

**Convert grams to moles:**

$$1. \frac{132.4 \text{ g calcium}}{40.07 \text{ g Ca}} \left| \frac{1 \text{ mol Ca}}{40.07 \text{ g Ca}} \right. = 3.30 \text{ mol Ca}$$

$$3. \frac{4177 \text{ g AlCl}_3}{133.33 \text{ g AlCl}_3} \left| \frac{1 \text{ mol AlCl}_3}{133.33 \text{ g AlCl}_3} \right. = 31.33 \text{ mol AlCl}_3$$

$$2. \frac{890 \text{ g HCl}}{36.45 \text{ g HCl}} \left| \frac{1 \text{ mol HCl}}{36.45 \text{ g HCl}} \right. = 24.42 \text{ mol HCl}$$

$$4. \frac{58.1 \text{ g oxygen}}{15.99 \text{ g O}} \left| \frac{1 \text{ mol O}}{15.99 \text{ g O}} \right. = 3.63 \text{ mol O}$$

OR

$$\frac{58.1 \text{ g O}_2}{31.98 \text{ g O}_2} \left| \frac{1 \text{ mol O}_2}{31.98 \text{ g O}_2} \right. = 1.82 \text{ mol O}_2$$

**Convert moles to grams:**

$$5. \frac{10.00 \text{ mol silver}}{1 \text{ mol Ag}} \left| \frac{107.87 \text{ g Ag}}{1 \text{ mol Ag}} \right. = 1078.7 \text{ g Ag}$$

$$7. \frac{8.00 \text{ mol chlorine}}{1 \text{ mol Cl}} \left| \frac{35.45 \text{ g Cl}}{1 \text{ mol Cl}} \right. = 283.6 \text{ g Cl}$$

$$6. \frac{4.10 \text{ mol ZnO}}{1 \text{ mol ZnO}} \left| \frac{81.38 \text{ g ZnO}}{1 \text{ mol ZnO}} \right. = 333.66 \text{ g ZnO}$$

$$8. \frac{1.5 \text{ mol H}_2\text{SO}_4}{1 \text{ mol H}_2\text{SO}_4} \left| \frac{98.02 \text{ g H}_2\text{SO}_4}{1 \text{ mol H}_2\text{SO}_4} \right. = 147.03 \text{ g H}_2\text{SO}_4$$

**Convert atoms or molecules to moles:**

$$9. \frac{7.80 \times 10^{23} \text{ molecules fluorine}}{6.02 \times 10^{23} \text{ molec F}_2} \left| \frac{1 \text{ mol F}_2}{6.02 \times 10^{23} \text{ molec F}_2} \right. = 1.30 \text{ mol F}_2$$

$$5.00 \times 10^{26} \text{ molecules NH}_3 \left| \frac{1 \text{ mol NH}_3}{6.02 \times 10^{23} \text{ molec NH}_3} \right. = 831 \text{ mol NH}_3$$

$$10. \frac{1.2 \times 10^{23} \text{ molecules CO}_2}{6.02 \times 10^{23} \text{ molec CO}_2} \left| \frac{1 \text{ mol CO}_2}{6.02 \times 10^{23} \text{ molec CO}_2} \right. = 0.20 \text{ mol CO}_2$$

$$20,000 \text{ atoms boron} \left| \frac{1 \text{ mol B}}{6.02 \times 10^{23} \text{ atoms B}} \right. = 3.32 \times 10^{-20} \text{ mol B}$$

**Convert moles to atoms or molecules:**

$$13. \frac{3.3 \text{ mol H}_2\text{O}}{1 \text{ mol H}_2\text{O}} \left| \frac{6.02 \times 10^{23} \text{ molec H}_2\text{O}}{1 \text{ mol H}_2\text{O}} \right. = 1.99 \times 10^{24} \text{ molec H}_2\text{O}$$

$$15. \frac{0.002 \text{ mol sodium}}{1 \text{ mol Na}} \left| \frac{6.02 \times 10^{23} \text{ atoms Na}}{1 \text{ mol Na}} \right. = 1.2 \times 10^{21} \text{ atoms Na}$$

$$14. \frac{16.2 \text{ mol CO}}{1 \text{ mol CO}} \left| \frac{6.02 \times 10^{23} \text{ molec CO}}{1 \text{ mol CO}} \right. = 9.75 \times 10^{24} \text{ molec CO}$$

$$16. \frac{10 \text{ mol H}_2\text{O}_2}{1 \text{ mol H}_2\text{O}_2} \left| \frac{6.02 \times 10^{23} \text{ molec H}_2\text{O}_2}{1 \text{ mol H}_2\text{O}_2} \right. = 6.02 \times 10^{24} \text{ molec H}_2\text{O}_2$$

**Two-step conversions:**

$$17. \frac{26.8 \text{ g HBr}}{80.90 \text{ g HBr}} \left| \frac{1 \text{ mol HBr}}{80.90 \text{ g HBr}} \right. \left| \frac{6.02 \times 10^{23} \text{ molec HBr}}{1 \text{ mol HBr}} \right. = 1.99 \times 10^{23} \text{ molec HBr}$$

$$18. \frac{5.00 \times 10^{23} \text{ molec LiOH}}{6.02 \times 10^{23} \text{ molec LiOH}} \left| \frac{1 \text{ mol LiOH}}{6.02 \times 10^{23} \text{ molec LiOH}} \right. \left| \frac{23.93 \text{ g LiOH}}{1 \text{ mol LiOH}} \right. = 19.98 \text{ g LiOH}$$

$$19. \frac{67.0 \text{ g KCl}}{74.54 \text{ g KCl}} \left| \frac{1 \text{ mol KCl}}{74.54 \text{ g KCl}} \right. \left| \frac{6.02 \times 10^{23} \text{ molec KCl}}{1 \text{ mol KCl}} \right. = 5.41 \times 10^{23} \text{ molec KCl}$$

$$20. \frac{6.3 \times 10^{25} \text{ atoms carbon}}{6.02 \times 10^{23} \text{ atoms C}} \left| \frac{1 \text{ mol C}}{6.02 \times 10^{23} \text{ atoms C}} \right. \left| \frac{12.01 \text{ g C}}{1 \text{ mol C}} \right. = 1257 \text{ g C}$$