Name
Chemistry
Stoichiometry
Molar Mass #1

- Mass is a means to measure number of particles.
- The only mathematical operation that can be performed on mass is to convert to moles.
- Mass is deceiving
- 207g Pb = 2g H_2 This have the same number of particles, 1 mole.

1. Molar mass is the mass of one mole of any chemical substance.
2. In order to calculate the mass of one mole of a compound one should add up the atomic mass units of each of the elements present in the compound.

Compute the molar mass of the following.

3. N_2 $2\times14 = 28$ g/mol
4. I_2 $2\times127 = 254$ g/mol
5. $C_6H_{12}O_6$ $(6\times12)+(12\times1)+(6\times16)=$ 180g/mol
6. Na^+ 23 g/mole
7. CO_3^{-2} $12+(3\times16)=60$ g/mol
8. $Al(HCO)_3$ $27+(1+12+16)3$ 114 g/mol
9. Potassium Chloride KCl 74.5 g/mol
10. Sulfate SO_4^{-2} 96 g/mol
11. Magnesium phosphate $Mg_3(PO_4)_2$ 136g/
12. Sulfuric Acid H_2SO_4 98 g/mol
13. Carbon Tetrachloride CCl_4 154g/mo
14. H_2O 18g/mol

Using the factor label method determine the number of moles in the following.

15. 64.0 g O_2 → 32 g/mol → $64\text{g } O_2 \mid \frac{1\text{mol}}{32\text{g}} = 2\text{mol}$ (2 mol O_2)
16. 58.9g NH_3 17 g/mol (3.5 mol NH_3)
17. .205g Cl^- 35.5 g/mol (0.0058 mol)
18. .205g Cl_2 71 g/mol (0.0029 mol)
19. 12.0g sodium chloride 58.5g/mol → $12\text{g NaCl} \mid \frac{1\text{mol}}{58.5\text{g}} = 0.205$ mol NaCl (0.205 mol NaCl)

Using the factor label method determine the number of grams in the following.

20. 1.5 moles H_2O — $1.5\text{mol } H_2O \mid \frac{18\text{g}}{1\text{mol}} = 27\text{g } H_2O$
21. .52 moles $AgNO_3$
22. 1.98 moles $PbCl_4$ 349 g/mol → $0.52\text{mol } AgNO_3 \mid \frac{170\text{g}}{1\text{mol}} = 88\text{g } AgNO_3$ (691g PbCl4)
23. 26.5 moles SO_4^{-2} 96 g/mol = 2500 g SO_4^{-2}
24. 1.5E-4 moles Ammonium sulfite $(NH_4)_2SO_3$ N-2x14 H-1x8 S 32 O 3x16=48 — $1.5\times10^{-4}\text{mol } (NH_4)_2SO_3 \mid \frac{116\text{g}}{1\text{mol}} = 0.017\text{g } (NH_4)_2SO_3$

Using the factor label method determine the number of particles for the following.

25. 90.5 g Mg^{2+} — $90.5\text{g } Mg^{+2} \mid \frac{1\text{mol}}{24\text{g}} \mid \frac{6.02\times10^{23}}{1\text{mol}} = 2.27\times10^{24}$ Mg
26. 125g Nitric Acid — $125\text{g } HNO_3 \mid \frac{1\text{mol}}{63\text{g}} \mid \frac{6.02\times10^{23}}{1\text{mol}} = 1.2\times10^{24}$ HNO_3
27. 1.5 moles Copper (II) Hydroxide — $1.5\text{mol } Cu(OH)_2 \mid \frac{6.02\times10^{23}}{1\text{mol}} = 9.03\times10^{23}$ $Cu(OH)_2$
28. 2.5 kg of SO_2 (careful) — $2.5\text{kg} \mid \frac{1000\text{g}}{1\text{kg}} \mid \frac{1\text{mol}}{64\text{g}} \mid \frac{6.02\times10^{23}}{1\text{mol}} = 2.35\times10^{25}$ SO_2
29. 2.5 mL Mercury (Density: 1g = 13.2 mL) — $2.5\text{mL Hg} \mid \frac{1\text{g}}{13.2\text{mL}} \mid \frac{1\text{mol}}{201\text{g}} \mid \frac{6.02\times10^{23}}{1\text{mol}}$