



Molecular Weight

Student Activity

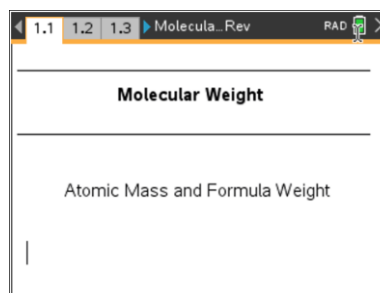


Name _____

Class _____

Open the TI-Nspire™ document *MolecularWeight.tns*.

In this activity, you will use the periodic table to determine atomic mass and calculate the formula weight for molecules.



Background

It is difficult to find a chemistry lab or a chemist's office that does not have a periodic table on hand. When Dmitri Mendeleev developed the first periodic table, he provided chemists with an invaluable tool for quickly finding information about chemical elements. Two of the most useful bits of information are the element's atomic number and its atomic mass. It is easy to confuse the two, but the atomic number is the number of protons in a single atom of an element. The atomic mass is the average mass of an atom of the element. It is measured in atomic mass units (amu). The mass of one mole of that element is equal to its atomic mass, only the units are changed from amu to grams. For example, 1 atom of hydrogen has a mass of 1.01 amu and 1 mole (6.022×10^{23} atoms) has a mass of 1.01 grams.

Molecules are combinations of atoms. To determine the formula weight, or molecular weight, of a molecule, you need to add up the atomic masses of all the atoms in the molecule. For example, one molecule of H_2O is made of two hydrogen atoms and one oxygen atom. Each hydrogen atom has a mass of 1.0 amu, and each oxygen atom has a mass of 16.0 amu. The total mass of one water molecule is then: $(2 \text{ hydrogen atoms} \times 1.0 \text{ amu}) + (1 \text{ oxygen atom} \times 16 \text{ amu}) = 18 \text{ amu}$. This would then mean that 1 mole of water would weigh 18.0 g. In this activity, you will use the periodic table to determine the atomic mass of different elements. Then you will calculate the formula weight, or molecular weight, for molecules.

Move to page 1.3.

A periodic table has been included for your reference.

Note that the data can be viewed for each element by selecting the box. Use the Periodic Table to help answer questions on pages 1.4-1.7.

Hydrogen																																		
1	4																2																	
Atomic Weight: 1.00794(7) u																																		
Electron Config: 1s																																		
Atomic Radius: 0.32 Å																																		
State: Gas																																		
11	12	13	14	15	16	17	18											19	20															
Na	Mg	Al	Si	P	S	Cl	Ar	K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr									
37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71
Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I	Xe	Ba	La	Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu	
85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	
Fr	Ra	Rf	Db	Sg	Bh	Hs	Mt	Ds	Rg	Cn	Nh	Fl	Mc	Lv	Ts	Og																		
57 58 59 60 61 62 63 64 65 66 67 68 69 70 71																																		
La Ce Pr Nd Pm Sm Eu Gd Tb Dy Ho Er Tm Yb Lu																																		
89 90 91 92 93 94 95 96 97 98 99 100 101 102 103																																		
Ac Th Pa U Np Pu Am Cm Bk Cf Es Fm Md No Lr																																		

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

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



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

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

Move to pages 1.8 -1.11

You will now calculate the molecular weight for different molecules using the Calculator application. Continue to refer to the Periodic Table on page 1.3 as needed.

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

Q6. What is the mass of 1.00 mole of H_2SO_3 ?

Q7. What is the mass of 4.00 moles of CaCl_2 ?

Q8. What is the mass of 1 mole of MgCO_3 ?

Q9. How many atoms are contained in Na_2O ?

Q10. The compound Li_2S contains:

Q11. What is the mass of 5 molecules of NaCl?

Q12. What is the mass of 0.25 mole of MgCl_3 ?

Q13. How many moles of LiBr are in 50.0 g of LiBr?