

Mole Conversion Worksheet- Accel

Name/Period: Key

Solve the following using dimensional analysis. Show all of your work and label all answers!

Complete the following table:

Name	Formula	Type of Compound (Ionic or Molecular)
Carbon tetrachloride	CCl ₄	molecular
diphosphorus pentoxide	P ₂ O ₅	molecular
Silver nitrate	AgNO ₃	ionic
sulfur trioxide	SO ₃	sulfur trioxide
barium Chloride	BaCl ₂	ionic

1. Given 3.25 mol AgNO₃, determine the number of formula units.

$$3.25 \text{ mol AgNO}_3 \left| \frac{6.02 \times 10^{23} \text{ formula units AgNO}_3}{1 \text{ mol AgNO}_3} \right. = 1.96 \times 10^{24} \text{ formula units AgNO}_3$$

2. How many moles are in 2.50 x 10²³ atoms Fe?

$$2.50 \times 10^{23} \text{ atoms Fe} \left| \frac{1 \text{ mol Fe}}{6.02 \times 10^{23} \text{ atoms Fe}} \right. = 0.0415 \text{ mol Fe}$$

3. How is a mole similar to a dozen?

A mole is used to group things when counting just like a dozen is.

4. What is the relationship between Avogadro's number and one mole?

Avogadro's number (6.02 x 10²³) is equal to one mole

5. Explain why chemists use the mole.

The particles are so small in chemistry, so the mole enables grasping which makes for a more workable number

6. Determine the number of particles in each of the following and identify the particle type (atom, formula unit, or molecule).

a. 11.5 mol Ag $\left| \frac{6.02 \times 10^{23} \text{ atoms Ag}}{1 \text{ mol Ag}} \right. = 6.92 \times 10^{24} \text{ atoms Ag}$ Atoms b/c it's a single element

b. 18.0 mol water $\left| \frac{6.02 \times 10^{23} \text{ molecules H}_2\text{O}}{1 \text{ mol H}_2\text{O}} \right. = 1.08 \times 10^{25} \text{ molecules H}_2\text{O}$ molecules b/c it's a molecular covalent compound

c. 0.150 mol NaCl $\left| \frac{6.02 \times 10^{23} \text{ formula units NaCl}}{1 \text{ mol NaCl}} \right. = 9.03 \times 10^{22} \text{ formula units NaCl}$ formula units b/c it's an ionic compound

7. Determine the mass in grams of 4.25 mol Zn.

$$4.25 \text{ mol Zn} \left| \frac{65.39 \text{ g Zn}}{1 \text{ mol Zn}} \right. = 278 \text{ g Zn}$$

8. Determine the number of moles in 2.50 kg Fe.

$$2.50 \text{ kg Fe} \left| \frac{1000 \text{ g Fe}}{1 \text{ kg Fe}} \right| \left| \frac{1 \text{ mol Fe}}{55.847 \text{ g Fe}} \right. = 44.8 \text{ mol Fe}$$

9. How many atoms are in 20.6 g Ca?

$$20.6 \text{ g Ca} \left| \frac{1 \text{ mol Ca}}{40.08 \text{ g Ca}} \right| \left| \frac{6.02 \times 10^{23} \text{ atoms Ca}}{1 \text{ mol Ca}} \right. = 3.09 \times 10^{23} \text{ atoms Ca}$$

10. What is the mass in grams of 6.02 x 10²⁴ atoms Mn?

$$6.02 \times 10^{24} \text{ atoms Mn} \left| \frac{1 \text{ mol Mn}}{6.02 \times 10^{23} \text{ atoms Mn}} \right| \left| \frac{54.9380 \text{ g Mn}}{1 \text{ mol Mn}} \right. = 549 \text{ g Mn}$$

11. What is the mass in grams of 15.7 moles of sulfur?

$$15.7 \text{ mol S} \left| \frac{32.06 \text{ g S}}{1 \text{ mol S}} \right. = 503 \text{ g S}$$

12. How many moles of silver are in 23.0 g?

$$23.0 \text{ g Ag} \left| \frac{1 \text{ mol Ag}}{107.8682 \text{ g Ag}} \right. = 0.213 \text{ mol Ag}$$

13. How many atoms nitrogen are in 6.98 grams?

$$\frac{6.98 \text{ g N}}{14.0067 \text{ g N/mol N}} \times \frac{6.02 \times 10^{23} \text{ atoms N}}{1 \text{ mol N}} = 3.00 \times 10^{23} \text{ atoms N}$$

14. What number of moles do you have with 5.43×10^{24} atoms of carbon?

$$\frac{5.43 \times 10^{24} \text{ atoms C}}{6.02 \times 10^{23} \text{ atoms C/mol C}} = 9.02 \text{ mol C}$$

15. What is molar mass?

mass in grams of one mole of substance

16. Determine which of the following is the largest:

a. 6.00×10^{24} atoms Ne $\frac{1 \text{ mol Ne}}{6.02 \times 10^{23} \text{ atoms Ne}} \times 20.179 \text{ g Ne} = 201 \text{ g Ne (largest)}$

b. 20.0 g Kr (smallest)

b, a

17. Determine the molar mass of ammonium phosphate. Formula:

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

$$3(14.0067) + 12(1.00794) + 30.97376 + 4(15.9994) = 149.08674 \text{ g/mol}$$

18. A sample of silicon dioxide contains 6.09 moles. What mass will the sample have?

SiO_2

$$6.09 \text{ mol SiO}_2 \times \frac{60.0843 \text{ g SiO}_2}{1 \text{ mol SiO}_2} = 366 \text{ g SiO}_2$$

$28.0855 + 2(15.9994) = 60.0843 \text{ g/mol}$

19. How many formula units are contained in 2.78 g of lithium nitride?

Li_3N

$$\frac{2.78 \text{ g Li}_3\text{N}}{34.8297 \text{ g Li}_3\text{N/mol Li}_3\text{N}} \times \frac{6.02 \times 10^{23} \text{ formula units Li}_3\text{N}}{1 \text{ mol Li}_3\text{N}} = 4.80 \times 10^{22} \text{ formula units Li}_3\text{N}$$

20. If a sample of ozone (O_3) has a mass of 25.0 g, how many moles are there?

$$\frac{25.0 \text{ g O}_3}{47.9982 \text{ g O}_3/mol \text{ O}_3} = 0.52 \text{ mol O}_3$$

O_3 $3(15.9994) = 47.9982 \text{ g/mol}$

21. 7.15×10^{23} atoms of neon will have what mass (in grams)?

$$\frac{7.15 \times 10^{23} \text{ atoms Ne}}{6.02 \times 10^{23} \text{ atoms Ne/mol Ne}} \times 20.179 \text{ g Ne} = 24.0 \text{ g Ne}$$