NAME: CLASS:

EXPERIMENT 3

DETERMINATION OF THE MOLAR MASS OF A METAL

Course Learning Outcome:

Solve chemistry related problems by applying basic concepts and principles in physical chemistry. (C4, PLO4, CTPS3, MQF LO6)

Learning Outcomes:

At the end of this lesson, students will be able:

i. To determine the molar mass of an alkaline earth metal by back-titration method.

Student-Learning Time:

Face-to-face	Non face-to-face
1 hour	1 hour

Direction: Read over the lab manual and then answer the following question.

Introduction:

1. What is back-titration?

2. Give one example of alkaline earth metal and write the equation for the reaction between the metal and HCl.

   Magnesium metal : Mg (s) + HCl (aq) → ☐ (aq) + ☐ (g)

Procedure:

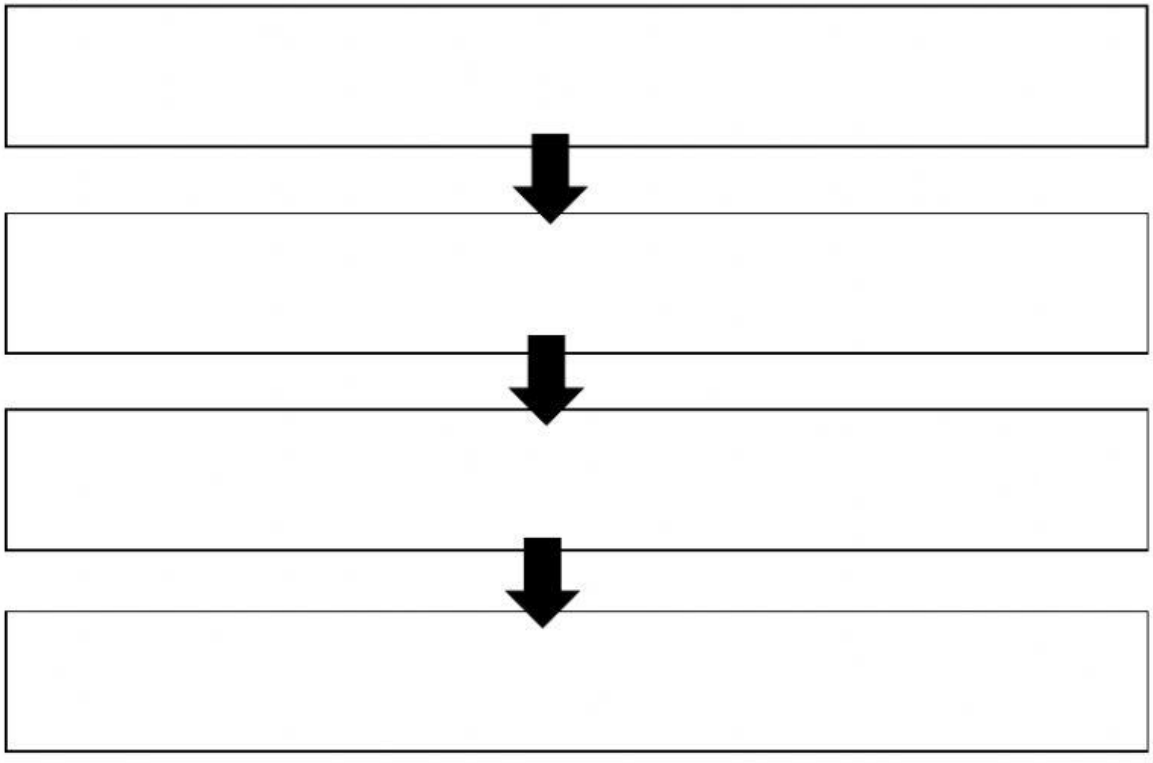
Calculate the difference of mole of acid before and after the reaction with metal.

After reaction with metal, determine the number of moles of unreacted acid by titrating it with a base.

Calculate the number of metal by using the balanced stoichiometric equation between the metal and acid.

Determine the moles of an acid present before reaction occurs.

Drag and drop to explain briefly how to determine the molar mass of an unknown metal by using back-titration method.



Experiment 3 : Data Analysis

A 0.2730 g sample of unknown metal, Y with oxidation number of +2, was completely reacted with 25.00 mL of 0.50 M excess HCl. The remaining solution required 4.15 mL of 1.00 M NaOH to reach end point. Calculate the,

i. number of mole of HCl reacted with NaOH.

$n_{HCl} = \frac{(0.5)(25)}{1000} =$ ____

$n_{NaOH} = \frac{(1)(4.15)}{1000} =$ ____

since ____ **is the limiting reactant,**

n_{HCl} *used in the titration with NaOH* $= n_{NaOH} =$ ____

ii. number of mole of HCl reacted with Y.

n_{HCl} *used to react with Y* $= 0.0125 - 0.00415 =$ ____

iii. number of mole of Y metal reacted.

Y (s) + HCl (aq) → YCl_2 (aq) + H_2 (g)

2 mol HCl ≡ 1 mol Y

0.00835 mol ≡ $\frac{1}{2}$ x 0.00835

= ____ **mol Y**

iv. molar mass of Y.

0.004175 mol Y ≡ 0.273g

∴ 1 mol Y ≡ $\frac{0.273}{0.0041}$

= ____

∴ Molar mass of Y = ____