitrate and 0.5 grams of sodium carbonate, the mixture was heated until a white ash was formed and was dissolved in 20 milliliters of water and acidified with dilute nitric acid. After the confirmation that it has been acidified, it was filtered into two portions as well. The test for sulfate ion in the first portion, the addition of 1 milliliter of Barium chloride solution resulted to a clear solution instead of a white precipitate because the mixture when it was heated formed a white ash because the students were unable to weigh the correct amount of 0.2 grams of calcium phosphate and did not wait for the mixture to turn a grayish ash. And it was not cooled after it was dissolved in water because of lack of time.

CONCLUSION

In the detection for common elements, there were 5 tests that were taken. There was a test for the common elements, like carbon, hydrogen, oxygen, nitrogen, sulphur and phosphorous. Also to test for the formation of halogens, the Beilstein test and Silver nitrate test were used. There was a control and a sample compound used for each test in order to observe if the results are positive or negative. After the experiment the students concluded that carbon is not the only element that can be seen in organic compound. For the test of carbon, hydrogen, oxygen, it gave a positive result and means that these are present in mefenamic acid and paracetamol as sample, which the students used. The test for nitrogen they used potassium nitrate as control, paracetamol as sample, which resulted positively that nitrogen is present in these. For test for halogens there are two tests associated with this. First is Beilstein test on where they used chloroform, Iodoform, and carbon tetrachloride of which resulted that halogens are present in these compounds. Another test was silver nitrate test, they used chlorpheniramine maleate and soda lime, and proved the presence of halogens in these compounds used. And the last, which is the test for sulphur and phosphorous, the compounds egg albumin, sulfamerazine and calcium phosphate were used. And it positively resulted to the confirmation that sulphur and phosphorous are present in these compounds. Thus the students conclude that these tests, namely Beilstein test, Silver nitrate test and others can be used to organic compounds.

REFERENCES

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