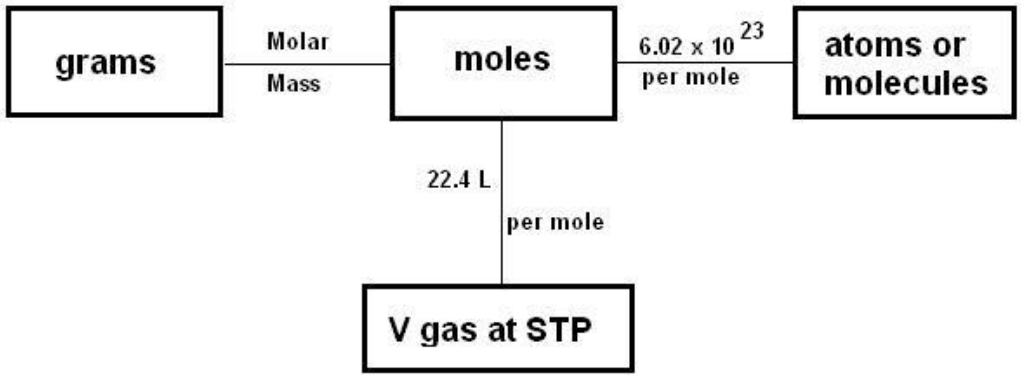
Worksheet on Moles

Three conversions to remember about chemicals – usually used when we are asking about just one chemical:



1. How many atoms are in 40.08 grams of calcium?
2. One mole of magnesium would contain how many atoms?
3. How many atoms are in 5.55 moles of silver?
4. How many moles are in 5.55×10^{33} molecules of H_2SO_4?
5. What is the molar mass of sodium carbonate?
6. What is the molar mass of nickel(III) sulfate?
7. How many moles are in 88.88 grams of calcium?
8. How many grams is 1.25 moles of potassium bromide?
9. 3.50 grams of gold would contain how many atoms?
10. How many liters is 0.975 moles of laughing gas at STP?
11. How many liters is 3.59×10^{19} atoms of argon gas at STP?
12. What is the percent oxygen in sulfuric acid, H_2SO_4?
13. What is the percent hydrogen in water?

Answers

1. 40.08 grams of calcium is one mole (see Periodic Table), and one mole is 6.02 x 10^{23} atoms.

2. One mole of anything is 6.02 x 10^{23}, so it is 6.02 x 10^{23} Mg atoms.

3. 5.55 mol Ag $\left(\frac{6.02\ x\ 10^{23} atoms}{1\ mol}\right)$ = 3.34 x 10^{24} atoms Ag

4. 5.55 x 10^{33} molecules $\left(\frac{1\ mol}{6.02\ x\ 10^{23} molecules}\right)$ = 9.22 x 10^{9} moles H_2SO_4

5. Na_2CO_3 adding up the masses of all the atoms = 105.99 g/mol

6. $Ni_2(SO_4)_3$ is 405.59 g/mol

7. 88.88 g Ca $\left(\frac{1\ mol}{40.08\ g}\right)$ = 2.218 mol Ca

8. 1.25 mol KBr $\left(\frac{119.00\ g}{1\ mol}\right)$ = 149 grams

9. 3.50 g Au $\left(\frac{1\ mol}{196.97\ g}\right)\left(\frac{6.02\ x\ 10^{23} atoms}{1\ mol}\right)$ = 1.07 x 10^{22} atoms Au

10. 0.975 mol $\left(\frac{22.4\ L}{1\ mol}\right)$ = 21.8 L gas

11. 3.59 x 10^{19} atoms Ar $\left(\frac{1\ mol}{6.02\ x\ 10^{23} atoms}\right)\left(\frac{22.4\ L}{1\ mol}\right)$ = 0.00134 L Ar gas

12. Four oxygens = 64.00 grams, H_2SO_4 total = 98.09 grams.

    So percent oxygen is $\left(\frac{64.00\ g}{98.09\ g}\right)$ x 100% = 65.25%

13. Two hydrogens in water = 2.02 grams, H_2O = 18.02 grams

    So percent H is $\left(\frac{2.02\ g}{18.02\ g}\right)$ x 100% = 11.2%