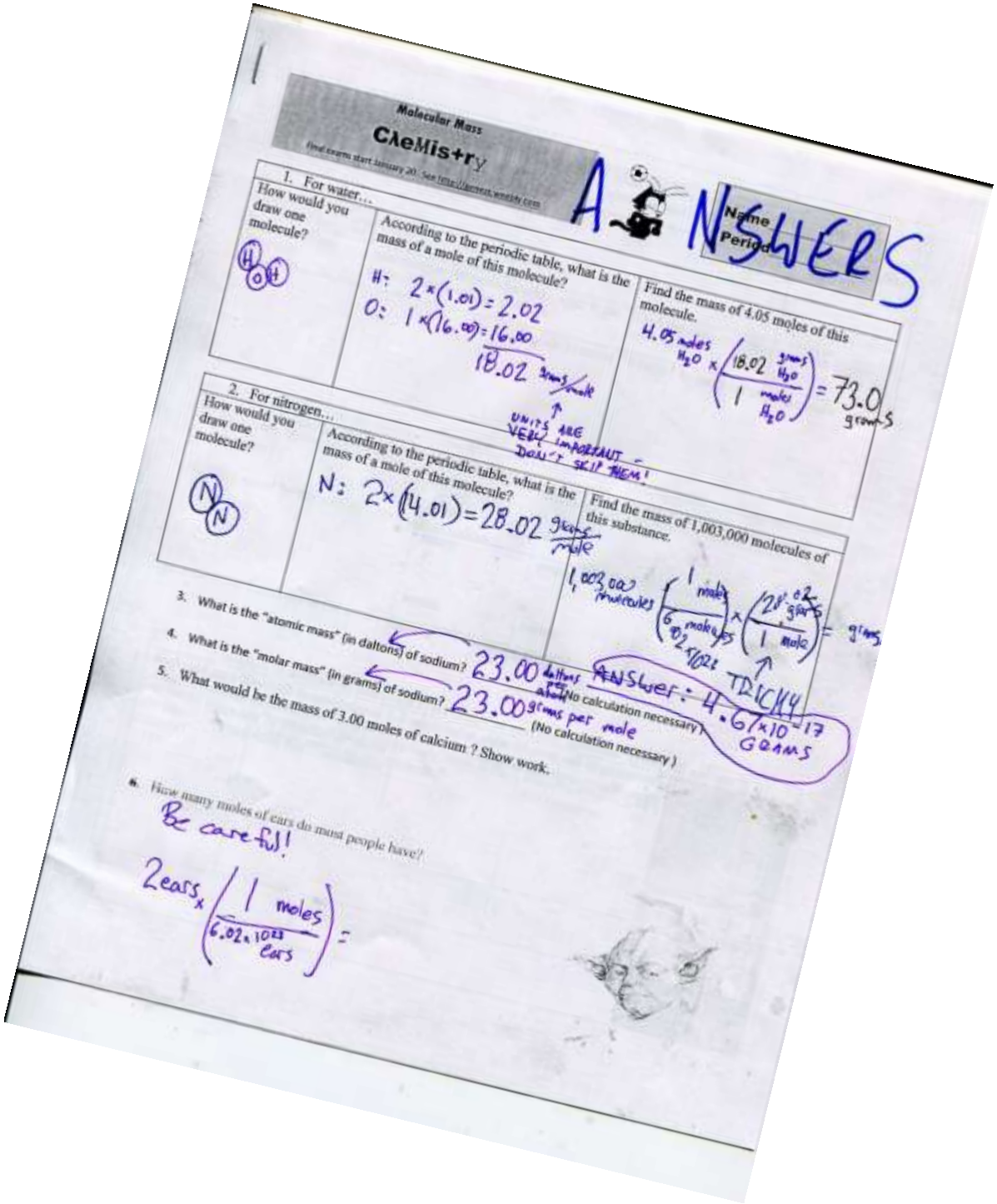
Hints for Tuesday

night's (tonight's) homework:



Molecular Mass

CleMis+ry

Final exams start January 20. See http://gemest.wmsky.com

Name

Period

ANSWERS

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 O H	H: $2\times(1.01)=2.02$ O: $1\times(16.00)=16.00$ 18.02 grams/mole UNITS ARE VERY IMPORTANT - DON'T SKIP THEM!	$4.05\ \text{moles}\ H_2O \times \left(\frac{18.02\ \text{grams}\ H_2O}{1\ \text{moles}\ H_2O}\right) = 73.0$ 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: $2\times(14.01)=28.02$ grams/mole	$1{,}003{,}000$ molecules $\left(\frac{1\ \text{moles}}{6.02\times10^{23}\ \text{molecules}}\right)\times\left(\frac{28.02\ \text{grams}}{1\ \text{mole}}\right) =$ grams TRICKY ANSWER: 4.67×10^{-17} GRAMS

3. What is the "atomic mass" (in daltons) of sodium? 23.00 daltons per atom (No calculation necessary)

4. What is the "molar mass" (in grams) of sodium? 23.00 grams per mole (No calculation necessary)

5. What would be the mass of 3.00 moles of calcium ? Show work.

6. How many moles of ears do most people have?

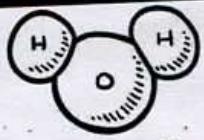
Be careful!

$2\text{ears}\times\left(\frac{1\ \text{moles}}{6.02\times10^{23}\ \text{ears}}\right) =$

Purpose:

Solve story problems for ~~atoms~~ *molecules*.

WARMUP:



What is the mass of this?

One oxygen is 16.00 daltons

two hydrogen is 2.02

18.02 daltons

Draw the diatomic elements

What is the molecular mass of eugenol?

Eugenol has a formula of $C_{10}H_{12}O_2$

C: $10 \times (12.01) = 120.1$

H: $12 \times (1.01) = 12.12$

O: $2 \times (16.00) = 32.00$

164.22 grams/mole

What would 3.2 moles of eugenol weigh?

$3.2 \text{ moles} \times \left(\frac{164.22 \text{ grams}}{1 \text{ moles}}\right) = 525.8 \text{ grams}$

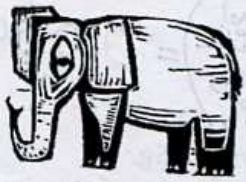
What would 1,000,000. molecules of eugenol weigh?

$1{,}000{,}000 \text{ molecules} \times \left(\frac{164.22 \text{ grams}}{1 \text{ molecules}}\right) = 1.64220 \times 10^{8} \text{ grams}$

Draw the diatomic elements

ANSWERS

Name_____ Hr._____



You may use any periodic table, including the fine one on our website or in your notes.

1. C Avogadro's number 2. A Atomic mass 3. D Mole 4. B Molar mass	a) mass of one atom b) mass in grams of one mole of a substance c) the number of atoms or molecules in 1 mole of a substance d) SI unit used to measure amount (aka…number of) particles in a substance.

5. If you have 25.49g Au, how many moles of gold do you have?

$$25.49\text{ g Au} \times \left(\frac{1\text{ mole}}{196.97\text{ g}}\right) = 0.1294\text{ moles}$$

TRICKY!

6. What is the mass of one helium atom in grams?

$$1\text{ atom He} \times \left(\frac{1\text{ mole He}}{6.02\times10^{23}\text{ atoms He}}\right) \times \left(\frac{4.00\text{ grams}}{1\text{ mole He}}\right) = 6.64\times10^{-24}\text{ grams}$$

7. You have 0.50 g of helium atoms. How many grams of gold must you have to have the same number of atoms of each? Since moles are number of atoms, start by finding moles

Step ①
$$0.50\text{ g He} \times \frac{1\text{ mol He}}{4.00\text{ g He}} = 0.125\text{ mol He}$$

Step ②
$$0.125\text{ mol Au} \times \left(\frac{196.97\text{ grams Au}}{1\text{ mol Au}}\right) = 24.6\text{ grams Au}$$

Answer: 24.6 grams gold has the same number of atoms as 0.5 grams of Helium.

8. A lead fishing weight has a mass of 7.09g. Determine the number of moles of lead atoms in the fishing weight.

$$7.09 \text{ grams} \times \left(\frac{1 \text{ mol Pb}}{207.2 \text{ grams Pb}}\right) = 0.0342 \text{ moles}$$

9. An aluminum can has a mass of 13.5g.
   a) Determine the number of moles of aluminum in an aluminum can.

$$13.5 \text{ g Al} \times \left(\frac{1 \text{ mol Al}}{26.98 \text{ g Al}}\right) = 0.500 \text{ moles Al}$$

   b) Determine the number of aluminum atoms in an aluminum can.

$$0.500 \text{ mol Al} \times \left(\frac{6.02 \times 10^{23} \text{ atoms}}{1 \text{ mol Al}}\right) = 3.01 \times 10^{23} \text{ atoms}$$

10. Convert 1.75×10^{26} atoms of potassium to moles of potassium

$$1.75 \times 10^{26} \text{ atoms} \times \left(\frac{1 \text{ mole}}{6.02 \times 10^{23} \text{ Atoms}}\right) = 291 \text{ moles}$$

11. A chemist needs 4.52 moles of carbon to run a reaction, how many grams are needed to run the reaction 5 times?

$$5 \text{ times} \times \left(\frac{4.52 \text{ moles}}{1 \text{ time}}\right) = 22.6 \text{ moles}$$

$$22.6 \text{ moles C} \times \left(\frac{12.01 \text{ grams}}{1 \text{ moles}}\right) = \boxed{271 \text{ grams}}$$

ANSWER