

Trick or Treat **MOLES**

1. If you have 0.801 moles of acetic acid, how many molecules are there?

$$0.801 \text{ mol} \times \frac{6.02 \times 10^{23} \text{ molecules}}{1 \text{ mol}} \\ = 4.82 \times 10^{23} \text{ CH}_3\text{COOH molecules}$$

TREAT

2. How many atoms in 7.00×10^{-6} mol of carbon?

$$7.00 \times 10^{-6} \text{ mol} \times \frac{12 \text{ g C}}{1 \text{ mol}} \times \frac{6.02 \times 10^{23} \text{ atoms}}{1 \text{ mol}} \\ = 5.06 \times 10^{19} \text{ C atoms}$$

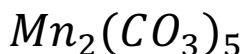
TRICK

*Because we don't need the converting to mass of carbon step because it is already in moles.

CORRECTION:

$$7.00 \times 10^{-6} \text{ mol} \times \frac{6.02 \times 10^{23} \text{ atoms}}{1 \text{ mol}} \\ = 4.214 \times 10^{19} \text{ C atoms}$$

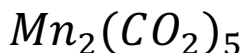
3. What is the molar mass of manganese (V) carbonite?



$$2(54.9) + 5(12.0) + 15(16.0) = 250. \text{ g/mol}$$

TRICK – the formula as written is manganese (V) carbonate

CORRECTION:



manganese (V) carbonite

$$2(54.9) + 5(12.0) + 10(16.0) = 329.8 \text{ g/mol (1 decimal place)}$$

4. What is the mass of 0.15 mol NaNO_3 ?

$$0.15 \text{ mol} \times \frac{86.0 \text{ g}}{1 \text{ mol}} = 12.75 = 13 \text{ g}$$

TREAT

5. What is the mass of 0.0027 mol of iron (III) chloride?

$$\begin{array}{l} 1 \text{ Fe } 55.8 \qquad \qquad \qquad 3 \text{ Cl}_2 \text{ } 71.0 \qquad \qquad \qquad 268.8 \text{ g/mol} \\ 0.0027 \text{ mol} \times \frac{268.8 \text{ g}}{1 \text{ mol}} = 0.73 \text{ g} \end{array}$$

TRICK

CORRECTION: iron (III) chloride FeCl_3

* 1 Fe

3 Cl ← Cl is not diatomic when it is combined with another element in a compound

$$55.8 + 3(35.5) = 162.3 \text{ g/mol}$$

$$0.0027 \text{ mol} \times \frac{162.3 \text{ g}}{1 \text{ mol}} = 0.44 \text{ g}$$

6. How many oxygen atoms are there in 0.0400 mol of aluminum oxalate, $\text{Al}_2(\text{C}_2\text{O}_4)_3$?

$$\begin{aligned} 0.0400 \text{ mol} \times \frac{6.02 \times 10^{23} \text{ Al}_2(\text{C}_2\text{O}_4)_3 \text{ molecules}}{1 \text{ mol}} \\ \times \frac{4.00 \text{ oxygen atoms}}{1 \text{ Al}_2(\text{C}_2\text{O}_4)_3 \text{ molecule}} \\ = 9.63 \times 10^{22} \text{ O atoms} \end{aligned}$$

TRICK

* $\text{Al}_2(\text{C}_2\text{O}_4)_3$

CORRECTION: should have multiplied by 12 O ← we have x12 not x4 O atoms...

6 CORRECTION:

$$\begin{aligned} 0.0400 \text{ mol} &\times \frac{6.02 \times 10^{23} \text{ Al}_2(\text{C}_2\text{O}_4)_3 \text{ molecules}}{1 \text{ mol}} \\ &\times \frac{12.0 \text{ oxygen atoms}}{1 \text{ Al}_2(\text{C}_2\text{O}_4)_3 \text{ molecule}} \\ &= 2.89 \times 10^{23} \text{ O atoms} \end{aligned}$$

7. What is the mass of 3.22 mol of elemental bromine?
(Elemental = found in nature)

$$3.22 \text{ mol} \times \frac{79.9 \text{ g}}{1 \text{ mol}} = 257 \text{ g Br}$$

TRICK

Br = 2 = diatomic

*wrong because elemental bromine exists in form of Br₂...

CORRECTION: So 79.9g x 2 = 159.8 g/mol

$$3.22 \text{ mol} \times \frac{159.8 \text{ g}}{1 \text{ mol}} = 515 \text{ g Br}$$

8. How many moles are in 38 g uranium (V) oxide?

$$38 \text{ g U}_2\text{O}_5 \times \frac{1 \text{ mol}}{556 \text{ g U}_2\text{O}_5} = 0.068 \text{ mol}$$

TREAT

*Because U = 237(2) + O = 16(5) = 556

9. What is the molar mass of copper (II) chloride pentahydrate?

$$63.5 + 2(35.5) + 10(1.01) + 5(16.0) = 224.6 \text{ g/mol}$$

TREAT

*CuCl₂ • 5H₂O

10. How many H atoms are in 70.00g ammonium fluoride?

$$70.00 \text{ g } NH_4F \times \frac{1 \text{ mol}}{37.0 \text{ g } NH_4F} \times \frac{6.02 \times 10^{23} \text{ molecules}}{1 \text{ mol}} \\ \times \frac{4H}{1 NH_4F} = 4.56 \times 10^{24} H \text{ atoms}$$

TREAT

*Because first changing the mass to the mole then changing mole to number of molecules then finally changing the number of molecules to number of H atoms.

11. What is the mass of 5.2 mol of thallium?

$$5.2 \text{ mol} \times \frac{232 \text{ g}}{1 \text{ mol}} = 1.2 \times 10^3 \text{ g}$$

TRICK

CORRECTION: *Not right because the molar mass of thallium is 202.4g not 232g. Thus changing the answer to:

$$5.2 \text{ mol} \times \frac{204.4 \text{ g}}{1 \text{ mol}} = 1.06 \times 10^3 \text{ g}$$

12. What is the molar mass of elemental phosphorus?

124g/mol

TREAT

*P=31.0g

$P_4 = 31.0\text{g} \times 4$

White phosphorus is tetratomic (P_4) and has an atomic mass of 31.0×4

13. If you have 4.0×10^{23} lithium oxide molecules, how many moles is this equivalent to?

$$4.0 \times 10^{23} \text{ molecules} \times \frac{1 \text{ mol}}{6.02 \times 10^{23} \text{ molecules}} =$$
$$6.6 \times 10^{45} \text{ mol Li}_2\text{O}$$

TRICK

The division was performed incorrectly, or perhaps the person didn't know how to correctly use their calculator to input these numbers with the powers of 10.

They should learn how to use their "EXP" or "EE" button!!!!

CORRECTION:

$$4.0 \times 10^{23} \text{ molecules} \times \frac{1 \text{ mol}}{6.02 \times 10^{23} \text{ molecules}} = 0.66 \text{ mol Li}_2\text{O}$$

14. A 45.09 g sample of solid magnesium phosphate contains how many moles?

$$45.09 \text{ g} \times \frac{1 \text{ mol}}{262.9 \text{ g}} = 0.1715 \text{ mol Mg}_3(\text{PO}_4)_2$$

TREAT

15. What is the number of atoms (total) in 21.9 g of calcium oxalate?

$$21.9 \text{ g} \times \frac{1 \text{ mol}}{128.1 \text{ g CaC}_2\text{O}_4} \times \frac{7 \text{ atoms}}{1 \text{ mol}} = 1.20 \text{ atoms total}$$

TRICK

*Because:

$$\text{Ca} = 40.1$$

$$\text{C} = 12.0 (2)$$

$$\text{O} = 16.0 (4)$$

$$= 128.1 \text{ g CaC}_2\text{O}_4$$

CORRECTION: We forgot 1 step (**missing**)

$$21.9 \text{ g} \times \frac{1 \text{ mol}}{128.1 \text{ g CaC}_2\text{O}_4} \times \frac{6.02 \times 10^{23} \text{ molecules}}{1 \text{ mol}} \times \frac{7 \text{ atoms}}{1 \text{ molecule}} = 7.2 \times 10^{23} \text{ atoms total}$$