

NOTE: Use engineering format for problems 1-3, and use non-engineering format for problems 4-6. This is an individual assignment.

1. Assume that a cylindrical tank with an internal diameter of 3cm and a water depth of 4cm contains salt water with a concentration of 0.10% NaCl by weight. You would like to add the correct amount of 1% NaCl to bring the concentration to 0.15% NaCl. However, when you add a certain mass of salt water, an equal mass of water leaves the system through an overflow. If 20% of the overflow is 1% NaCl and the rest is 0.10% NaCl, then what is the amount of 1% NaCl salt water that you should add to your system? $m=1.96g$
2. Maple syrup, consisting of 34% water and 66% sugar by weight, is created by boiling sap (97% water and 3% sugar) to force water in the sap to evaporate. If the bottling plant can process 1500 kg of sap per hour, how much water must be evaporated per hour, and how much syrup will result?
 $water=1431.8kg/hr$ & $syrup=68.2kg/hr$
3. An industrial engineer at a paper plant oversees the paper making process. She is currently conducting an efficiency analysis on the dryer section of the process. The paper entering the dryer contains 70% water (by weight), and the finished paper that leaves the dryer section contains 5% water. If 1200 lbs/min of water is removed through evaporation in the dryer section, find
 - a. the rate (lbs/min) that finished paper is wound up on the take-up reel (next phase of the paper making process). $1753.8lb/min$
 - b. the rate (lbs/min) that paper is entering the dryer $553.8lb/min$
4. Work with your group to finish the salinity control program from class. Each individual should include the sketch and a screen shot of the serial monitor, printing out when you are entering and leaving various functions as well as all variables and calculated values. Be sure to identify variables as they are printed. Bring your working system to class.
5. Print out the final system evaluation form on the downloads page under Class 14. Fill out the first page of information for your fishtank system. You do not have to fill out the sections on deadtime compensation and gain (we will discuss these next class).
6. Using the Internet and any other sources, learn about the world's supply of non-renewable energy (oil, gas, coal, other). Consider implications of your findings on environmental sustainability, quality of life, the economy and the engineering profession. Write a paragraph in your own words describing what you have learned; be thinking about how the topic of energy could impact your career. We expect you to spend about half an hour completing this problem; this is not meant to be an exhaustive study of the topic.