

# Nuclear Notes



**Name** \_\_\_\_\_

**Quiz Date** \_\_\_\_\_

## Chemical vs Nuclear Reactions

### Chemical Reactions:

- \*
- \*
- \*
- \*
- \*

### Nuclear Reactions

- \*
- \*
- \*
- \*
- \*

### **Vocabulary:**

Term	Definition
radioisotope	
nucleon	
nuclides	
transmutation	

*Why do nuclear reactions occur?*

### **Types of Radiation**

Type	Symbol	Charge	Blocked by	Mass
alpha, $\alpha$				
Beta, $\beta$				
Gamma, $\gamma$				

***Energy of the particles:***

\_\_\_\_\_ has the least energy.

\_\_\_\_\_ has the most energy.

***Alpha Emission:***

\_\_\_\_\_  
\_\_\_\_\_

Example Equation:

***Beta Emission:***

\_\_\_\_\_  
\_\_\_\_\_

Example Equation:

***Electron Capture:***

\_\_\_\_\_  
\_\_\_\_\_

Example Equation:

***Alpha Bombardment:***

\_\_\_\_\_  
\_\_\_\_\_

Example Equation:

***Gamma Emission:***

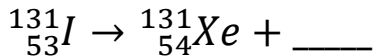
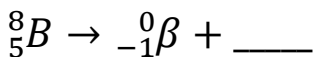
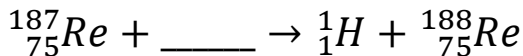
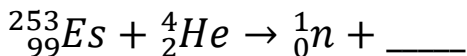
\_\_\_\_\_  
\_\_\_\_\_

Example Equation:

**Determine the Type of Radiation Occurring:**



**Balancing Nuclear Reactions**



Write a balanced nuclear equation for the alpha decay of thorium-230.

Why is radiation dangerous? \_\_\_\_\_

*Units for detecting radiation:*

\* \*  
\*

*Detecting methods for radiation detection*

\* \*  
\*

Which unit refers to the amount of ionization present in the air?

\_\_\_\_\_

Which unit measures the effects of radiation on humans?

\_\_\_\_\_

**Fission vs Fusion**

Terms	Definition
Fission	
Fusion	
Chain Reaction	
Nuclear Power Plant	

*Fission:* \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_

Reaction:

Picture:



**Fusion:** \_\_\_\_\_

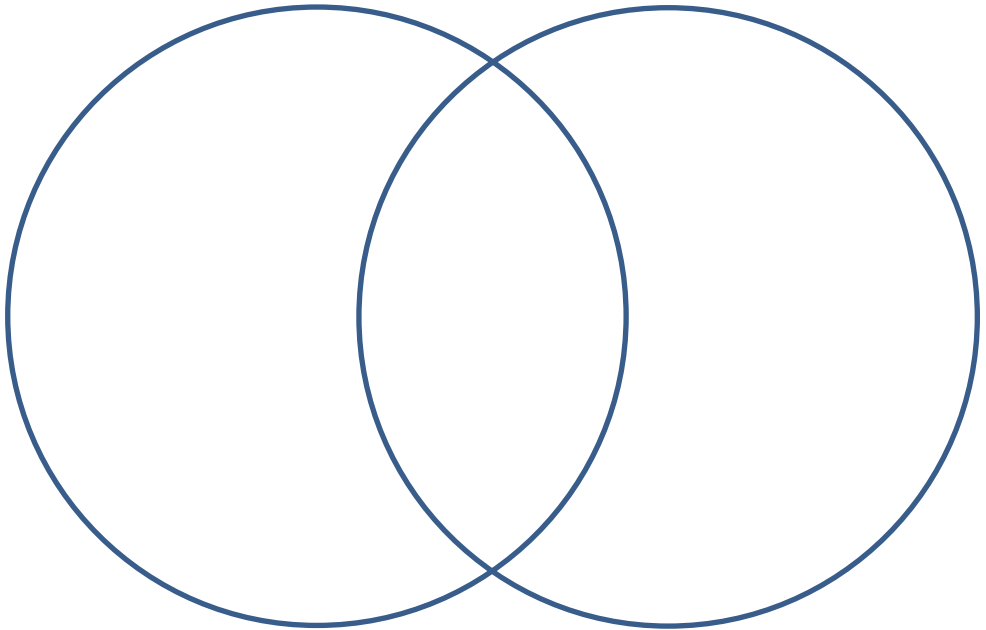
\_\_\_\_\_

Reaction:

Picture:



**Fission vs. Fusion:**



**Nuclear Reactor:**

Fuel:

Control Rods:

Moderator:

Coolant:

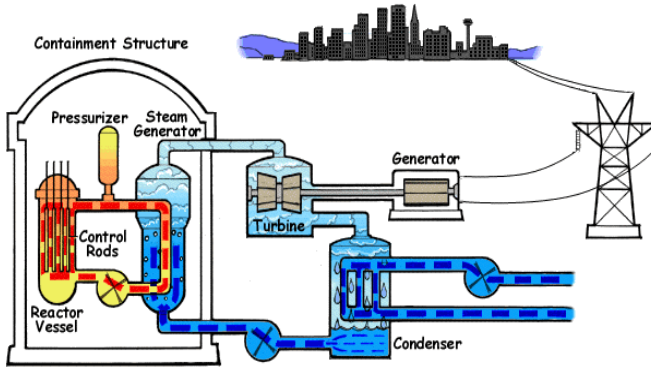
Description of a nuclear power plant: \_\_\_\_\_

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*Application of Nuclear Radiation*  
Radioactive Dating

### Nuclear Medicine

- Radioactive tracers (\_\_\_\_\_) used to find things like a blocked kidney
- Radiation therapy for cancer
- \_\_\_\_\_ scans → shows cross-sectional views of the body
- \_\_\_\_\_ scans → uses positrons
- Sterilization of medical instruments

### Nuclear Agriculture

- Tracers in fertilizer to monitor effectiveness
- Prolong \_\_\_\_\_ of foods

Radon Gas:

Smoke Detectors:

**Half Life:**

Definition: \_\_\_\_\_

The longer the half life the \_\_\_\_\_ the nuclide.

Try It:

1. The half life of polonium-210 is 138.4 days. How many milligrams of polonium-210 remain after 415.2 days, if you start with 2.0 mg of the isotope?
2. Assuming a half-life of 1599 years, how many years will be needed for the decay of  $15/16$  of a given amount of radium-226?
3. The half-life of polonium-218 is 3.0 minutes. If you start with 16 mg, how long will it be before only 1.0 mg remains?
4. If it takes 6.5 hours for 20.g to decay to 2.5 g, what is the half-life?