

Chapter 7

Practice Test

Name: _____

Date: _____ Per: _____

DIRECTIONS: Look at each sample problem. Complete the remaining problems using the same format.

Part 1: Converting Moles to Mass or Mass to Moles

Sample: Convert 60g NaOH to moles		
60g NaOH	$\frac{1 \text{ mol NaOH}}{39.997 \text{ g NaOH}}$	= 1.50 mol NaOH

1. Convert 34.1g NaHCO₃ to moles

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Sample: Convert 78.2g NaCl to moles		
78.2 g NaCl	$\frac{1 \text{ mol NaCl}}{58.443 \text{ g NaCl}}$	= 1.338 mol NaCl

2. Convert 0.013g CaCl₂ to moles

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Sample: Convert 2.15 moles MgCl ₂ to grams		
2.15 mol MgCl ₂	$\frac{95.211 \text{ g MgCl}_2}{1 \text{ mol MgCl}_2}$	= 204.704 g MgCl ₂

3. Convert 3.4 moles H₂O₂ to grams

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Sample: Convert 1.2×10^{11} moles H ₂ O to grams		
$1.2 \times 10^{11} \text{ mol H}_2\text{O}$	$\frac{18.015 \text{ g H}_2\text{O}}{1 \text{ mol H}_2\text{O}}$	= $2.162 \times 10^{12} \text{ g H}_2\text{O}$

4. Convert 0.113 moles NaCl to grams

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Part 2: Converting Moles to Particles or Particles to Moles

Sample: Convert 3.01×10^{23} formula units NaOH to moles NaOH		
$3.01 \times 10^{23} \text{ units NaOH}$	$\frac{1 \text{ mol NaOH}}{6.022 \times 10^{23} \text{ units NaOH}}$	= 0.50 mol NaOH

5. Convert 9.1×10^{24} formula units NaOH to moles NaOH

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Sample: Convert 2.5 moles MgCl ₂ to formula units MgCl ₂		
2.5 mol MgCl ₂	$\frac{6.022 \times 10^{23} \text{ units MgCl}_2}{1 \text{ mol MgCl}_2}$	= $1.505 \times 10^{24} \text{ units MgCl}_2$

6. Convert 3.4 moles H₂O₂ to formula units H₂O₂

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Part 3: Two Step Conversions

Sample: Convert 60g NaOH to formula units NaOH			
60g NaOH	$\frac{1 \text{ mol NaOH}}{39.997 \text{ g NaOH}}$	$\frac{6.022 \times 10^{23} \text{ units NaOH}}{1 \text{ mol NaOH}}$	= $9.031 \times 10^{23} \text{ units NaOH}$

7. Convert 34.1g NaHCO₃ to formula units NaHCO₃

_____	_____	_____	=
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Sample: Convert 3.01×10^{23} formula units NaOH grams NaOH			
$3.01 \times 10^{23} \text{ units NaOH}$	$\frac{1 \text{ mol NaOH}}{6.022 \times 10^{23} \text{ units NaOH}}$	$\frac{39.997 \text{ g NaOH}}{1 \text{ mol NaOH}}$	= 19.998 grams NaOH

8. Convert 2.3×10^{22} molecules H₂O₂ to grams H₂O₂

_____	_____	_____	=
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Exercise 7R

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Part 4: Percent Composition

Sample: Find the percent composition of NaHCO_3

Na	1 x 22.990 Da =	22.990 Da	$(22.990/84.006) \times 100 =$	27.4% Na
H	1 x 1.008 Da =	1.008 Da	$(1.008/84.006) \times 100 =$	1.2% H
C	1 x 12.011 Da =	12.011 Da	$(12.011/84.006) \times 100 =$	14.3% C
O ₃	3 x 15.999 Da =	+ 47.997 Da	$(47.997/84.006) \times 100 =$	+ 57.1% O
		84.006 Da		100%

9. Find the percent composition of Na_2CO_3

Na ₂		/	
C		/	
O ₃	+	/	+
			100%

Part 5: Empirical & Molecular Formulas

Sample: Find the Empirical Formula of a substance with a composition of 54.5% carbon, 9.1% hydrogen and 36.4% oxygen.

54.5% C →	<u>54.5g C</u>	$\frac{1 \text{ mol C}}{12.011 \text{ g C}}$	= 4.54 mol C	$\frac{4.54 \text{ mol C}}{2.28 \text{ mol O}} = 2$	
9.1% H →	<u>9.1g H</u>	$\frac{1 \text{ mol H}}{1.008 \text{ g H}}$	= 9.03 mol H	$\frac{9.03 \text{ mol H}}{2.28 \text{ mol O}} = 4$	
36.4 % O →	<u>36.4g O</u>	$\frac{1 \text{ mol O}}{15.999 \text{ g O}}$	= 2.28 mol O	$\frac{2.28 \text{ mol O}}{2.28 \text{ mol O}} = 1$	= C ₂ H ₄ O ₁

10. Find the Empirical Formula of a substance with a composition of 40.0% carbon, 6.7% hydrogen and 53.3% oxygen.

_____		_____
_____		_____
_____		_____

Sample: Find the Molecular Formula of the sample problem above if the molar mass is really 88.1 g/mol.

Since the molar mass of C₂H₄O = 44.05 g/mol, the subscripts need to be doubled $[(88.1 \text{ g/mol}) / (44.05 \text{ g/mol}) = 2]$. So, the molecular formula is C₄H₈O₂.

11. Find the Molecular Formula of the practice problem above (10) if the molar mass is 60 g/mol.

Part 6: Hydrates

12. Name the following hydrates:

- | | |
|---|--|
| a. ZnSO ₄ •7H ₂ O _____ | c. FeSO ₄ •7H ₂ O _____ |
| b. CaCl ₂ •2H ₂ O _____ | d. Na ₂ CO ₃ •10H ₂ O _____ |