# Trick or Treat MOLES

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

$$0.801 mol \times \frac{6.02 \times 10^{23} molecules}{1\ mol} = 4.82 \times 10^{23} CH_3COOH\ molecules$$

**TREAT**

2. **How many atoms in 7.00x10$^{-6}$ mol of carbon?**

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

**TRICK**

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

**CORRECTION:**

$$7.00 \times 10^{-6} mol \times \frac{6.02 \times 10^{23} atoms}{1\ mol} = 4.214 \times 10^{30} C\ atoms$$

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

$Mn_2(CO_3)_5$

2 Mn + 5 C + 15 O

2(54.9) + 5(12.0) + 15(16.0) = 250. g/mol

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

**CORRECTION:**

$Mn_2(CO_2)_5$

**manganese (V) carbonite**

2(54.9) + 5(12.0) + 10(16.0) = 329.8 g/mol (1 decimal place)

4. **What is the mass of 0.15 mol $NaNO_3$?**

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

**TREAT**

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

1 Fe 55.8 3 $Cl_2$ 71.0 268.8 g/mol

$$0.0027 mol \times \frac{268.8\ g}{1\ mol} = 0.73\ g$$

**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 g/mol

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

6. **How many oxygen atoms are there in 0.0400 mol of aluminum oxalate, $Al_2(C_2O_4)_3$?**

$$0.0400\ mol \times \frac{6.02\times10^{23} Al_2(C_2O_4)_3\ molecules}{1\ mol} \times \frac{4.00\ oxygen\ atoms}{1\ Al_2(C_2O_4)_3\ molecule} = 9.63\times10^{22}\ O\ atoms$$

**TRICK**

*$Al_2(C_2O_4)_3$

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

**# 6 CORRECTION:**

$$0.0400\ mol \times \frac{6.02\times10^{23}\ Al_2(C_2O_4)_3\ molecules}{1\ mol} \times \frac{12.0\ oxygen\ atoms}{1\ Al_2(C_2O_4)_3\ molecule} = 2.89\times10^{23}\ O\ atoms$$

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

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

**TRICK**

Br = 2 = diatomic

*wrong because elemental bromine exists in form of $Br_2$…

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

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

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

$$38g\ U_2O_5 \times \frac{1\ mol}{556g\ U_2O_5} = 0.068\ mol$$

**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 g/mol

**TREAT**

*$CuCl_2 \bullet 5H_2O$

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

$$70.00\ g\ NH_4F \times \frac{1\ mol}{37.0\ g\ NH_4F} \times \frac{6.02\times10^{23} molecules}{1\ mol} \times \frac{4H}{1\ NH_4F} = 4.56\times10^{24} H\ atoms$$

**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?**

$$5.2\ mol \times \frac{232g}{1\ mol} = 1.2\times10^{3} g$$

**TRICK**

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

$$5.2\ mol \times \frac{204.4\ g}{1\ mol} = 1.06\times10^{3} g$$

12. **What is the molar mass of elemental phosphorus?**

124g/mol

**TREAT**

*P=31.0g

$P_4$ = 31.0g x4

White phosphorus is tetratomic ($P_4$) and has an atomic mass of 31.0 x4

13. **If you have $4.0\times10^{23}$ lithium oxide molecules, how many moles is this equivalent to?**

$$4.0\times10^{23} molecules \times \frac{1\ mol}{6.02\times10^{23}\ molecules} =$$

$$6.6\ x\ 10^{45} mol\ Li_2O$$

**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:**

$$4.0\times10^{23} molecules \times \frac{1\ mol}{6.02\times10^{23}\ molecules} = 0.66 mol\ Li_2O$$

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

$$45.09\ g \times \frac{1\ mol}{262.9\ g} = 0.1715\ mol\ Mg_3(PO_4)_2$$

**TREAT**

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

$$21.9\ g \times \frac{1\ mol}{128.1 g\ CaC_2O_4} \times \frac{7\ atoms}{1\ mol} = 1.20\ atoms\ total$$

**TRICK**

*Because:

Ca = 40.1

C = 12.0 (2)

O = 16.0 (4)

= 128.1 g $CaC_2O_4$

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

$$21.9\ g \times \frac{1\ mol}{128.1 g\ CaC_2O_4} \times \frac{6.02 \times 10^{23} molecules}{1\ mol} \times \frac{7\ atoms}{1\ molecule} = 7.2 \times 10^{23}\ atoms\ total$$