TODAY

1) Homework Check
2) LET'S MAKE WOOD ALCOHOL BY "DESTRUCTIVE DISTILLATION" OF WOOD! (Teacher Demonstration)
3) NOTES

Friday: Quiz WEDNESDAY: Test
FINAL EXAM: Covers everything. Start reviewing now.

PURPOSE: How Do we Calculate MOLECULAR MASS?

WARMUP: COPY THIS BUT CORRECT THE WRONG NUMBER:
"6.02×10^{23} potassium atoms weighs 12.01 grams"

#1 WHAT IS THE MASS OF 6.02×10^{23} MOLECULES OF WOOD ALCOHOL?

The formula is CH_4O

How to calculate the molar mass:

C 12.01	1 atom	$1 \times 12.01 = 12.01$	grams/mole
H 1.01	4 atoms	$4 \times 1.01 = 4.04$	grams/mole
O 16.00	1 atom	$1 \times 16.00 = 16.00$	grams/mole
		32.05	grams/mole

Counting Atoms

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Name ANSWERS

Period _____

NOTE: YOU WILL NEED A PERIODIC TABLE TO ANSWER MOST OF THESE QUESTIONS

1. Our next test is Wednesday. It covers Everything since January 5th.

2. Assume that pennies have a mass of 2.1 g for one penny. Recall that 1 gross is 144 things. Also, from today's class notes, recall that 1 mole is 6.02×10^{23} things.

   a. What would be the mass of 501 pennies?

$$\frac{501 \text{ pennies}}{} \left| \frac{2.1 \text{ grams}}{1 \text{ penny}} \right| = 1052.1 \approx 1100 \text{ grams}$$

3. How many pennies are there in 4.75 dozen pennies?

$$\frac{4.75 \text{ dozen}}{} \left| \frac{12 \text{ pennies}}{1 \text{ dozen}} \right| = 57 \text{ pennies}$$

4. How many pennies are there in 0.947 moles of pennies?

$$\frac{0.947 \text{ moles}}{} \left| \frac{6.02 \times 10^{23} \text{ pennies}}{1 \text{ mole}} \right| = 5.7 \times 10^{23} \text{ pennies}$$

5. Assume that one mole of carbon atoms has a mass of 12.01 g. Also, from yesterday's class notes, recall that 1 mole is 6.02×10^{23} things.

   What would be the mass of 55.55 moles of carbon atoms?

$$\frac{55.55 \text{ moles C}}{} \left| \frac{12.01 \text{ grams}}{1 \text{ mole}} \right| = 667.2 \text{ grams}$$

6. How many carbon atoms are there in 0.00000004440 moles of carbon atoms?

$$\frac{0.00000004440 \text{ moles}}{} \left| \frac{6.02 \times 10^{23} \text{ atoms}}{1 \text{ mole}} \right| = 2.67 \times 10^{16} \text{ atoms}$$

7. How many moles are there 560000000000000000000 carbon atoms?

$$\frac{5.6 \times 10^{20} \text{ atoms}}{} \left| \frac{1 \text{ mole}}{6.02 \times 10^{23} \text{ atoms}} \right| = 9.3 \times 10^{-4} \text{ moles}$$

8. One mole of atoms is 6.02×10^{23} atoms. This number is called ***Avogadro's number***. Avogadro's number of particles is referred to as ***one mole***.

9. Write a conversion factor for the number of carbon atoms in one mole of carbon.

   1 mole C atoms = 6.02×10^{23} C atoms

10. What is the mass of one mole (Avogadro's number) of carbon atoms? 12.01 grams (from the periodic table) ★

11. The mass of one mole is often called a **molar mass**. They can be written as conversion factors too! Write a conversion factor for grams of carbon to moles of carbon.

1 mole C atoms = 12.01 g of C

12. Suppose that 3.01×10^{23} atoms of carbon are needed for a particular reaction. Set up a calculation to convert this number of atoms to moles of atoms.

$$3.01 \times 10^{23} \text{ atoms} \times \frac{1 \text{ mole}}{6.02 \times 10^{23} \text{ atoms}} = 0.500 \text{ moles}$$

13. Calculate the mass of 9.7×10^{25} carbon atoms.

From periodic table

$$9.7 \times 10^{25} \text{ atoms} \times \frac{1 \text{ mole}}{6.02 \times 10^{23} \text{ atoms}} \times \frac{12.01 \text{ grams}}{1 \text{ mole}} = 1935 \approx 1900 \text{ grams}$$ ★

14. We can also convert the other direction... A pencil contains 8.6 g of graphite (carbon). Change this from grams of carbon to atoms of carbon.

$$8.6 \text{ grams} \times \frac{1 \text{ mole}}{12.01 \text{ grams}} \times \frac{6.02 \times 10^{23} \text{ atoms}}{1 \text{ mole}} = 4.3 \times 10^{23} \text{ atoms}$$

15. How many atoms of carbon are there in 0.008324 g of carbon?

$$0.008324 \text{ g} \times \frac{1 \text{ mole}}{12.01 \text{ grams}} \times \frac{6.02 \times 10^{23} \text{ atoms}}{1 \text{ mole}} = 4.17 \times 10^{20} \text{ atoms}$$

16. Calculate the mass of 6.980×10^{25} carbon atoms.

$$6.980 \times 10^{25} \text{ atoms} \times \frac{1 \text{ mole}}{6.02 \times 10^{23} \text{ atoms}} \times \frac{12.01 \text{ grams}}{1 \text{ mole}} = 1390 \text{ grams}$$

17. Convert 0.00960 g of graphite to atoms of carbon.

$$0.00960 \text{ g} \times \frac{1 \text{ mole}}{12.01 \text{ grams}} \times \frac{6.02 \times 10^{23} \text{ atoms}}{1 \text{ mole}} = 4.81 \times 10^{20} \text{ atoms}$$

ANSWERS

Molecular Mass

Name

Period

1. For water…		
How would you draw one molecule?	According to the periodic table, what is the mass of a mole of this molecule?	Find the mass of 4.05 moles of this molecule.
(H)(H)(O)	(H) $2 \times 1.01 = 2.02$ g/mole (O) $1 \times 16.00 = 16.00$ g/mole 18.02 g/mole	$4.05 \text{ moles} \times \left(\frac{18.02 \text{ grams}}{1 \text{ mole}}\right) =$ Answer: 72.98 grams

2. For nitrogen…		
How would you draw one molecule?	According to the periodic table, what is the mass of a mole of this molecule?	Find the mass of 1,003,000 molecules of this substance.
(N)(N)	N 2 atoms 2×14.01 g/mol $= 28.02$ grams/mole	$1{,}003{,}000 \text{ molecules}_{N_2} \times \left(\frac{28.02 \text{ grams}}{6.02 \times 10^{23} \text{ molecules}_{N_2}}\right) = 4.67 \times 10^{-17}$ grams

3. For bromine…		
How would you draw one molecule?	According to the periodic table, what is the mass of a mole of this ~~molecule~~?	Find the mass of 56.9 moles of this molecule.
(Br)(Br)	$2 \times 79.904 = 159.808$ g/mol	$56.9 \text{ moles} \times \left(\frac{159.808 \text{ g}}{1 \text{ mole}}\right) = 9090$ grams

4. What would be the mass of 3.08×10^{13} atoms of nickel?

$$3.08 \times 10^{13} \text{ atoms} \times \frac{1 \text{ mole}}{6.02 \times 10^{23} \text{ atoms}} \times \frac{58.6934 \text{ grams}}{1 \text{ mole}} = 3.00 \times 10^{-9} \text{ grams}$$