

Chemical Processes

Things you should learn:

1. Two major methods for producing a desired molecule/compound/substance
2. Types of molecules: small, large, polymers
3. Basic formulas for describing molecules in terms of constituent atoms
4. The use of moles in defining chemical quantities
5. Reactors as a means for producing substances
6. Problems associated with exo- vs. endo- thermic reactions
7. Mass/energy balance in a closed system
8. How separation processes isolate substances
9. Properties of substances that can be used in these separation processes
10. What is a hydrometer and how does it work
11. Creation of substances using a reactor
12. What goes in must come out
13. How to use mass/energy balance as a deductive tool
14. What are unit operations
15. Distillation as a separation process—McCabe-Thiele diagrams
16. What is an azeotrope
17. Using a McCabe-Thiele diagram to calculate number of separation stages

Things you should be able to do:

1. Carry out bilinear interpolation of temperature, concentration, density tables
2. Calculate the number of unit-op stages required to purify a desired substance
3. Design a sequence of separation processes to isolate constituents of a dry mixture
4. Determine specific gravity of a liquid/solid

Things you should lie awake at night thinking about:

1. TiO_2 is an \$80B yearly business. A 1% improvement in efficiency in producing this product is worth \$800M/year.
2. Distillation as a separation process represents about 75% of all chemical processes (primarily due to the petroleum industry).
3. What are the problems associated with bio-substances, e.g., how might one separate different length strands of DNA?