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CHM. 121.004
Inst. Mark Novak
Lab Report – Experiment 4
9/28/17

100

Experiment Objective

The objective of this experiment was to determine the simplest formula for magnesium oxide based on the results we get from our experimentation. We also learned how to use a meeker burner and crucible.

Conclusion

Trial 1:

Following the procedure, we burnt off any residue and weighed everything. After starting our fire and correcting our flame, we put the crucible containing the magnesium onto the ring stand and waited to see the reaction. After 8-12 minutes of not seeing any kind of light illuminating out of the crucible, we decided to look inside and noticed the magnesium was a greyish-white powder; we then proceeded to cover the crucible completely and allow it to react. After allowing everything to cool down, we weighed out our product and calculated out our data. Our magnesium had a mass of 0.160 grams, our oxygen had a mass of 0.101 grams, and our product had a mass of 0.261 grams. After doing more calculations, we found that our simplest formula for magnesium oxide was MgO for trial one. Because we have a one to one molar ratio, this means that we had a complete and successful combustion of magnesium and oxide.

Trial 2:

Just like in trial one, we burnt off any residue and weighed everything out. Shortly after putting the crucible above the meeker burner, we started to notice the reaction that we missed in trial 1. At the end of experiment, we had a magnesium mass of 0.161 grams, an oxygen mass of 0.090 grams, and a product mass of 0.251 grams. After calculating everything out, the simplest formula for magnesium oxide was Mg_7O_6 for trial two. Unlike trial one, we did not get a one to one molar ratio; one of possible reasons for this may be because that the magnesium did not combust all the way.

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The Simplest Formula of Magnesium Oxide

ADVANCE STUDY ASSIGNMENT

1) Calculate the percent composition of a compound with the simplest formula $C_3H_4O_2$.

% C = 50.0 % % H = 5.60 % % O = 44.40 %

$3(C) = 3(12.011) = 36.033$
$4(H) = 4(1.008) = 4.032$
$2(O) = 2(15.999) = 31.998$
$72.063\ g/mol$

$C = \frac{36.033}{72.063} \times 100 = 50.00\%$

$H = \frac{4.032}{72.063} \times 100 = 5.60\%$

$O = \frac{31.998}{72.063} \times 100 = 44.40\%$

ADVANCE STUDY ASSIGNMENT (Continued)

2) Analysis disclosed that 5.76 g of acrylic acid contains 2.88 g of carbon, 2.56 g of oxygen and 0.323 g of hydrogen. What is the simplest formula of the acid?

Simplest Formula: $C_3O_2H_4$

C O H

$\frac{2.88\,g}{12.011}$ $\frac{2.56\,g}{15.999}$ $\frac{.323\,g}{1.008}$ = 5.76 g

↓ ↓ ↓

$\frac{0.240}{.160}$ $\frac{0.160}{.160}$ $\frac{0.320}{.160}$

1.5 1 2

3 2 4

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ADVANCE STUDY ASSIGNMENT (Concluded)

3) If the approximate molar mass of a substance with the empirical formula of $C_3H_4O_2$ is 216 g/mole, what is its molecular formula?

molecular formula = $C_9H_{12}O_6$ ✓

$3C = 3(12.011) = 36.033$

$4H = 4(1.008) = 4.032$

$2O = 2(15.999) = 31.998$

$72.063\ g/mol$ = Simplest formula mass

$$\frac{216\ g/mol}{72.063\ g/mol} = 2.99$$

$2.99 \simeq 3$

$C_3H_4O_2 \times 3 = C_9H_{12}O_6$

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The Simplest Formula of Magnesium Oxide

DATA AND CALCULATIONS

Do two separate sets of calculations, one from each trial. Report the simplest formula from each trial based up the results obtained.

		Trial 1	Trial 2
1)	Number of Balance used	19	21
2)	Mass of magnesium and beaker	29.705 g	29.241 g
3)	Mass of empty beaker	29.545 g	29.080 g
4)	Mass of magnesium (#2 - #3)	00.160 g	00.161 g
5)	Mass of crucible, cover, pie plate, and product	46.210 g	54.746 g
6)	Mass of empty crucible, cover, and pie plate	45.949 g	54.495 g
7)	Mass of product (#5 - #6)	00.261 g	00.251 g
8)	Mass of oxygen (#7 - #4)	00.101 g	00.090 g
9)	Simplest Formula for magnesium oxide based upon results obtained	MgO good	Mg_7O_6 ok

Trial 1

	mass	moles	mole ratio	Emp Formula
MgO product	0.261 g			
Mg	0.160 g	.006583 mol	1.043 : 1	MgO
O	0.101 g	.006313 mol		

Trial 2

MgO Product	0.251 g			
Mg	0.161 g	.006624 mol	1.18 : 1	Mg_7O_6
O	0.090 g	.005625 mol		

Mg	O
$\frac{0.160\ g}{24.305\ g/mol}$	$\frac{0.101\ g}{15.999\ g/mol}$
↓	↓
$\frac{0.006583\ mol}{0.006313\ mol}$	$\frac{0.006313\ mol}{0.006313\ mol}$
↓	↓
1.043	1
↓	↓
1	1

Mg	O
$\frac{.161\ g}{24.305\ g/mol}$	$\frac{.090\ g}{15.999\ g/mol}$
↓	↓
$\frac{0.006624}{0.005625}$	$\frac{0.005625}{0.005625}$
1.17755	1
x 6	x 6
7	6