

## Molecular Weight – ID: 16148

By Texas Instruments

TEACHER GUIDE

Time required  
45 minutes

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Topic: Atomic Mass and Formula Weight

- Use the periodic table to determine atomic mass.
- Calculate the formula weight for molecules.

Activity Overview

*In this activity, the students will use the periodic table to determine the atomic mass of elements. They will then calculate the formula weight for different molecules.*

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Materials

*To complete this activity, each student will require the following:*

- TI-Nspire™ technology
- copy of student worksheet
- periodic table
- pen or pencil

TI-Nspire Applications

*Calculator, Notes*

Teacher Preparation

*Students should be familiar with the structure of the periodic table and how to locate elements on it. This will help students calculate atomic mass and molecular weight. They should also be familiar with moles.*

- *The screenshots on pages 2–5 demonstrate expected student results.*
- *Students should be reminded that not all periodic tables are identical and that they should take that into account when locating elements and atomic mass.*
- ***To download the .tns file, go to [education.ti.com/exchange](http://education.ti.com/exchange) and enter “16148” in the search box.***

Classroom Management

- *This activity is designed to be **student-centered**, with the teacher acting as a facilitator while students work cooperatively. The student worksheet guides students through the main steps of the activity and includes questions to guide their exploration. Students may record their answers to the questions on blank paper or answer in the .tns file using the Notes application.*
- *The ideas contained in the following pages are intended to provide a framework as to how the activity will progress. Suggestions are also provided to help ensure that the objectives for this activity are met.*
- *In some cases, these instructions are specific to those students using TI-Nspire handheld devices, but the activity can easily be done using TI-Nspire computer software.*

The following questions will guide student exploration during this activity:

- What is a mole?
- Which units are used for the mass of atoms, and which units are used for the mass of moles of atoms?
- How do you determine the number of atoms of each element in a molecule?

The goal of this activity is for students to explore the concepts of atomic mass and formula weight. Students will use the periodic table to determine the atomic mass of elements and then use that information to calculate the molecular weight for various molecules.

### Problem 1 – Background Knowledge

**Step 1:** Students will open the file **Molecular\_Weight.tns** and read pages 1.1–1.2. Then, they should answer questions 1– 4.

**Q1.** What is the mass of 1 atom of C?

**A.** 12.01 amu

**Q2.** What is the mass of 1.00 mole of C?

**A.** 12.0 g

**Q3.** What is the mass of 2 atoms of O?

**A.** 32.0 amu

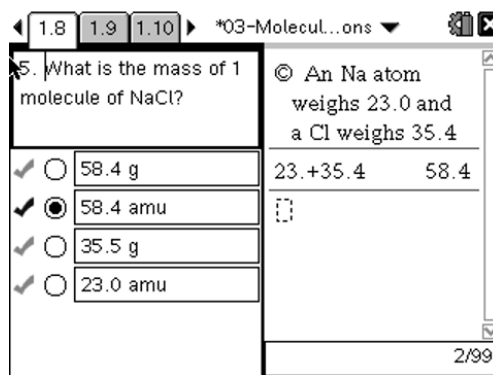
**Q4.** What is the mass of 2 moles of O?

**A.** 32.0 g

**Step 2:** Students will calculate the molecular weight for different molecules using the *Calculator* application.

**Q5.** What is the mass of 1 molecule of NaCl?

**A.** 58.4 amu



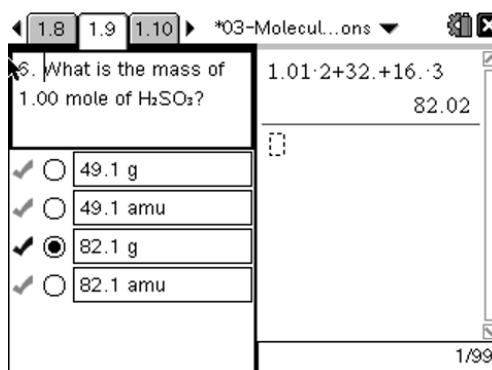
**TI-Nspire Navigator Opportunity: Quick Poll**

Quick Poll can be used here to ensure that students understand the process of calculating molecular weight. For Question 5, ask students to answer the following questions:

- How many atoms of Na and Cl are there in 1 molecule of NaCl? (There is one of each.)
- What is the atomic mass of Na? What is the atomic mass of Cl? (23 amu and 35.4 amu, respectively)
- What is the combined mass of the Na and Cl atoms in this molecule? (58.4 amu)

**Q6.** What is the mass of 1.00 mole of  $\text{H}_2\text{SO}_3$ ?

**A.** 82.1 g



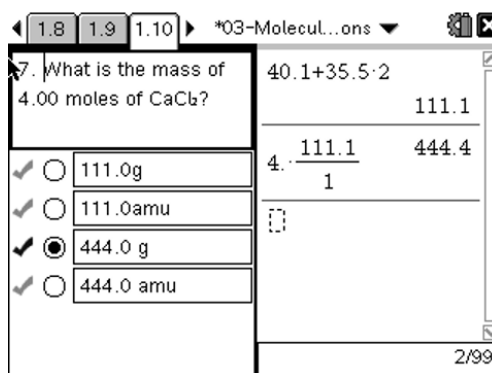
6. What is the mass of 1.00 mole of  $\text{H}_2\text{SO}_3$ ?  $1.01 \cdot 2 + 32. + 16. \cdot 3$   
82.02

49.1 g  
 49.1 amu  
 82.1 g  
 82.1 amu

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**Q7.** What is the mass of 4.00 moles of  $\text{CaCl}_2$ ?

**A.** 444.0 g



7. What is the mass of 4.00 moles of  $\text{CaCl}_2$ ?  $40.1 + 35.5 \cdot 2$   
111.1

$4. \cdot \frac{111.1}{1}$  444.4

111.0g  
 111.0amu  
 444.0 g  
 444.0 amu

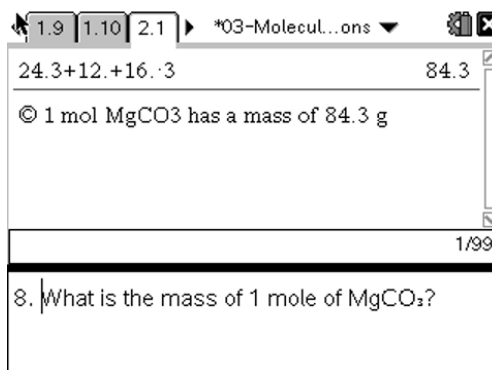
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**Problem 2 – Analysis and Problem Solving**

**Step 1:** Students should use the *Calculator* application to answer questions 8–13.

**Q8.** What is the mass of 1 mole of  $\text{MgCO}_3$ ?

**A.** 84.0 g



$24.3 + 12. + 16. \cdot 3$  84.3

© 1 mol  $\text{MgCO}_3$  has a mass of 84.3 g

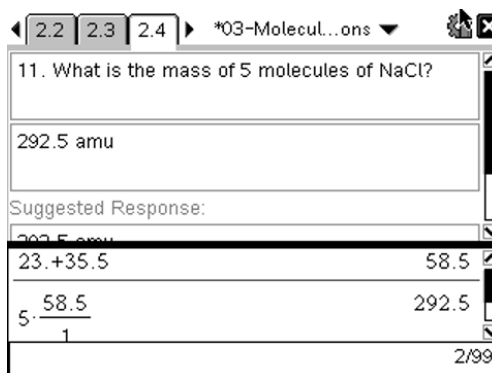
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8. What is the mass of 1 mole of  $\text{MgCO}_3$ ?

**Q9.** How many atoms are contained in  $\text{Na}_2\text{O}$ ?  
**A.** *There are 2 Na atoms and 1 oxygen atom for a total of 3.*

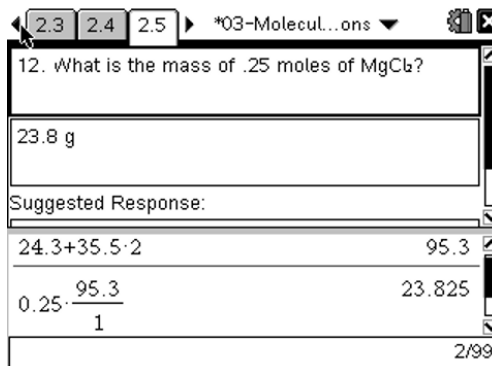
**Q10.** The compound  $\text{Li}_2\text{S}$  contains  
**A.** *2 lithium and 1 sulfur*

**Q11.** What is the mass of 5 molecules of  $\text{NaCl}$ ?  
**A.** *292.0 amu*



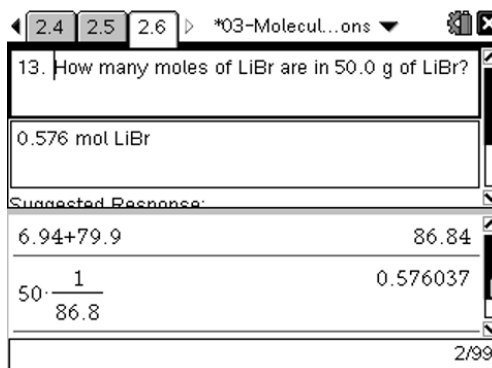
TI-Nspire calculator window showing the solution for Q11. The question is "11. What is the mass of 5 molecules of NaCl?". The user has entered "292.5 amu". The suggested response shows the calculation:  $23 + 35.5 = 58.5$  and  $5 \cdot \frac{58.5}{1} = 292.5$ . The window title is "\*03-Molecul...ons".

**Q12.** What is the mass of 0.25 mole of  $\text{MgCl}_2$ ?  
**A.** *23.8 g*



TI-Nspire calculator window showing the solution for Q12. The question is "12. What is the mass of .25 moles of MgCl2?". The user has entered "23.8 g". The suggested response shows the calculation:  $24.3 + 35.5 \cdot 2 = 95.3$  and  $0.25 \cdot \frac{95.3}{1} = 23.825$ . The window title is "\*03-Molecul...ons".

**Q13.** How many moles of  $\text{LiBr}$  are in 50.0 g of  $\text{LiBr}$ ?  
**A.** *0.58*



TI-Nspire calculator window showing the solution for Q13. The question is "13. How many moles of LiBr are in 50.0 g of LiBr?". The user has entered "0.576 mol LiBr". The suggested response shows the calculation:  $6.94 + 79.9 = 86.84$  and  $50 \cdot \frac{1}{86.8} = 0.576037$ . The window title is "\*03-Molecul...ons".