

Alphabet Soup Scaleup

GOALS:

1. To teach how Chemical Engineers do Process Design
2. To teach students how to use scientific facts they know
3. To understand scaleup issues in process design

PROGRAM DESCRIPTION:

The students will “design” a process for making Alphabet Soup for 300 from a recipe for one bowl.

MATERIALS NEEDED:

Overhead Projector
Blank transparencies
Enough blank paper for every student
4 or 5 sheets of ‘L’ sized paper - most likely off of a flipchart
Enough copies of a blank reactor for each student

PROCEDURE:

Introduce yourself as a chemical engineer, and introduce scale-up and what it means.

Explain that today’s problem is to design a process that makes Alphabet Soup for 300.

Get out the blank paper and transparencies, and ask students for ideas as to what to put in the soup. Make sure somebody thinks to add water, heat and Alphabets.

Draw up a final recipe from the ideas (Take no more than 10 minutes with this)

Put up a transparency of th

Water Treatment
Making Gasoline
Making Medicine
Making Plastic

frozen chicken. How do they like the chicken fresh from the oven? What would be the best option for the best taste?

How do we make the soup hot?

Let the children brainstorm about how to heat things up. The students may want to build a large version of a stove burner. Point out the heat transfer, safety and energy waste problems with that option. Consider talking about steam heat. If there are radiators in the room, they might visualize a radiator on the pot. If not, you might want them to think about how steam is made, and to imagine how you would get the steam to the pot. They may come up with a “double boiler” option. This is not far off from a jacketed reactor; the external heater just happens to be on the jacket. Of course, boiling the steam somewhere else, and piping the condensate back would be the traditional way. The conversation should be directed to this solution if possible.