

(14.5) a) Estimate the yield (% of fissions) of ^{142}La in thermal fission of ^{235}U given a chain yield of 5.839% for $A = 142$, most probable charge = 55.86 and a width parameter of 0.56. b) Is an appreciable amount of ^{142}Nd formed directly in thermal fission of ^{235}U ?

Given values:

$$y_A := 5.839 \cdot \% \quad Z_p := 55.86 \quad s := 0.56$$

For La, Z=57:

$$Z := 57 \quad y_{AZ} := \frac{y_A}{s \cdot \sqrt{2 \cdot \pi}} \cdot \exp \left[-\frac{(Z - Z_p)^2}{2 \cdot s^2} \right] \quad \text{Eqn. (14.11)} \quad y_{AZ} = 0.52 \cdot \%$$

For Nd, Z=60:

$$Z := 60 \quad y_{AZ} := \frac{y_A}{s \cdot \sqrt{2 \cdot \pi}} \cdot \exp \left[-\frac{(Z - Z_p)^2}{2 \cdot s^2} \right] \quad \text{Eqn. (14.11)} \quad y_{AZ} = 5.637 \cdot 10^{-12} \cdot \%$$

Answers are thus: 0.52% and yes (the yield is small, but not zero).