NPRE 247

Homework 9

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1) Jupyter

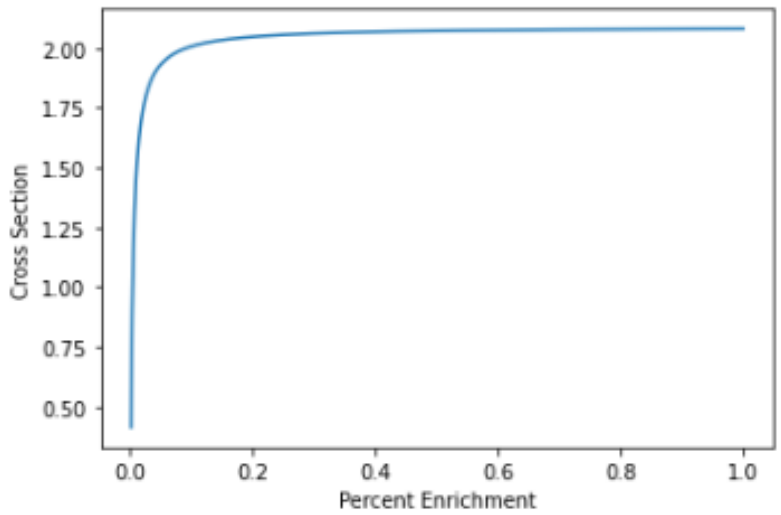
2)

- Low A value - removes more energy per scatter
- Low absorption cross section - want to keep neutrons in the mixture just make their energy lower
- Stable at High Temperatures - don't want moderator failing at high temps when it's needed the most.
- Good heat conductivity - remove heat readily enough for it to have low energy for scatters
- Abundant and cheap - good for economics of the reactor

3) eta = 1.338

4) 3.126%

5)



6a) We can assume epsilon is roughly 1 as the only fission is thermal fission. P is also 1 because we are assuming all neutrons reach the thermal region.

b) k = 1.0436

c) R = 1.945 m

7) The shape that has the smallest mass with a k>1 would have to the shape that maximizes surface area to volume to decrease leakage as much as possible. This shape is the **sphere**.

8) max ratio of 2.08 (by inspection) w/ ratio of 0.0263 U235/C

9) k = 1.2335