

# 22.01 - Recitation #5

- Please grab a snack, get up off the sofa, look at something that isn't a screen for 5 mins!
- Please turn on your video (if possible) and mute yourself.
- These slides are at:  
[bit.ly/2201Rec5](https://bit.ly/2201Rec5)

# Outline + Intended Learning Outcomes (ILOs)

## Burning isotopes in a reactor

- Turn mass of an isotope into a number of atoms
- Set up a differential equation for burning an isotope in a reactor
- Find relevant parameters from KAERI and JANIS
- Calculate the removal rate of an isotope
- Determine the quantity of an isotope after a given time

# Burning isotopes in a reactor

1kg of Fe-55 is put into a reactor with thermal flux =  $1E14$  [n/cm<sup>2</sup>/s]

- What is the removal rate of Fe-55? [atoms/s]
- How much Fe-55 will there be after 1 year? [kg]

# Burning isotopes in a reactor

1kg of Fe-55 is put into a reactor with thermal flux =  $1E14$  [n/cm<sup>2</sup>/s]

- What is the removal rate of Fe-55? [atoms/s]  
**9E16**
- How much Fe-55 will there be after 1 year? [kg]  
**0.767**

# P Set 4 - Question 3

## 22.01 Intro to NE Ionizing Radiation Lecture

Sep 18, 2020 2:00 PM Eastern Time (US and Canada) ID: 934 0290 9537

Radioactivity and Count Rates

gross count rate background count

Counts - background counts = net counts

$Bq = 1 \frac{\text{decay}}{\text{second}}$

$Ci = 3.7 \cdot 10^{10} Bq$

$\lambda N = A =$

1 pCi 1 nCi 1  $\mu$ Ci

Food consumer goods a lot need shield (EBR-I)

eff =  $\frac{\# \text{ counts}}{14600 \text{ V } \delta}$

$\frac{dA}{dt} = -\lambda A$  decay constant

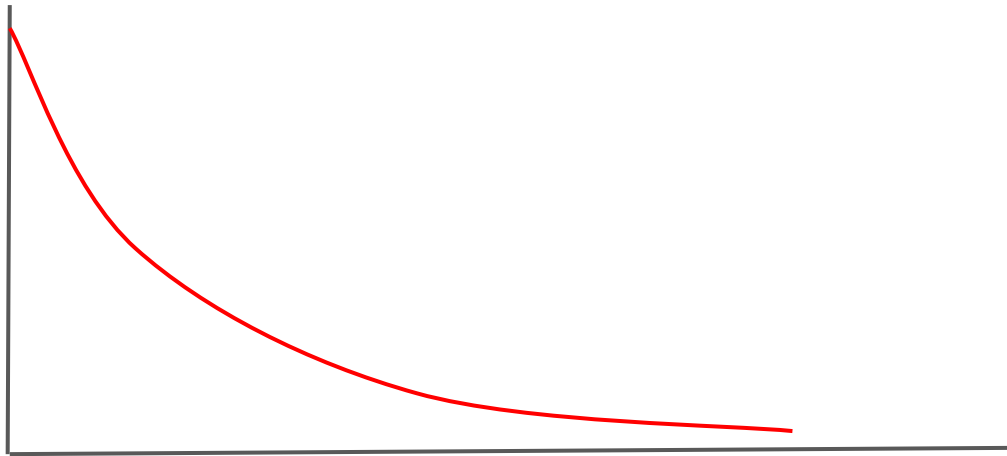
$A(t) = A_0 e^{-\lambda t}$  initial rad ( $t=0$ ) in Be

$Bq = \left[ \frac{1}{s} \right]$  atoms

$\left[ \frac{\text{decay}}{\text{sec}} \right] = \left[ \frac{1}{s} \right]$  atoms

# P Set 4 - Question 5.1

“Draw the approximate, to-scale solution to this system of equations...”



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Office Hour 3-3.45pm Monday

Questions?

Please grab a snack, get up off the sofa, look at something that isn't a screen for ~X mins!

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## 22.01 Introduction to Nuclear Engineering and Ionizing Radiation

Spring 2024

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