PROPERTIES OF HYDRATES

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You plagiarized half of this report which should be a Ø out of 20.

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Talk to me after Lab Please

OBJECTIVES

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The objectives of this experiment were to:

1. Explore the physical and chemical characteristics of hydrates.
2. Determine the level of hydration of various hydrates (by measuring the amount of water in the hydrated compounds).
3. Find the mathematical relationship between the starting mass and the mass lost during dehydration for various hydrates.

Introduction

Hydrates are defined as compounds that contain water molecule within their crystalline structure. The water is chemically bonded to the other atoms in the structure. However, the water of hydration can be removed from the crystalline structure by subjecting it to heat.

Equipment and procedure

The equipment and compounds used in the experiment were:

- Hydrated copper sulfate

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- Hydrated ferrous sulfate
- Hydrated cobalt sulfate
- Epsom salt
- Sugar
- Test tubes and holders
- Test tube rack
- Ring stand
- Crucible and lid
- Iron ring
- Porcelain triangle\
- Bunsen burner and sticker
- Water bottle
- Magnifying glass
- Eye dropper

Data collection

A pea-sized amount of three different hydrated salts and sugar were placed in separate test tubes.

The test tubes were placed on a table and observed.

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Observations

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PART 1:

Description of each substance

Hydrated salts	**Description**
Hydrated copper sulfate	Blue rock-like crystals

Hydrated ferrous sulfate	Light green, sand-styled crystals
Hydrated cobalt sulfate	Dark purple, sugary-styled crystals

Each of the test tubes were heated over a Bunsen burner for one minute. Each tube was held at an angle without pointing towards other students. The test tubes were never allowed to be red hot.

Appearance when heating

Hydrated salts	**Changes when heating**
Hydrated copper sulfate	The substance started bobbling and the blue color started changing
Hydrated ferrous sulfate	Color changedto white
Hydrated cobalt sulfate	Bobbling effect color changing from purple to blue

Appearance after heating

Hydrated salts	**Changes after heating**
Hydrated copper sulfate	Color changed from blue to white
Hydrated ferrous sulfate	Sparkling changing color to white
Hydrated cobalt sulfate	Sugar crystals changed to sand and color changed to brown

The test tubes were allowed to cool in a beaker for a few minutes. An eye dropper was then used to add three drops of water in each test tube. The observations were then recorded.

Hydrated salts	Changes after heating
Hydrated copper sulfate	Color is the same
Hydrated ferrous sulfate	Color is different
Hydrated cobalt sulfate	Color is different

The heating of hydrated copper sulfate is a reversible reaction while heating the other two is irreversible because the color does not change to the original state.

Part 2

Data collection

The table was set up and the following information was collected.

he said there is no info here

Masses before heating

Masses recorded	Mass in grams
Crucible and sample	45.929
Crucible	42.326
sample	3.603

Masses after heating

Masses recorded	Mass in grams
Crucible and sample	44.657
Crucible	42.326

sample	2.349
Water lost by dehydration	1.254

- The masses of a clean dry crucible and recorded in the table below.
- One to three grams of hydrated copper sulfate were put in the crucible and weighed. The results were recorded in the table.
- An iron ring was attached in ring stand and placed in a wired triangle around the iron ring.
- The crucible was set in the triangle
- A Bunsen burner was placed on the bottom and heated gently
- The heat was not applied strongly to prevent the oxygen and salt from reacting

Write paragraphs not bulletpoints

Masses recorded	Mass in grams
Crucible and sample	31.193
Crucible	28.119
sample	3.074

Mass after heating

Masses recorded	Mass in grams
Crucible and sample	30.084
Crucible	28.119
Sample	1.965
Mass of water lost by dehydration	1.109

6. Appearances when heating at different times

The copper sulfate loses the crystallized water through evaporation gradually changing from blue to white after the anhydrous copper sulfate is left.

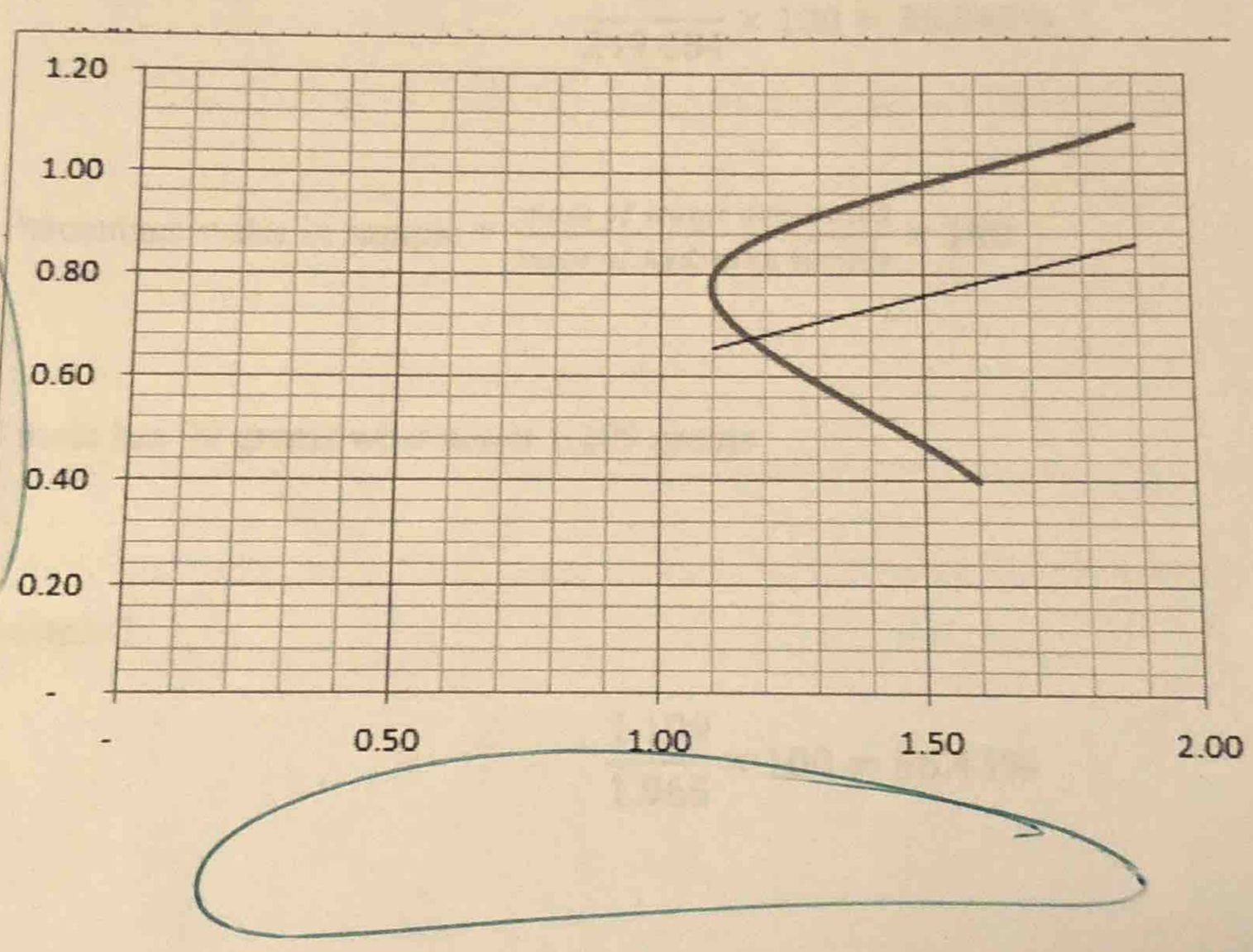
Data analysis

7. **What trends are seen in the data table**? The weight of the sample decreases after heating.

Graph the two pieces of data and establish an algebraic equation relating the two quantities

Mass of water lost	Sample mass
1.1	1.9
0.8	1.1
0.48	1.6

Graph of sample mass against mass of water lost



8. **Find the percentage water mass in each sample of the original hydrate.**

Percentage water $= \frac{mass\ of\ water\ in\ 1\ mole\ of\ hydrate}{molar\ mass\ of\ hydrate} \times 100$

$$CUSO_4.5H_2O$$

Mass of water in one hydrate= $18 \times 5 = 90\ grams$

Molar mass of hydrated copper sulfate hydrate= 249.684 grams

$$\frac{90}{249.684} \times 100 = 36.045\%$$

Percentage water in sample = $\frac{mass\ of\ water\ dehdrated}{mass\ of\ hydrated\ sample} \times 100$

I mole has 90 grams what about 1.109 grams

Sample 1

$$\frac{1.109}{1.965} \times 100 = 56.43\%$$

9. percentage mass in each sample

Sample 2

$$\frac{0.848}{1.152} \times 100 = 73.61\%$$

Sample 3

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$$\frac{0.48}{1.6} \times 100 = 30\%$$

Interpretation

10. **Examine the results from the hydrated samples, are they consistent**? The percentage masses are not consistent

Should they be consistent? Yes

Are they similar to other groups? NO

Explain? The varying percentages can be resulted to the duration of heating. Samples that were heated for longer periods lost more water that the ones that were heated for less time bringing changes in the evaporation.

PART 3

A pea-sized Epsom salt was put in a test tube.

12 describe the appearance of the salt? White with cloudy crystals

Chemical formula of Epsom salt $MgSO_4.7H_2O$

The salt was heated in a Bunsen burner for about one minute by holding the test tube away from other students. The tube was not allowed to become red hot.

13. Observations that occurred when heating

The salt burnt with a vibrating sound

14. Appearance of the salt after heating

The salt changed to a brown liquid

The difference recognized when heating this salt is the vibrating sound and the formation of a liquid

15 how to determine the dehydration of Epsom salt

- Put the Epsom salt in a dry evaporating dish
- Record the mass of the Epson and container
- Heat it gently with a Bunsen burner for about 5 minutes
- Ensure no water is coming out of the salt
- Let the evaporating dish to cool and record the mass A
- Repeat the process above by heating the salt and recording the mass B again
- Allow it to cool and heat again and record the masses C
- To find the percentage of water in the Epsom salt divide the mole ratio of water molecules to the magnesium sulfate in A B and C
- The three results are compared to determine the correct percentage.

CONCLUSION

The results from this experiment have used the dimensional analysis to determine the percentage water lost in the hydrated salts. The law of conservation of mass is utilizes because the mass of the original hydrated salt is converted into vapor without destroying or creating anything. The percentage water lost plus the percentage of the anhydrous salts form 100% of the total hydrated salt. Some of the potential sources of error may occur when heating the salt for longer periods allowing them to react with oxygen affecting the percentage water lost. This can led to inaccurate results.