4. Find the **molar mass** of each substance:

- the element oxygen, O $\quad 16\ g$

- oxygen gas, O_2 $\quad 2 \times 16 = 32\ g$

- Caffeine, $C_8H_{10}N_4O_2$

$C = 8 \times 12.0 = 96.0$
$H = 10 \times 1.0 = 10.0$
$N = 4 \times 14.0 = 56.0$
$O = 2 \times 16.0 = 32.0$
$\left.\begin{array}{c}\\\\\\\end{array}\right\} 194.0\ g$

- agricultural fertilizer, $(NH_4)_3PO_4$

$N = 3 \times 14.0 = 42.0$
$H = 12 \times 1.0 = 12.0$
$P = 1 \times 31.0 = 31.0$
$O = 4 \times 16.0 = 64.0$
$\left.\begin{array}{c}\\\\\\\end{array}\right\} 149.0\ g$

5. If I have one **mole** of H_2O (water), how many **molecules** of water do I have?
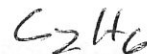
6.02×10^{23} molecules

6. a) Which has more mass, $\boxed{\text{two moles of } CH_4}$ or one mole of C_2H_6?
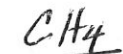
CH_4
$C = 1 \times 12.0 = 12.0$
$H = 4 \times 1.0 = \dfrac{4.0}{16.0} \times 2 = 32\ g$

C_2H_6
$C = 2 \times 12.0 = 24.0$
$H = 6 \times 1.0 = \dfrac{6.0}{30.0\ g}$

b) Which contains more molecules, two moles of CH_4 or one mole of C_2H_6?

two moles CH_4

7. How many **moles** are there in 56.4 grams of FeF_3?

$Fe = 1 \times 55.8 = 55.8$
$F = 3 \times 19.0 = \dfrac{57.0}{112.8}$

$\dfrac{56.4\ g}{112.8\ g} = .50\ moles$

8. How many **moles** are in 195 grams of copper (II) hydroxide, $Cu(OH)_2$?

$Cu = 1 \times 63.5 = 63.5$
$O = 2 \times 16.0 = 32.0$
$H = 2 \times 1.0 = \dfrac{2.0}{97.5}$

$\dfrac{195}{97.5} = 2\ moles$