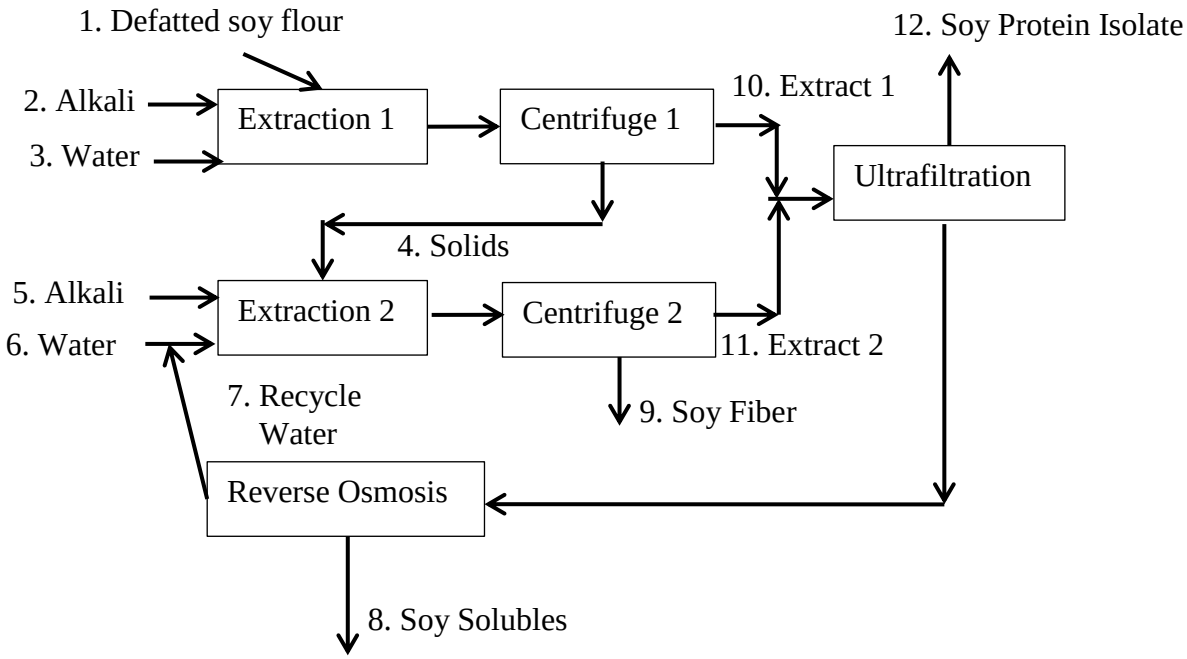
ABE – 201 Fall 2016

Due Friday 9/16/16

Homework Set 5 (20 pts total) – Answer the following questions about the soy protein isolate process. **Please show your work!** Include in your homework a copy of any code you used in MatLAB or other software you use.

Multiple steps are required to prepare soy protein isolate from defatted soybean flour. A simplified diagram is given below.



Use the process information below to answer the following questions.

Compositions of Selected Processing Streams (% w/w)

	Defatted Soy Flour 575.0 kg/min	Solids 935.6 kg/min	Extract 1	Extract 2	Soy Fiber	Soy Solubles
Protein	47.00%	14.44%	7.71%	9.28%	8.42%	0.59%
Fiber	18.70%	11.49%	0.00%	0.0%	33.50%	0.0%
Solubles	27.30%	5.03%	6.27%	3.44%	2.20%	6.15%
Water	7.00%	68.95%	85.91%	86.79%	55.56%	92.95%
Alkali	0.00%	0.09%	0.11%	0.49%	0.32%	0.31%

Alkali and Water

At steady state, 2.70 kg of NaOH is added per minute to Extraction 1. Although some alkali is carried with the solids from Centrifuge 1, an additional 5.95 kg of fresh NaOH is added per minute to Extraction 2 (stream 5).

Water is added to Extraction 1 at 2110 kg/min and to Extraction 2 at 330.0 kg/min. Recycle water dilutes the slurry inside Extraction 2 to 80% water w/w.

Questions

1. **(15 pts) If the soy protein isolate is 59.70% water and 0 fiber, what is the rest of its composition and what is the mass flow rate?**
2. **(5 pts) What is the flow rate of the recycle water (assume it is pure water)?**