

3 • Molecules and Compounds

Station 1 – NAMING COMPOUNDS FROM FORMULAS

Name the following compounds:

Formula	Name
BF_3	
SF_6	
$(\text{NH}_4)_2\text{Cr}_2\text{O}_7$	
PbCO_3	
NI_3	

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Station 2 – WRITING FORMULAS FROM NAMES

Write the formulas for the following compounds:

Name	Formula
Dinitrogen pentoxide	
Aluminum oxide	
Stannic sulfate	
Oxygen difluoride	
Carbon tetrachloride	

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Station 3 – MINI MEGA-ION QUIZ

Fill in the symbol and charge for each of the following ions:

ferric	_____	sulfite	_____	hydronium	_____
permanganate	_____	silver	_____	hydroxide	_____
sulfide	_____	thiosulfate	_____	cupric	_____
phosphate	_____	hypoiodite	_____	mercurous	_____
calcium	_____	nickel	_____	cyanide	_____

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Station 4 – MYSTERY IONS

Use your knowledge of ions and a little logic to answer the following questions:

Sodium arsenide has the formula: Na_3As . What is the formula for magnesium arsenide? _____

Gold sulfide has the formula: Au_2S_3 . What is the formula for gold chloride? _____

Calcium oxalate has the formula: CaC_2O_4 . What is the formula for aluminum oxalate? _____

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Use your periodic table and calculator to determine the % composition (by mass) of each element in:

Note: Give your answers to 1 decimal place.

Formula	%Ca	%C	%N
Ca(CN) ₂			

Calculation Area:

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Determine the empirical formula of the compound from the following %composition (by mass) information:

A compound composed of carbon and hydrogen is found to contain 85.6% C and 14.4% hydrogen by mass.

What is the empirical formula of the compound? _____

Calculation Area:

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Station 7 – MOLE PROBLEMS

Solve the following problems. Show your work using dimensional analysis:

A 2.00 Liter bottle is filled with XeF_4 gas. What is the mass of the gas sample? [MM $\text{XeF}_4 = 207.30 \text{ g/mol}$]

How many molecules of CO_2 make up a 5.25 g chunk of dry ice? [MM $\text{CO}_2 = 44.01 \text{ g/mol}$]

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Station 8 – IDENTIFY MYSTERY SUBSTANCE

When asked to identify a mystery compound, it is often useful to determine the molar mass of the substance. Use the following information to identify the mystery substance:

A 1.25 Liter sample of a diatomic gas, measured at STP, has a mass of 3.96 grams.
What is the identity of the gas? _____

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Station 9 – HYDRATE LAB

A student is assigned the task of determining the number of moles of water in one mole of $\text{MgCl}_2 \cdot n \text{H}_2\text{O}$. The student collects the data shown in the following table.

Mass of empty container	22.347 g
Initial mass of sample and container	25.825 g
Mass of sample and container after first heating	23.982 g
Mass of sample and container after second heating	23.976 g
Mass of sample and container after third heating	23.977 g

Determine the *moles of water lost* when the sample was heated.

Determine the *formula* of the hydrated compound.

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