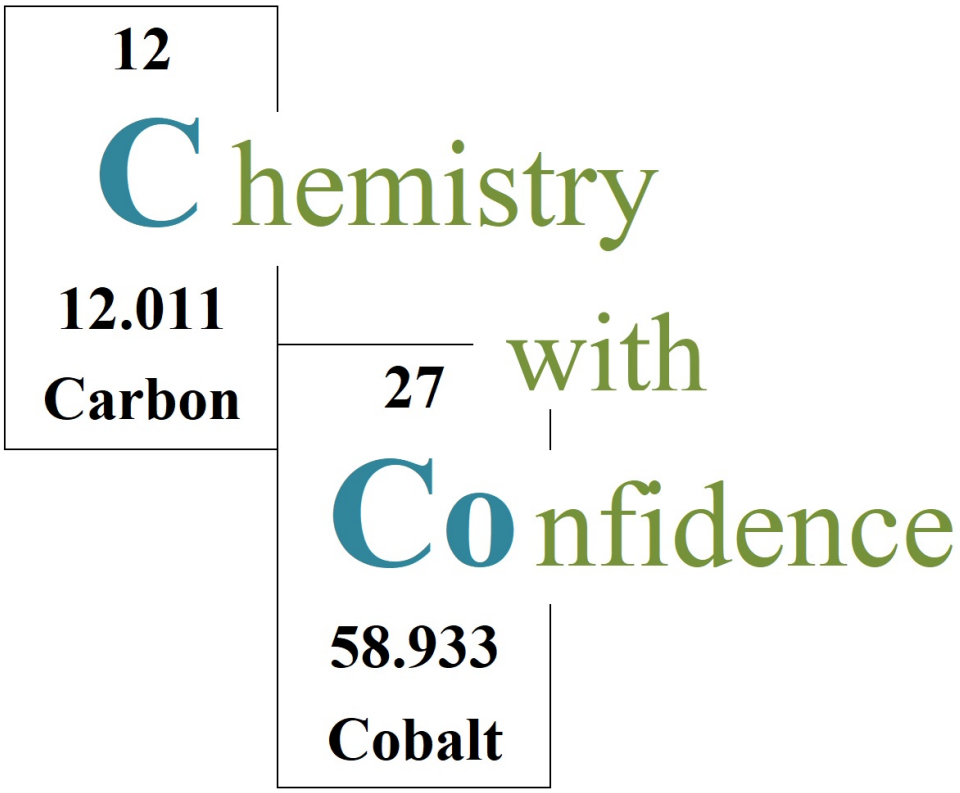
Lesson Plans

Mole Unit



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Lesson Plans

Mole Unit

Students will be able to…

- Use dimensional analysis to convert between moles and molecules/formula units/atoms/ions.
- Identify that a mole represents a set-amount just like a dozen represents a set-amount.
    - Identify that there are 6.02×10^{23} molecules/formula units/atoms/ions in 1 mole.
    - Identify that there are 12 units in 1 dozen.
- Identify that Avogadro's number is 6.02×10^{23}.
- Count the atoms of each element in a compound.
- Calculate the molar mass of compounds.
- Identify the units for molar mass are g/mol.
- Identify that the mass of 1 mole (molar mass) is different for different substances while 1 mole always represents 6.02×10^{23} particles of a substance.
- Calculate the percent composition of compounds.
- Calculate the percent composition of a crème filled cookie. Students will calculate the percent by mass of the two components (crème filling and 2 wafers) in a cookie.
- Use dimensional analysis to convert between moles and grams.
- Measure out the grams of a substance after converting from moles to grams.
- Use Avogadro's Number (6.02×10^{23}) and Molar Mass (g/mol) in dimensional analysis to convert between mass and molecules/formula units/atoms/ions.
- Use dimensional analysis to convert between Metric units.
- Use dimensional analysis to convert between US Customary units.
- Use dimensional analysis to convert between Metric units and US Customary units.

Teaching Material

Chemistry with Confidence Curriculum ***(Can be purchased at https://www.teacherspayteachers.com/Store/Chemistry-With-Confidence/Category/Mole-Unit-494865)***
GUIDED NOTES - Mole Unit
Moles & Dimensional Analysis Moles & Dimensional Analysis - WS #1 Moles & Dimensional Analysis - WS #2
Molar Mass Molar Mass DEMO Instructions & Jar Labels Molar Mass - WS #1
Percent Comp. COOKIE Lab!
Percent Comp. COOKIE Lab Percent Composition - WS #2
Molar Mass & Dimensional Analysis LAB Molar Mass & Dimensional Analysis LAB Molar Mass & Dimensional Analysis - WS #2
Mass ↔ Molecule: Dimensional Analysis Dimensional Analysis & Nutrition - Mini-Poster Mass ↔ Molecule: Dimensional Analysis - WS #1
Mole Unit Task-Card RACE Mole Unit Task-Card RACE - *INSTRUCTIONS, REFERENCE INFORMATION, TASK CARDS, MAKE-UP ASSIGNMENT* Mole Calculation Practice
Measurements & Dimensional Analysis Life and Measurements - Dimensional Analysis WS Measurements & Dimensional Analysis - Practice A Measurements & Dimensional Analysis - Practice B Challenge Problems in Dimensional Analysis

Additional Required Materials	
Periodic Table per Student	~250 Crème Filled Cookies
Scientific Calculator per Student	~80 Cookies for the Lab
Safety Data Sheets (SDS) for H_2O, $C_{12}H_{22}O_{11}$, and NaCl	~170 Cookies - 1 cookie per student for eating *(Optional)*
~775 mL Water - H_2O	"Nutrition Facts" Label from a food item/container that contains sugar - 1 per student
~425 g Sugar - $C_{12}H_{22}O_{11}$	Coloring Utensils (Colored Pencils/Markers/Crayons) per group of students
~160 g Table Salt - NaCl	Scissors (5-8 to be shared by students)
3 Glass Jars	Glue (5-8 to be shared by students)
Clear Tape *(Recommend Packing Tape)*	Cardstock
1 Pair of Scissors	Lamination
12 Electronic Balances	Notebook Paper/Computer Paper (~2-5 pieces of paper per student)
24 Disposable Weighing Boats	Prizes (for Mole Unit Task-Card RACE)
12 50-mL Beakers	*Optional:*
12 250-mL Beakers	*Colored Butcher Paper & Markers*
40 Plastic Spoons	*Projector*
1 Trash Can	*Individual White-Boards w/ Erasers & Expo Markers for each student*
Paper Towels *(for cleaning)*	*Small Classroom item such as a Paperclip/Eraser/Pencil*

Mole Unit

Level Chemistry - Lesson Plans

Day 1	15 min.	Guided Notes: What is a Mole?
	35 min.	Guided Notes: Moles & Dimensional Analysis Intro *(Begin Day 1, and complete Day 2.)*

Day 2	30 min.	Guided Notes: Moles & Dimensional Analysis Intro
	20 min.	Moles & Dimensional Analysis - WS #1 *(Begin the assignment Day 2, and complete assignment Day 3.)*

Day 3	20 min.	Moles & Dimensional Analysis - WS #1
	30 min.	Guided Notes: Molar Mass

Day 4	8 min.	Molar Mass DEMO
	20 min.	Molar Mass - WS #1
	22 min.	Guided Notes: Percent Composition *(Begin Day 4, and complete Day 5 if needed.)*

Day 5	15 min.	*Finish as needed* - Guided Notes: Percent Composition
	35 min.	Percent Comp. COOKIE Lab
	HW	Percent Composition - WS #2 (Due Day 8)

Day 6	50 min.	Guided Notes: Molar Mass & Dimensional Analysis

Day 7	50 min.	Molar Mass & Dimensional Analysis LAB

Day 8	2 min.	Collect HW - Percent Composition - WS #2 (Assigned Day 5)
	10 min.	Moles & Dimensional Analysis - WS #2
	10 min.	Molar Mass & Dimensional Analysis - WS #2
	28 min.	Guided Notes: Mass ↔ Molecule Dimensional Analysis *(Begin Day 8, and complete Day 9.)*
	HW	Bring a "Nutrition Facts" Label from a food item/container that contains sugar. Due Day 10. *(This is for the Dimensional Analysis & Nutrition - Mini-Poster)*

Day 9	30 min.	Guided Notes: Mass ↔ Molecule Dimensional Analysis
	20 min.	Mass ↔ Molecule: Dimensional Analysis - WS #1 *(Begin Day 9, and complete Day 10.)*

Day 10	25 min.	Mass ↔ Molecule: Dimensional Analysis - WS #1
	25 min.	Dimensional Analysis & Nutrition - Mini-Poster (Reference HW for Day 8)

Day 11	50 min.	Mole Unit Task-Card RACE
	HW	Mole Calculation Practice (Due Day 13)

Day 12	50 min.	Guided Notes: Measurements & Dimensional Analysis

Day 13	2 min.	Collect HW - Mole Calculation Practice (Assigned Day 11)
	22 min.	Measurements & Dimensional Analysis - Practice A *(Place students in groups of 2, and have students complete the problems on butcher paper with markers.)*
	26 min.	Life & Measurements - Dimensional Analysis
	Optional HW	Measurements & Dimensional Analysis - Practice B *(Only assign if students need extra practice with these concepts.)*

Day 14	50 min.	Review

Day 15	35 min.	Test
	15 min.	Guided Notes: Dimensional Analysis Challenge Problems! *(Only teach Examples #1, #2, and #4 in the notes as an introduction to challenge problems. Teach the remainder of these notes in a Bonus/Optional Tutoring session.)*

Bonus/Extra Credit Tutoring Session
Hold an optional tutoring session to teach the "Guided Notes: Dimensional Analysis Challenge Problems!" Time: ~45 min. Offer bonus points/extra credit to students who attend the tutoring session.
Bonus/Extra Credit Assignment
After the tutoring session, assign the "Challenge Problems in Dimensional Analysis" worksheet. Offer bonus points/extra credit for each problem completed correctly with work shown.

Mole Unit

Advanced Chemistry - Lesson Plans

Day 1	15 min.	Guided Notes: What is a Mole?
	35 min.	Guided Notes: Moles & Dimensional Analysis Intro *(Begin Day 1, and complete Day 2.)*

Day 2	10 min.	Guided Notes: Moles & Dimensional Analysis Intro
	40 min.	Moles & Dimensional Analysis - WS #1

Day 3	25 min.	Guided Notes: Molar Mass
	25 min.	Guided Notes: Percent Composition *(If needed, complete Day 4.)*
	HW	Molar Mass - WS #1

Day 4		*DUE:* Molar Mass - WS #1
	15 min.	*Finish as needed* - Guided Notes: Percent Composition
	35 min.	Percent Comp. COOKIE Lab
	HW	Percent Composition - WS #2

Day 5		*DUE:* Percent Composition - WS #2
	8 min.	Molar Mass DEMO
	42 min.	Guided Notes: Molar Mass & Dimensional Analysis

Day 6	50 min.	Molar Mass & Dimensional Analysis LAB

Day 7	10 min.	Moles & Dimensional Analysis - WS #2
	10 min.	Molar Mass & Dimensional Analysis - WS #2
	30 min.	Guided Notes: Mass ↔ Molecule Dimensional Analysis *(Begin Day 7, and complete Day 8.)*

Day 8	20 min.	Guided Notes: Mass ↔ Molecule Dimensional Analysis
	30 min.	Mass ↔ Molecule: Dimensional Analysis - WS #1

Day 9	50 min.	Mole Unit Task-Card RACE
	HW	Mole Calculation Practice

Day 10		*DUE:* Mole Calculation Practice
	40 min.	Guided Notes: Measurements & Dimensional Analysis
	10 min.	*Begin* Life & Measurements - Dimensional Analysis
	HW	*Complete* Life & Measurements - Dimensional Analysis

Day 11		*DUE:* Life & Measurements - Dimensional Analysis
	50 min.	Guided Notes: Dimensional Analysis Challenge Problems!
		Recommend: Introduce the concepts in the "Dimensional Analysis Challenge Problems!" However, do not focus heavily or test heavily these topics.

Day 12	*Optional: Project the questions for the worksheets listed below on a board. Then, have students complete the questions on individual whiteboards with expo markers.*	
	15 min.	Measurements & Dimensional Analysis - Practice A
	15 min.	Measurements & Dimensional Analysis - Practice B
	20 min.	Challenge Problems in Dimensional Analysis

Day 13		Review

Day 14		Test