**Determining the Molar Mass of a Metal**

**Chemistry 101***: General Chemistry*

Post-Lab & Lab Report #4



*Sitthiphol Yuwanaboon*

*Professor Nina Ram*

*Lab Professor*

*January 14, 2020*

***Lab 4 :Determining the molar Mass of a Metal***

Purpose:

To determine the molar of element such as a metal by using chemical reaction apply to process the balance equation to apply amount the reactant have in the reaction.using balanced equation to determine the molar mass in the process from changing the volume of water displaced.

Procedures:

Part I:

1.Measure the mass of 250 mL beaker and measure the mass of beaker with water from full flask container. By transferring into the beaker and measure it again. Calculate mass differences between a beaker and water in the beaker and find the mass of water in 4 decimal place.

Measure the temperature and using the table on the back on lab manual to determine the density of water.

Part II:

Get metal zinc .25 g- .32 g. add 20 mL to beaker before put in to have a chemical reaction with zinc. Repeat step from part I .Connect the delivery tube between the flask full with water flipped it into the generator. With partner hold flask with water in place. When chemical reaction is done. Use the tap cardboard slide under the bottom of generator and find the mass that the water has been displaced or gone from the full flask. After chemical reaction is done, you supposed to measure the temperature of water. Make sure the gas hydrogen is displaced mostly to the water tube.

Then calculate the molar of mass of Zn.

Part III

Repeat step 1 and II with aluminum mass of 0.074 g and 0.089 g when we got the volume displaced we have to use that for calculations.

Data:

Part I

|  |  |
| --- | --- |
| Mass of empty beaker | 95.000 g |
| Mass of beaker and H2O from filled collection flask | 249.791 g |
| Gram of H2O from filled collection flask | 154.791 mL |
| H2O temperature | 21.7 Celsius |
| H2O density | 0.997837 g/mL |

Part II

Part II

|  |  |
| --- | --- |
| Mass of empty beaker | 95.000 g |
| Mass of beaker and H2O from filled collection flask left | 142.985 g |
| Gram of H2O from filled collection flask displaced | 106.806 mL |
| H2O temperature | 18.8 Celsius |
| H2O density | 0.998444 g/mL |
| Gram of Zn | 0.273 g |
| Gram of H2O left in flask | 47.985g |
| Vapor pressure of H2O | 16.297 torr |

Pressure of atmosphere = Pressure of H2+Pressure of H2O

760 torr- 16.297 torr = Pressure of H2 = 0.9785 atm

Zn(s)+2HCl (aq) →ZnCl2(aq)+H2(g)

n= PV/(RT) = (0.9785 atm\* 106.806 mL/1000)/((0.08206 atm\*L/mol\*K)\*291.15)

4.366\*10-3mole

Molar mass = Gram of reactant/ mole of reactant =0.273 g/4.366\*10-3mole =62.51 g/ mol Zn

Percent different of Zn theoretical vs actual

((65.38-62.51)/65.38)\*100 = 4.38 % percent error +-

Percent error are relative small. So we stepped the right place on the experiment.

Part III

|  |  |
| --- | --- |
| Mass of empty beaker | 95.000 g |
| Mass of beaker and H2O from filled collection flask displaced left | 162.542 g |
| Gram of H2O from filled collection flask displaced | 87.542g |
| H2O temperature | 19.9 Celsius |
| H2O density | 0.998444 g/mL |
| Gram of Al | 0.047 g |
| Gram of H2O left in flask | 87.542g |
| Vapor pressure of H2O | 17.444 torr |

Pressure of atmosphere = Pressure of H2+Pressure of H2O

760 torr- 17.444 torr = Pressure of H2 = 0.9770 atm

2Al(s)+6HCl (aq) →2AlCl3(aq)+3H2(g)

n= PV/(RT) = (0.9770 atm \* 87.542mL

mL

/1000)/((0.08206 atm\*L/mol\*K)\*293.15)

3.5567\*10-3mole\*2/3 = 0.002371

Molar mass = Gram of reactant/ mole of reactant =0.047 g/0.002371mole =19.90 g/ mol Zn

Percent different of Zn theoretical vs actual

((26.98-19,90)/26.98)\*100 = 26.2 % percent error +-

Percent error are relative large because of the volume is displaced has changed because of limting amount of metal reacted into chemical reaction so the gas H2 less displaced to the chamber of the flask which makes inaccurate number from calculating the amount of molar mass of this kind of matter.

The amount of Al is not 1: 1 ratio of Hydrogen gas are produced in calculating. So it make a change the number supposed to be in .

It might be the blockage of delivery tube that can cause the stuck hydrogen gas in the tunnel. That would be the reason we make a wrong a decision. Gas loss ?