

# Pre-Laboratory Questions

Seeh

1. What is the mole and molar mass? What are the molar masses of magnesium and atomic oxygen?

1 mole is the amount of substance of a system which contains as many elementary entities as there are atoms in 0.012 kg of carbon 12.

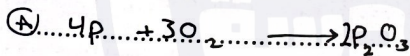
Molar mass is the sum of the atomic masses in a molecule.

$M = 16.00$  g/mol  
 $Mg = 24.31$  g/mol  
 molar mass for magnesium oxide is  $= 40.31$  g/mol

2. When  $0.192$  g of phosphorus is burned,  $0.341$  g of a white oxide is obtained. (a) Write a balanced chemical equation for the reaction of phosphorus with molecular oxygen based on this empirical formula. (b) Determine the empirical formula of the oxide.

mass O =  $0.142$  g  $\rightarrow 9.3 \times 10^{-3}$  mole

mass P =  $0.192$  g  $\rightarrow 6.2 \times 10^{-3}$  mole



P	O	}	$\rightarrow (P_2O_3) \times 2$
↓	↓		
$\frac{0.0062}{0.0062}$	$\frac{0.0093}{0.0062}$		

$P_2O_3 \rightarrow$  (B)

# Results and Calculations

Mass of empty crucible (after first heating)		g
Mass of empty crucible (after second heating)		g
Final mass of empty crucible		20,74 ± 0.01 g
Mass of crucible and Mg		20,94 g
Mass of Mg		0.20 g
Moles of Mg (n <sub>1</sub> )		8.2 × 10 <sup>-3</sup> mol
Final mass of crucible and Mg-oxide		21.08 g
Mass of Mg-oxide produced <small>Crucible<sub>Mg-oxide</sub> - Crucible<sub>empty</sub></small>		0.34 g
Mass of oxygen gained <small>MgO<sub>mass</sub> - Mg<sub>mass</sub></small>		0.14 g
Moles of oxygen atoms (n <sub>2</sub> )		8.75 × 10 <sup>-3</sup> mol
Formula of magnesium oxide (Mg <sub>n1</sub> O <sub>n2</sub> )		Mg <sub>8.2 × 10<sup>-3</sup></sub> O <sub>8.75 × 10<sup>-3</sup></sub>
Empirical formula of magnesium oxide <small>النسبة المولية</small>		MgO
Mass percent of Mg in the oxide (x <sub>1</sub> ) (experimentally) <small>النسبة المئوية</small>		58.2 %
Mass percent of Mg in the oxide (x <sub>2</sub> ) (calculated for MgO) <small>النسبة المئوية</small>		60.3 %
Percentage error = [ x <sub>2</sub> - x <sub>1</sub>   / x <sub>2</sub> ] × 100%		2.48 %

$$\frac{1.5}{60.3} \times 100 \%$$

49

40.31

# QUESTIONS

Mg<sub>3</sub>N<sub>2</sub>  
MgO

1. If water had not been added to your initial product, what error in the determined percentage of magnesium would have resulted (that is, if part of the product has been magnesium nitride)? Explain.

(1/10/11) The total mass will increase and number of moles of Mg will increase too. When Mg increases the percent of Mg would have decrease.

2

If large amount of magnesium oxide had been lost during the heating of the crucible, would this have made the calculated %Mg in the product too high or too low? Explain.

too high, the percentage error is indirect proportional to with mass percent of Mg. so if we lost Mg during the experiment the percent will decrease of Mg because of that the