5.6 The Yield of a Chemical Reaction

Define:

- Yield
- Theoretical yield
- Actual yield
- Percentage yield

- The quantities that we calculate in our predictions are theoretical and are the quantities that should be produced. However, they may not be the quantities we actually obtain.
- We can compare our predictions (theoretical yield) with our actual values (actual yield). We can also convert this value to a percentage.
- E.g. In an experiment, when 16.1 g of $FeS_{(s)}$ is reacted with 10.8 g of $O_{2(g)}$, 14.1 g of $Fe_2O_{3(g)}$ was produced.
  a) Write a balanced equation.
  b) Identify the limiting reagent.
  c) Calculate the theoretical yield.
  d) Calculate the percent actual yield from this reaction.

Yield in Industrial Chemical Reactions

- Chemical engineers work very hard to create reactions that produce as close to 100% yield to maximize profits for their company.
- In the 1960's, ibuprofen was produced using a 6-step process that only yielded 40% product. In 1991 a new 3-step process was developed that had a 77% yield.

Calculations

- % Yield = (actual/theoretical) x 100

Homework

- Practice Questions: 1,2,3,4,5,69,10,11
- Section Questions: 1,2,3