INTRODUCTION to MOLE CONVERSION CALCULATIONS

Complete the following. You MUST show all of your work in the conversions:

1) 540 Megabytes of ram = _____Gigabytes of ram

2) 18fg = _____Mg

3) 36 pencils = _____ dozen

4) 5 pencils = _____ dozen

5) 6.02×10^{23} pencils = _____ moles

6) 12.0408×10^{23} pencils = _____ moles

7) 41.0 g N = _____ moles

8) 41.0 g N = _____ atoms

9) The mass of 1 atom of nitrogen

10) 2.408×10^{24} ammonia molecules = _____ moles

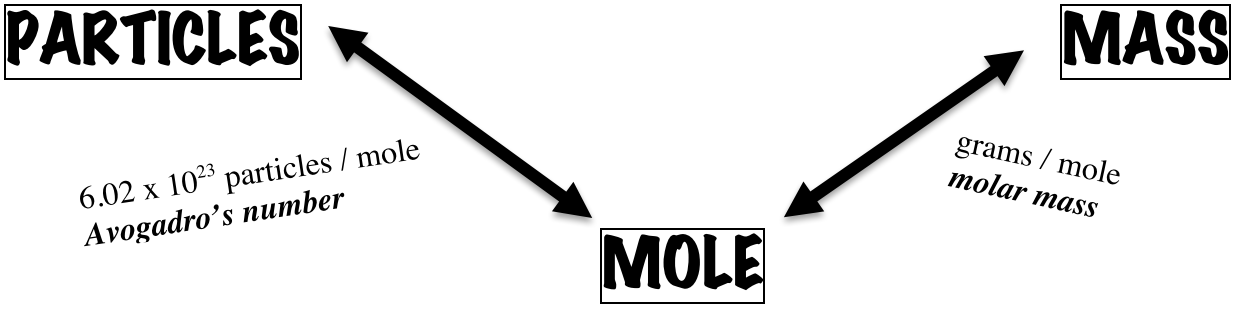
11) The # of nitrogen atoms in #10:

12) The # of hydrogen atoms in #10:

13) The # of TOTAL atoms in #10:

14) 0.86 moles of ammonia = _____molecules

Starting to draw the mole map:



Sample calculations

WHAT IS THE MASS in grams, of one mole of lead?

mass =

WHAT IS THE MASS in grams, of one atom of lead?

$$\text{mass} = \frac{207\ \text{g}}{\text{mole}} \times \frac{1\ \text{mole}}{6.02 \times 10^{23}\ \text{atoms}} \times 1\ \text{atom} =$$

WHAT IS THE MASS in grams, of 5.8 x 10^{25} atoms of lead?

$$\text{mass} = \frac{207\ \text{g}}{\text{mole}} \times \frac{1\ \text{mole}}{6.02 \times 10^{23}\ \text{atoms}} \times \frac{5.8 \times 10^{25}\ \text{atoms}}{1} =$$

How many molecules in 715 grams of oxygen?
(This is the amount of oxygen that a person breathes, on average, per day):

$$\text{Molecules} = 715\ \text{g} \times \frac{1\ \text{mole}}{31.998\ \text{g}\ O_2} \times \frac{6.02 \times 10^{23}\ \text{molecules}}{1\ \text{mole}} =$$

Mole Practice Worksheet #1

1. What is the atomic mass (to 3 significant figures) of…
a) rubidium b) astatine c) manganese

2. What is the molar mass (to 3 significant figures) of…
a) gallium manganate b) triiodine heptafluoride c) zinc carbonate

3. How many moles are there in…
a) 86 g of chlorine gas b) 258 g of tellurium dioxide gas
c) 48.00 g of carbon tetrafluoride gas

4. What is the mass in grams of…
a) 8 moles of ammonia b) 5.0 moles of nitric acid
c) 0.049 moles of hydrogen chloride

5. How many molecules/atoms are there in …
a) 4.5 moles of neon gas b) 1.50 moles of nitrogen dioxide gas
c) 35.0 g of sulphur difluoride gas

6. What would be the mass in grams of…
a) 6.02×10^{25} atoms of osmium b) 1.53×10^{22} molecules of silicon tetrabromide
c) 1 molecule of water

Answers

1. atomic mass means the mass of a single atom
a) 84.5 a.m.u. b) 210 a.m.u. c) 54.9 a.m.u.
AMU is just a generic set of units. So when you see AMU, you can treat is like grams per mole (as this is easier to use in unit converstions)

2. molar mass means mass of 1 mole of the substance in grams
a) 378 g/mole $Ga(MnO_3)_3$ b) 514 g/mole I_3F_7 c) 125 g/mole $ZnCO_3$

3. a) ? moles = (1 mole / 71.0 g) (86 g) = 1.2 moles Cl_2 (2 sig. figs.) b) 1.62 moles TeO_2
c) 0.545 moles CF_4

4. a) ? g = (17.0 g / mole) (8 moles) = 100 g NH_3 (1 sig. fig.) b) 320 g HNO_3
c) 1.8 g HCl

5. a) ? molecules = (6.02×10^{23} atoms / mole) (4.5 moles) = 2.7×10^{24} atoms Ne
b) 9.03×10^{23} molecules NO_2 c) 3.01×10^{23} molecules SF_2

6. a) ?g = (190.2 g / mole)(1 mole / 6.02×10^{23} atoms)(6.02×10^{25} atoms) = 1.90×10^{4} g
b) 8.84 g $SiBr_4$ c) 2.99×10^{-23} g H_2O

Mole Calculations Worksheet #2

"mol" is the universally accepted short way to write "moles."
There is no short form for molecules. I know...It's silly.

1. How many moles of Na are in 42 g of Na?
2. How many moles are in 8.25 g of oxygen?
3. How much does 2.18 mol of Cu weigh?
4. What is the mass of 0.28 mol of iron?
5. How many atoms are in 7.2 mol of antimony?
6. How many moles are in 36 g of bromine?
7. How many moles are in 1.0×10^9 atoms?
8. What is the mass of 1.20×10^{25} atoms of sulfur?
9. How many moles of CO molecules are in 52 g of CO?
10. How many moles of C_2H_6 are in 124 g?
11. How many moles of CCl_4 are there in 56 g?
12. What is the mass of 2.50 mol of H_2SO_4?
13. What is the mass of 0.25 mol of Fe_2O_3?
14. How many molecules are there in 52 g of CO?
15. How many formula units (***aka molecules***) are in 22.4 g SnO_2?
16. How many molecules are in 116 g CCl_4?
17. What is the mass of 3.01×10^{23} formula units of Fe_2O_3?
18. What is the mass of 1.2×10^{25} molecules of CO?
19. How many O atoms are in 1.25 mol of SO_2?
20. How many moles of O atoms do you have when you have 1.20×10^{25} N_2O_5 molecules?
21. How many formula units are in 5.33 mol of $CuCl_2$?
22. How many copper atoms are in 5.33 mol of $CuCl_2$?
23. How many moles of Cl atoms are in 5.33 mol of $CuCl_2$?
24. How many moles of $CuCl_2$ contain 1.2×10^{23} atoms of Cl?
25. How many O atoms are in 3.15 mol of SnO_2?
26. How many H atoms are in 17.5 g $(NH_4)_2C_2O_4$?

Answers

1. 1.8 mol Na	14. 1.1×10^{24} molecules
2. 0.258 moles of O_2	15. 8.95×10^{22} molecules
3. 139 g Cu	16. 4.54×10^{23} molecules
4. 16 g Fe	17. 79.9 g Fe_2O_3
5. 4.3×10^{24} atoms	18. 5.6×10^2 g CO
6. 0.225 moles of Br_2	19. 1.51×10^{24} O atoms
7. 1.7×10^{-15} mol	20. 99.7 mol O
8. 639 g S	21. 3.21×10^{24} molecules
9. 1.9 mol	22. 3.21×10^{24} Cu atoms
10. 4.12 mol	23. 10.7 mol of Cl atoms
11. 0.36 mol	24. 0.10 mol $CuCl_2$
12. 245 g	25. 3.79×10^{24} O atoms
13. 40. g	26. 6.79×10^{23} H atoms