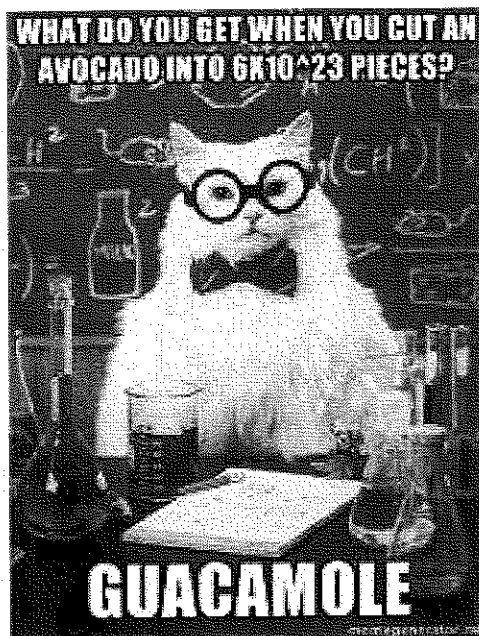
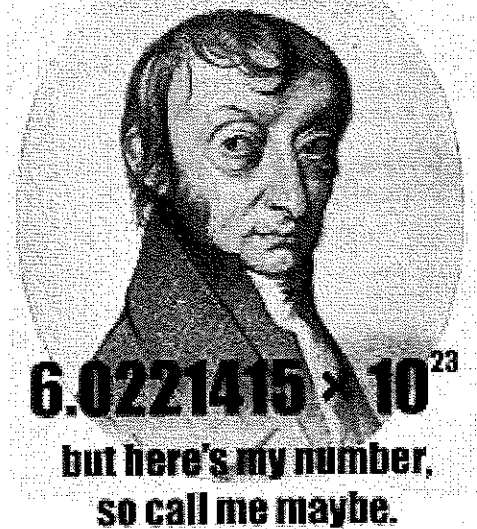


Mole Workbook

Name: KEY.

I just met you,
and this is crazy.



1. What is a mole?

a measurement of particles in
a substance $\frac{6.02 \times 10^{23} \text{ particles}}{1 \text{ mol}}$

2. What is Avogadro's number?

6.02×10^{23}

3. How is the definition of a mole and Avogadro's number connected?

$1 \text{ mol} = 6.02 \times 10^{23} \text{ particles}$

4. Write out the chemical symbol for each element at room temperature. Find the molar mass of the elements.

| | Chemical Name | Chemical Symbol (with states) | Molar Mass |
|----|---------------|----------------------------------|-------------|
| a) | potassium | $K_{(s)}$ | 39.10 g/mol |
| b) | zirconium | $Zr_{(s)}$ | 91.22 g/mol |
| c) | chlorine | $Cl_{2(g)}$ | 70.90 g/mol |
| d) | oxygen | $O_{2(g)}$ | 32.00 g/mol |

5. Write out the chemical symbol for each compound at room temperature. Find the molar mass of the compounds

| | Chemical Name | Chemical Symbol | Molar Mass |
|----|---------------------------------------|---------------------|--------------|
| a) | potassium bromide $Na^+ SO_4^{2-}$ | $KBr_{(s)}$ | 119 g/mol |
| b) | methane | CH_4 | 16.05 g/mol |
| c) | sodium sulfate $Al^{3+} NO_3^-$ | Na_2SO_4 | 142.05 g/mol |
| d) | aluminum nitrate | $Al(NO_3)_3$ | 213.01 g/mol |
| e) | nitrogen trioxide | NO_3 | 62.01 g/mol |
| f) | ammonium carbonate | $(NH_4)_2CO_{3(s)}$ | 96.11 g/mol |
| g) | aluminum sulfide | $Al_2S_3(s)$ | 150.17 g/mol |

What's the formula for molar mass, moles & mass?

6. Calculate the **number of moles** in each of the following:

a) 1000g of NaCl

$$m = 1000g$$

$$M = (22.99 + 35.45) \text{ g/mol}$$

$$M = 58.44 \text{ g/mol}$$

$$n = \frac{m}{M} = \frac{1000g}{58.44 \text{ g/mol}}$$

$$n = 17.11 \text{ mol}$$

b) 32.5g of NaHCO₃

$$m = 32.5g$$

$$M = 84.01 \text{ g/mol}$$

$$n = 0.387 \text{ mol}$$

c) 4.69g of sodium carbonate

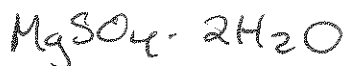


$$m = 4.69g$$

$$M = 105.99 \text{ g/mol}$$

$$n = 0.0442 \text{ mol}$$

d) 0.258 g of magnesium sulfate heptahydrate



$$m = 0.258g$$

$$M = 246.52 \text{ g/mol}$$

$$n = 1.05 \times 10^{-3} \text{ mol}$$

e) 550g of sodium phosphate



$$m = 550\text{g}$$

$$M = 163.94\text{g/mol}$$

$$n = 3.35\text{mol}$$

f) 6.2g of carbon dioxide

$$m = 6.2\text{g}$$

$$M = 44.01$$

$$n = 0.14\text{mol}$$

7. Calculate the **mass in grams** for the following:

a) 0.21 mol of $\text{NaCl}_{(s)}$

$$n = 0.21\text{mol}$$

$$M = 58.44\text{g/mol}$$

$$m = 12\text{g}$$

b) 55.56 mol of water

$$n = 55.56\text{mol}$$

$$M = 18.02\text{g/mol}$$

$$m = 1001\text{g}$$

c) 1.2 mol of $\text{Na}_2\text{SO}_4 \cdot 10\text{H}_2\text{O}$

$$n = 1.2 \text{ mol}$$

$$M = 322.25 \text{ g/mol}$$

$$m = 3.9 \times 10^2 \text{ g}$$

d) 0.15 mol of phosphorus



$$n = 0.15 \text{ mol}$$

$$M = 123.88 \text{ g/mol}$$

$$m = 19 \text{ g}$$

e) 0.025 mol of tin(II) fluoride

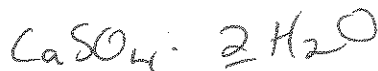


$$n = 0.025 \text{ mol}$$

$$M = 156.71 \text{ g/mol}$$

$$m = 3.9 \text{ g}$$

f) 0.400 mol of calcium sulphate dihydrate



$$n = 0.40 \text{ mol}$$

$$M = 172.14 \text{ g/mol}$$

$$m = 68.9 \text{ g}$$