

Answer the following. (1 point each)

1. Explain "counting by weighing" using an everyday (not chemistry) example.

If a hardware store weighs out a certain # of pounds of nails to give you 5000 nails. They can do this because they know the average mass of 1 nail

2. If I have an item that weighs 5.80 grams and I need 5880 of these items how would you produce the required amount without counting each item.

$$5.80 \times 5880 = 34104$$

Weigh out 34,104 g of the item

3. Avogadro's number is equal to what number?

$$6.022 \times 10^{23}$$

4. Avogadro's number is represented by what collective unit?

a mole

5. Explain why counting by weighing is necessary in Chemistry.

atoms are too small to count

Solve the following problems. Be sure to include UNITS on your answers!! (3 points each)

6. How many amu would  $2.97 \times 10^{13}$  atoms of hydrogen weigh?

$$1.008 \text{ amu} = 1 \text{ atom}$$

$$\frac{2.97 \times 10^{13} \text{ atoms}}{1 \text{ atom}} \div \frac{1.008 \text{ amu}}{1 \text{ atom}} = 2.99 \times 10^{13} \text{ amu}$$

7. How many atoms of barium would I have if I had 823.9 amu of barium?

$$137.33 \text{ amu} = 1 \text{ atom}$$

$$\frac{823.9 \text{ amu}}{137.33 \text{ amu}} \div \frac{1 \text{ atom}}{137.33 \text{ amu}} = 5.999 = 6.00 \text{ atoms}$$

8. How many grams of argon do I have if I have 23.2 moles of argon?

$$39.948 \text{ g} = 1 \text{ mol}$$

$$\frac{23.2 \text{ mol}}{1 \text{ mol}} \times \frac{39.948 \text{ g}}{1 \text{ mol}} = 926.7 \cdot 927 \text{ grams}$$

9. How many moles of zinc do I have if I have 108.9 grams of zinc?  $65.38 \text{ g} = 1 \text{ mol}$

$$\frac{108.9 \text{ g}}{65.38 \text{ g}} \times 1 \text{ mol} = 1.6656 \quad \boxed{1.67 \text{ moles}}$$

10. How many atoms of silver do I have if I have 4.92 moles of silver?  $6.022 \times 10^{23} \text{ atoms} = 1 \text{ mole}$

$$\frac{4.92 \text{ mole}}{1 \text{ mol}} \times 6.022 \times 10^{23} \text{ atoms} = \boxed{2.96 \times 10^{24} \text{ atoms}}$$

11. How many atoms of sulfur do I have if I have 30.5 grams of sulfur?  $32.065 \text{ g} = 1 \text{ mole}$   
 $1 \text{ mol} = 6.022 \times 10^{23} \text{ atoms}$

$$\frac{30.5 \text{ g}}{32.065 \text{ g}} \times 1 \text{ mol} = .951192889 \text{ mol} \times 6.022 \times 10^{23} \text{ atoms} = \boxed{5.73 \times 10^{23} \text{ atoms}}$$

12. What is the molar mass of calcium oxide?



Ca -  $40.08 \times 1 = 40.08$

O -  $15.999 \times 1 = 15.999$

$\boxed{56.079 \text{ g/mol}}$

13. What is the molar mass of barium nitrate? Ba(NO3)2

Ba -  $137.33 \times 1 = 137.33$

N -  $14.01 \times 2 = 28.02$

O -  $15.999 \times 6 = 95.994$

$\boxed{261.344 \text{ g/mol}}$

14. How many grams of barium chloride do I have if I have 0.572 moles of barium chloride?



Ba -  $137.33 \times 1 = 137.33$

Cl -  $35.45 \times 2 = 70.90$

$\boxed{208.23 \text{ g/mol}}$

$$\frac{0.572 \text{ mol}}{1 \text{ mol}} \times 208.23 \text{ g} = \boxed{119.1 \text{ grams}}$$

15. How many moles of nitrogen dioxide do I have if I have 89.8 grams of nitrogen dioxide?



N -  $14.01 \times 1 = 14.01$

O -  $15.999 \times 2 = 31.998$

$\boxed{46.098}$

$$\frac{89.8 \text{ g}}{46.098 \text{ g}} = \boxed{1.95 \text{ mol}}$$

Find the percent composition of all of the elements in the following compounds (3 pts per line)

16.  $(\text{NH}_4)_3\text{PO}_4$

$$\text{N} - 14.01 \times 3 = 42.03 \div 149.092 \quad \text{N: } \underline{28.19\%}$$

$$\text{H} - 1.008 \times 12 = 12.096 \div 149.092 \quad \text{H: } \underline{8.11\%}$$

$$\text{P} - 30.97 \times 1 = 30.97 \div 149.092 \quad \text{P: } \underline{20.77\%}$$

$$\text{O} - 15.999 \times 4 = \underline{63.996} \div 149.092 \quad \text{O: } \underline{42.92\%}$$

$149.092 \text{ g/mol}$

17.  $\text{Al}_2(\text{SO}_4)_3$

$$\text{Al} - 26.98 \times 2 = 53.96 \div 342.143 \quad \text{Al: } \underline{15.77\%}$$

$$\text{S} - 32.065 \times 3 = 96.195 \div 342.143 \quad \text{S: } \underline{28.12\%}$$

$$\text{O} - 15.999 \times 12 = \underline{191.988} \div 342.143 \quad \text{O: } \underline{56.11\%}$$

$342.143$

NOTE: PERCENT COMPOSITION MAY OR MAY NOT BE ON THE QUIZ... I WILL LET YOU KNOW.