Honors Chemistry Unit 1 Slides

Bellwork

On a notecard answer the following:

1. How many protons does Neon have?
2. An atom has 10 protons, 11 electrons, and 10 neutrons. What is its mass?
3. True/False: electrons have absolutely no mass

How do fireworks work?

Tell your group members any ideas you have

FLAME TEST

- In order to investigate this we will perform a flame test
- During this lab, we will all wear goggles
- Do not light your Bunsen burner without your teacher present

FLAME TEST

Watch the video to discover

a. How to light a Bunsen burner
b. How to turn off a Bunsen burner

FLAME TEST

Watch the video to discover

a. How to perform a flame test safely

PURPOSE OF THE LAB

In addition to our question about fireworks, we will be making a data table and comparing our knowns to determine what our unknown is

PREDICTIONS

Why do you think that different colors were produced in the flame test?

Flame Test Lab Day 2

Complete your bellwork on a whiteboard

1. How many neutrons are there in an atom that has a mass of 43 and 21 protons?
2. What color of flame was produced from burning the NaCl?
3. Which group is Barium in on the periodic table?

Explain

Instructions:

1. Read the article out-loud at your table as a group. A different person should read each paragraph within your group.
2. Work as a group to answer the questions on your worksheet.

Explain

Instructions:

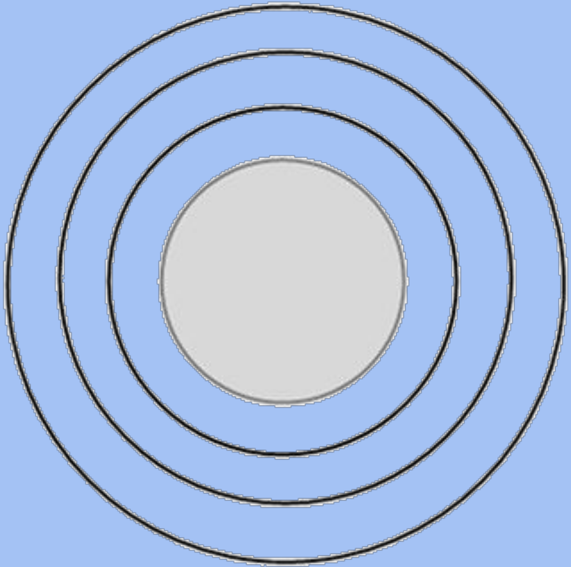
1. Read the article again out-loud at your table as a group. A different person should read each paragraph within your group.
2. Work as a group to draw a picture of how electrons are involved in producing the light we saw in the flame test. Be prepared to explain how your drawing shows this idea to the rest of the class.

Explain

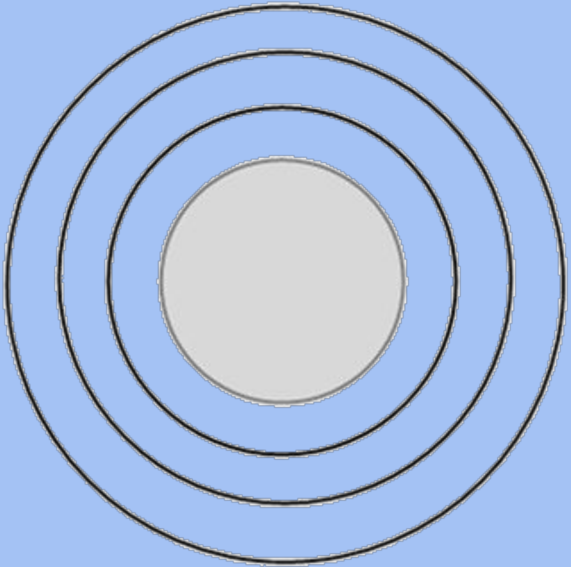
Instructions:

1. Each group will present their drawing to the rest of the class.
2. Each group will discuss which drawing they thought most accurately represents how electrons are involved in producing the light seen in the flame test.
3. Each group will then explain their reasoning and their vote for which drawing was the most accurate.

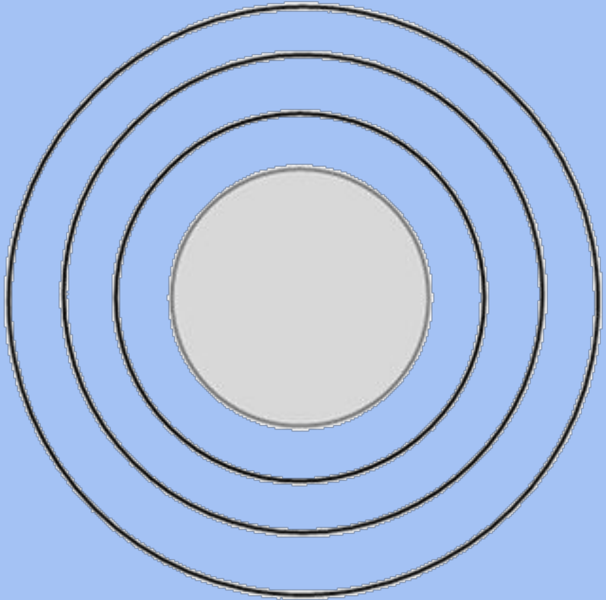
Elaborate



Ground State



Excited State



Return to Ground State

Evaluate

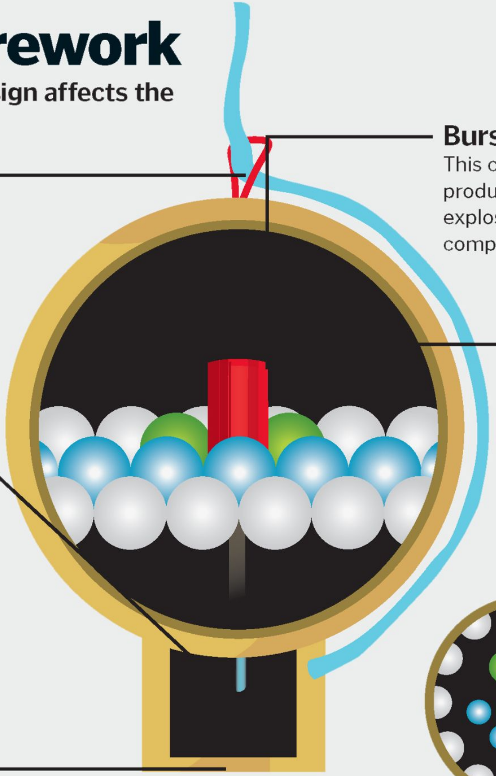
Now discuss with your group which picture was the most accurate and why. Now edit your own picture to fit with what we know have seen.

Color	Wavelength
Violet	380–
Blue	450–
Green	495–
Yellow	570–
Orange	590–
Red	620–

Complete the chart on the “Electromagnetic Spectrum Calculations” Document

Inside a firework

See how the internal design affects the shape of the explosion



Fuse

This initial fuse ignites other, smaller fuses within the firework. In public displays, these are lit by electrical contacts called wirebridge fuseheads.

Burst charge

This central structure produces a large, quick explosion that sets the entire compartment off.

Gunpowder

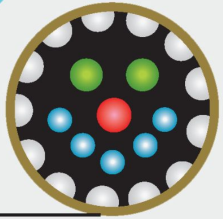
Also known as black powder, this provides the explosive force that ignites the stars and launches them in all directions.

Timed fuse

This section ignites the burst charge once the firework has reached the appropriate altitude.

Lifting charge

The initial explosion sends the shell soaring into the air without detonating the main compartment.



Star arrangement

Different chemicals are added to create a range of colours, while the shape is determined by the arrangement of small, combustible pellets.

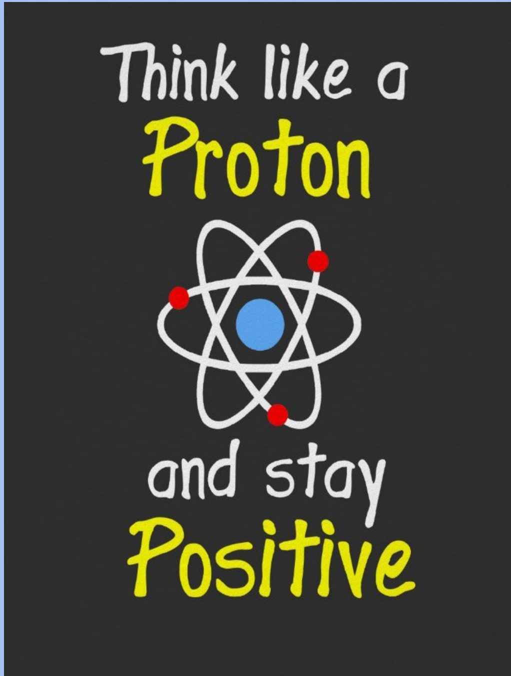
HOW IT WORKS

Complete your bellwork on goformative

Then pull out your

- Periodic table
- Syllabus
- Chem MONEY

And get ready for your quiz



Radioactive Decay

https://www.mentalfloss.com/article/55464/how-albuquerque-isotopes-got-their-name

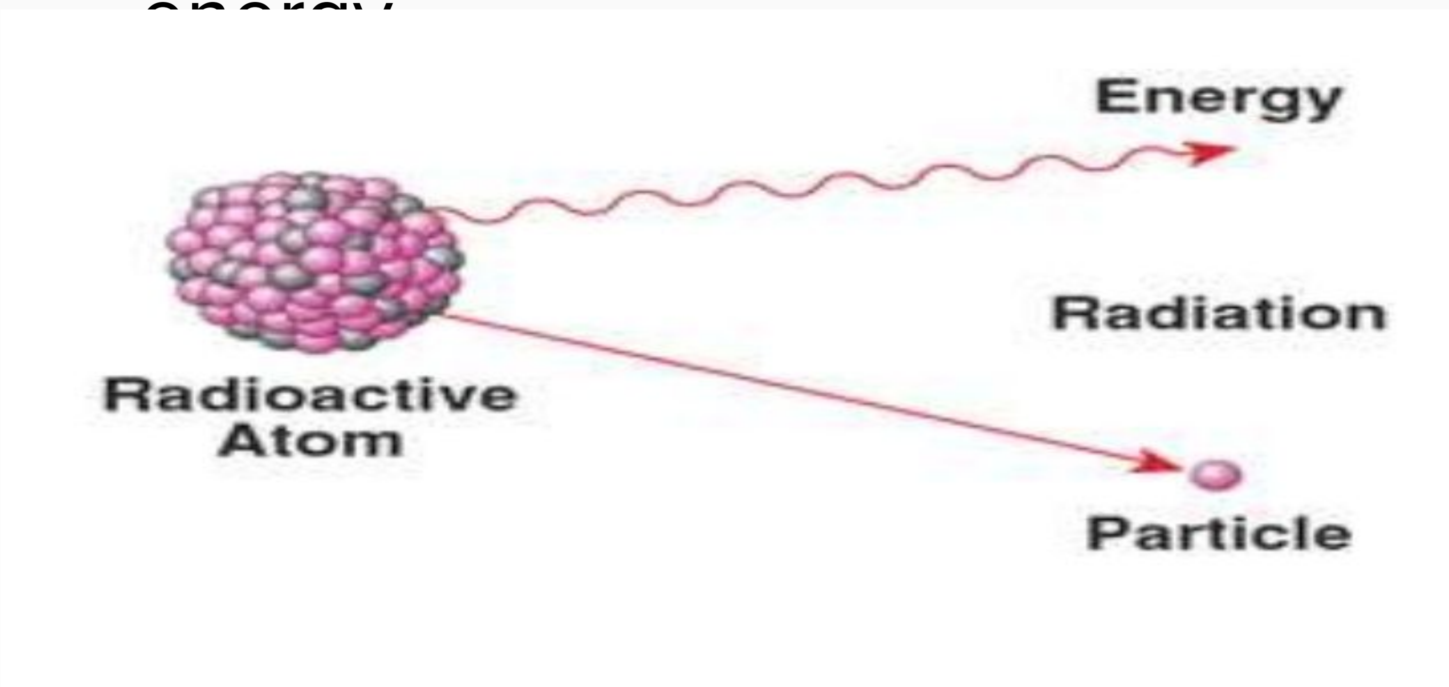
1. How many neutrons does an atom of lithium have if it has a mass of 8 amu?
2. What is the mass of one atom of helium to the nearest whole number?
3. How many protons does an atom of helium have?

Objectives

- SWBAT draw models IOT demonstrate understanding of radioactive stability and decay.

***Radioactive isotopes**

- Unstable and readily decay.
- Shed excess particles and/or energy.



Read the article

Alpha Particles

Type of Radiation	Symbol	Mass	Penetrating Power
Alpha	${}^{4}_{2}He$	**4 amu**	**Low**

- Alpha radiation is the release of a helium nucleus from a decaying atom.
- It is made up of ____ protons and _____ neutrons so it has a mass of 4 amu.
- Since it has _____ protons and no electrons it has a charge of +2.

Alpha Particles

Type of Radiation	Symbol	Mass	Penetrating Power
Alpha	${}^{4}_{2}He$	**4 amu**	**Low**

- Alpha radiation is the release of a **helium** nucleus from a decaying atom.
- It is made up of **2** protons and **2** neutrons so it has a mass of **4** amu.
- Since it has **2** protons and no electrons it has a charge of +2.

Beta Radiation

Type of Radiation	Symbol	Mass	Penetrating Power
Beta	${}^{0}_{-1}e$	**0 amu**	**Medium**

- Beta radiation is the conversion of a **neutron** to a **proton**. In this process an electron is released.

$$ {}^{230}_{90}Th \rightarrow {}^{230}_{91}Pa + {}^{0}_{-1}e $$

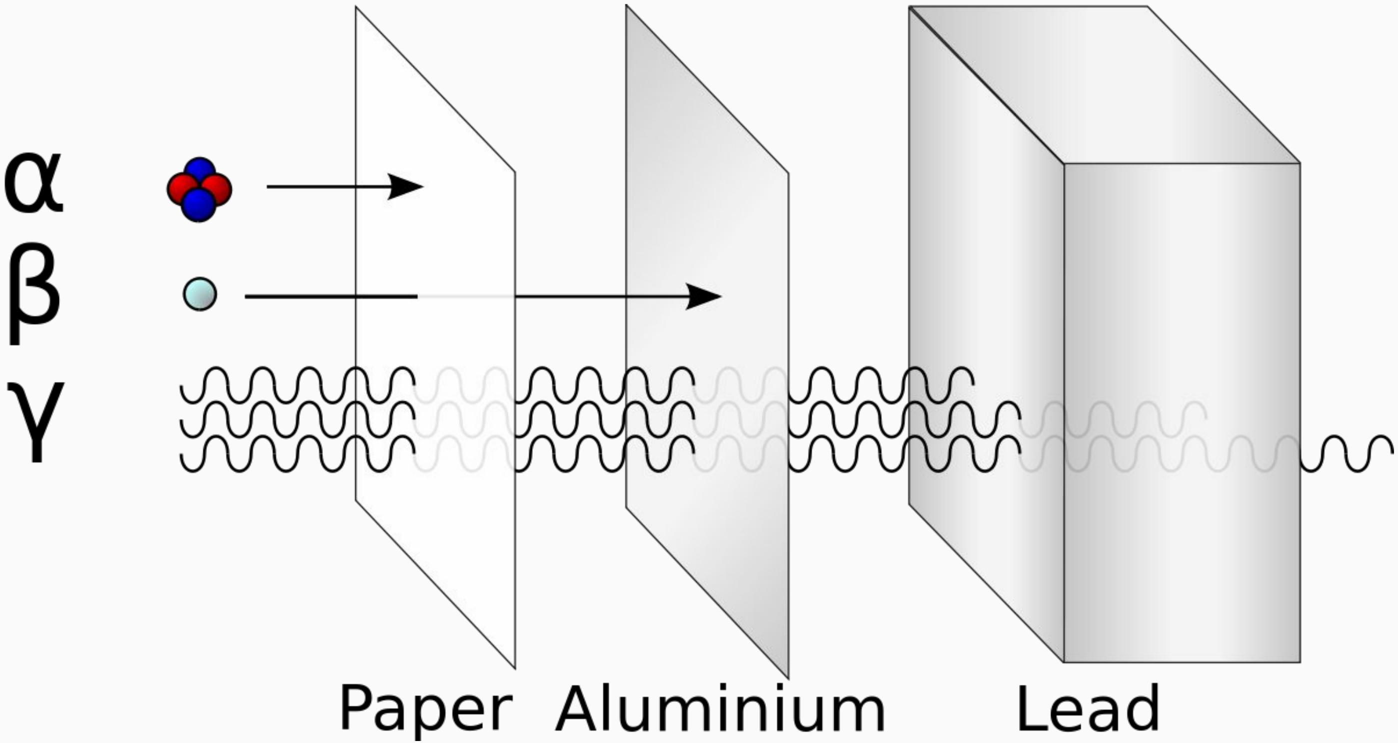
Gamma Radiation

Type of Radiation	Symbol	Mass	Penetrating Power
Gamma	${}^{0}_{0}\gamma$	**0 amu**	**High**

- A form of energy that is **higher** in energy and frequency than visible light.
- It can penetrate through most common substances including **metals**.

*Types of Radiation

Type of Radiation	Symbol	Mass	Penetrating Power
Alpha	$^{4}_{2}He$	**4 amu**	**Low**
Beta	$^{0}_{-1}e$	**0 amu**	**Medium**
Gamma	$^{0}_{0}\gamma$	**0 amu**	**High**


α
β
γ
Paper
Aluminium
Lead

1. Place at the top of your desk the alpha, beta and gamma cards.
2. Place the cards under the correct type of radiation, based on the characteristics shown on that card.

Which type of radiation is most commonly used to treat cancer externally?

$$^{233}_{92}U \rightarrow$$

$$^{209}_{83}Bi \rightarrow$$

Practice on your whiteboards

$$^{60}_{28}Ni \rightarrow \underline{\,^{4}_{2}He\qquad} + \underline{\qquad\qquad}$$

Practice on your whiteboards

$$^{14}_{6}C \rightarrow \underline{\quad ^{0}_{-1}e \quad} + \underline{\qquad\qquad}$$

Practice on your whiteboards

$$^{233}_{92}U \rightarrow {}^{4}_{2}He + \_\_\_\_\_\_$$

Practice on your whiteboards

$$^{236}_{94}Pu \rightarrow ^{4}_{2}H\_\_\_\_\_\_\_\_\_\_ U$$

Practice on your whiteboards

$${}^{12}_{6}C \rightarrow \_\_\_\_\_ + {}^{0}_{0}\gamma$$

Practice on your whiteboards

$^{201}_{79}Au \rightarrow$ ____ + ________ This include alpha decay

One final practice problem

Iodine-131 which is used to treat thyroid cancer goes through beta decay. Write out the equation for this decay process on your white board.

1. What do unstable nuclei do to try to become stable?
2. Write two complete sentences explaining how nuclear power plants harness energy from nuclear fission reactions.
3. What’s an example of a place where nuclear fusion is currently happening?
4. In one to two complete sentences explain the difference between nuclear fusion and nuclear fission.
5. What is one of the main reasons we currently do not have any nuclear power plants that run off of nuclear fusion reactions?


FISSION
VS
FUSION

1. What do unstable nuclei do to try to become stable?
2. Write two complete sentences explaining how nuclear power plants harness energy from nuclear fission reactions.
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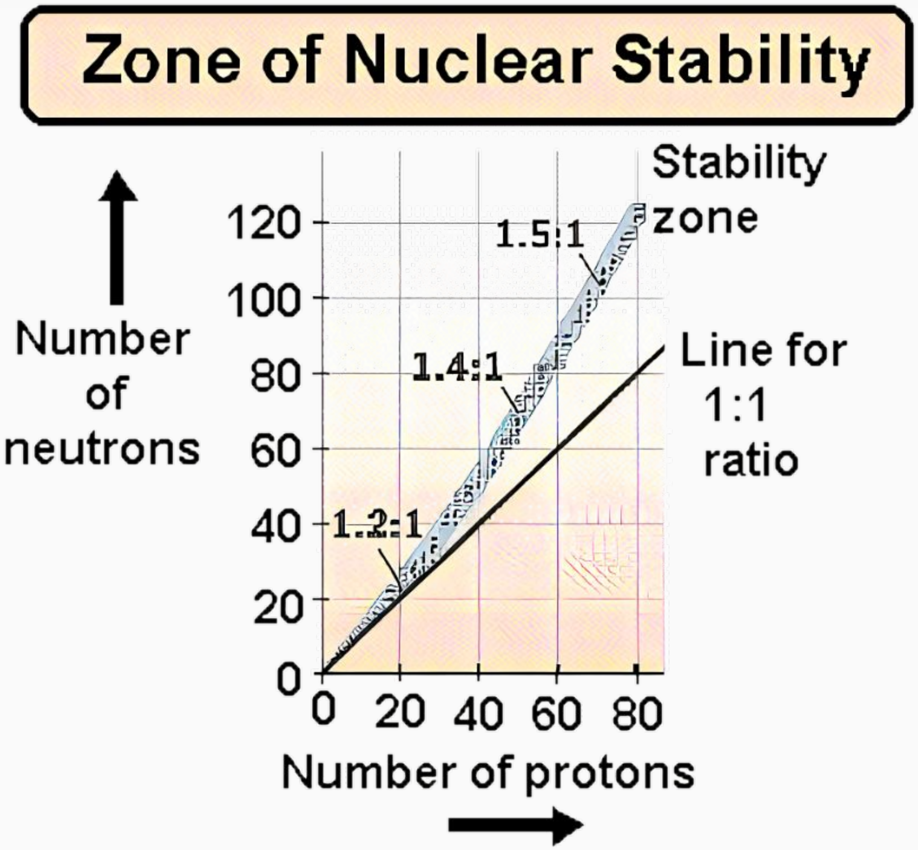


Adapted from an image by S. Goode (2001)

End of Class

Complete your exit ticket on formative

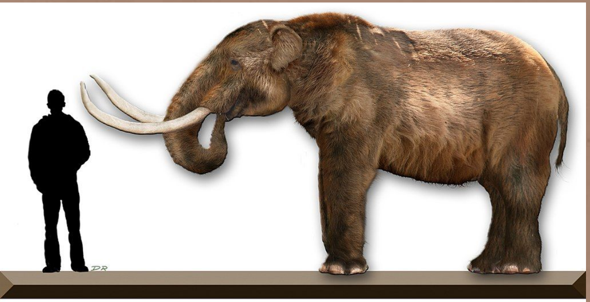
8/23-24/22 Exit ticket

Complete your bellwork

- Write the nuclear decay equation for carbon-14 going through gamma decay
- What is the symbol for alpha decay?
- An atom has 15 protons, 13 neutrons, and 12 electrons. What is its charge?

You think you found a mastodon bone

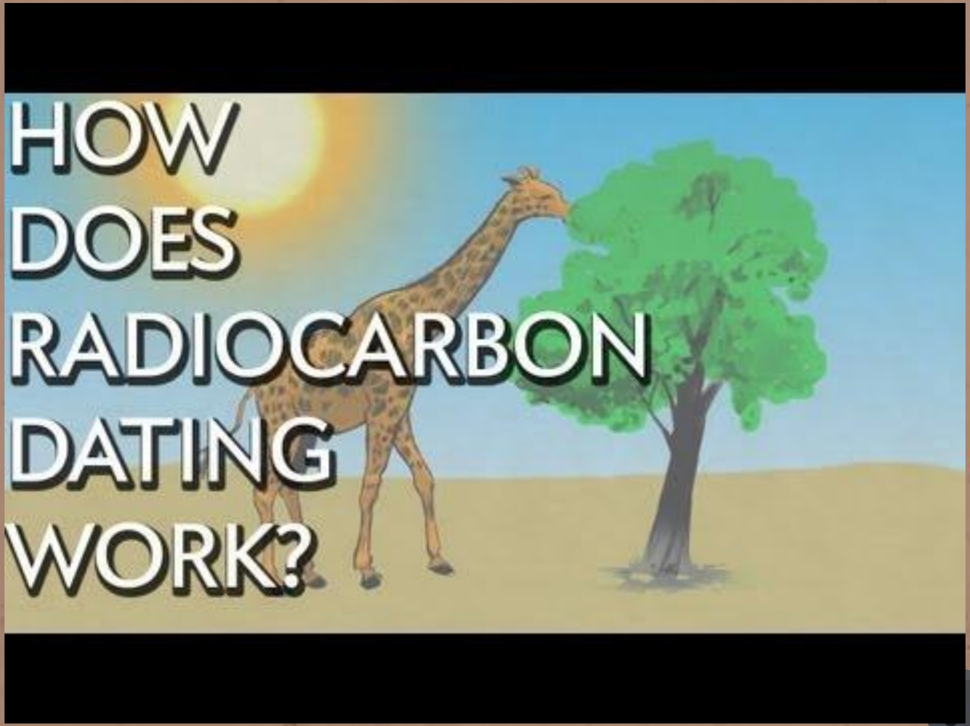
- You want to sell the bone to the MoSH to get that bag
- The MoSH says that it looks like the correct shape and size but you need to prove that the bone is old enough to be a mastodon
- Mastodons lived in this area 17,000 to 23,000 years ago



Explore

Work with your groups to determine the age of the bone

Explain

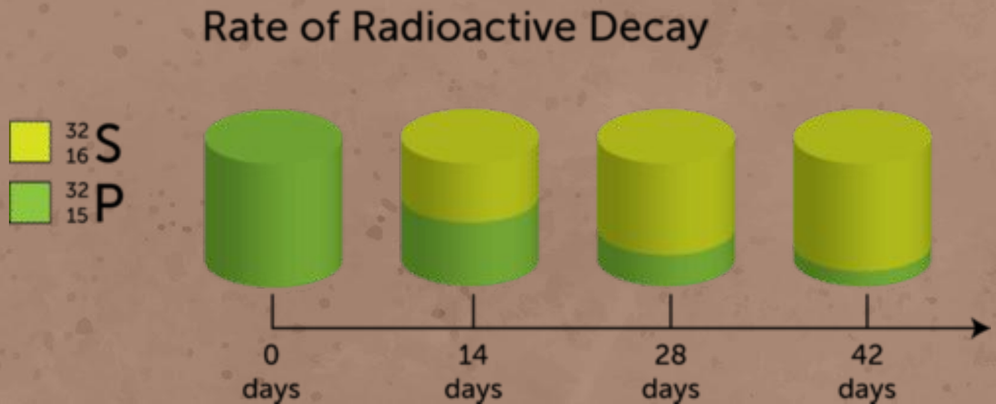


Explain

Half-life

The amount of time it takes for half a radioactive material to decay

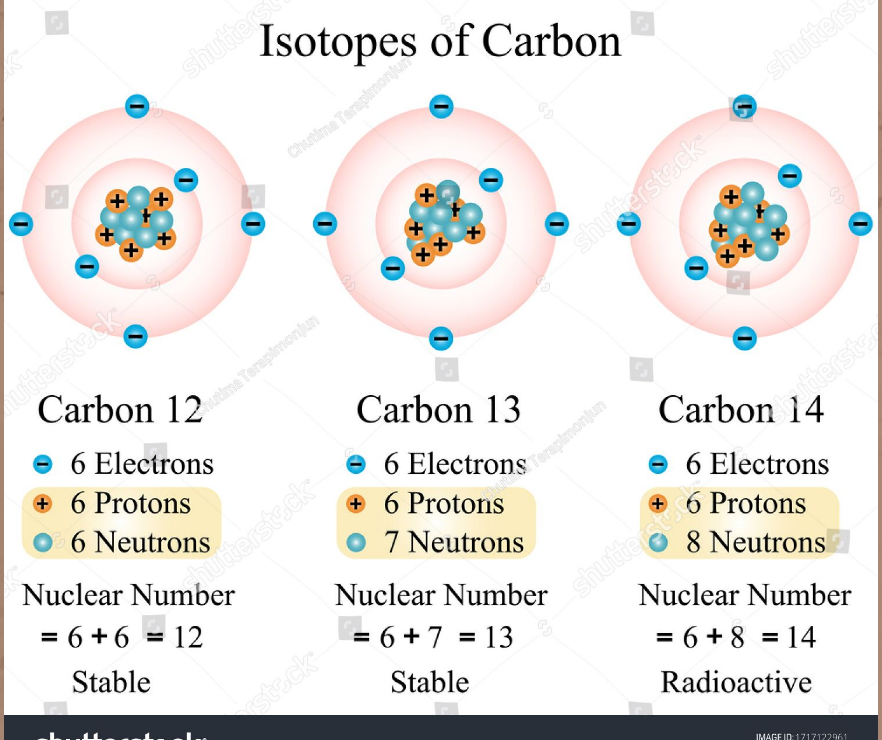
This will be different for each radioactive isotope



Explain

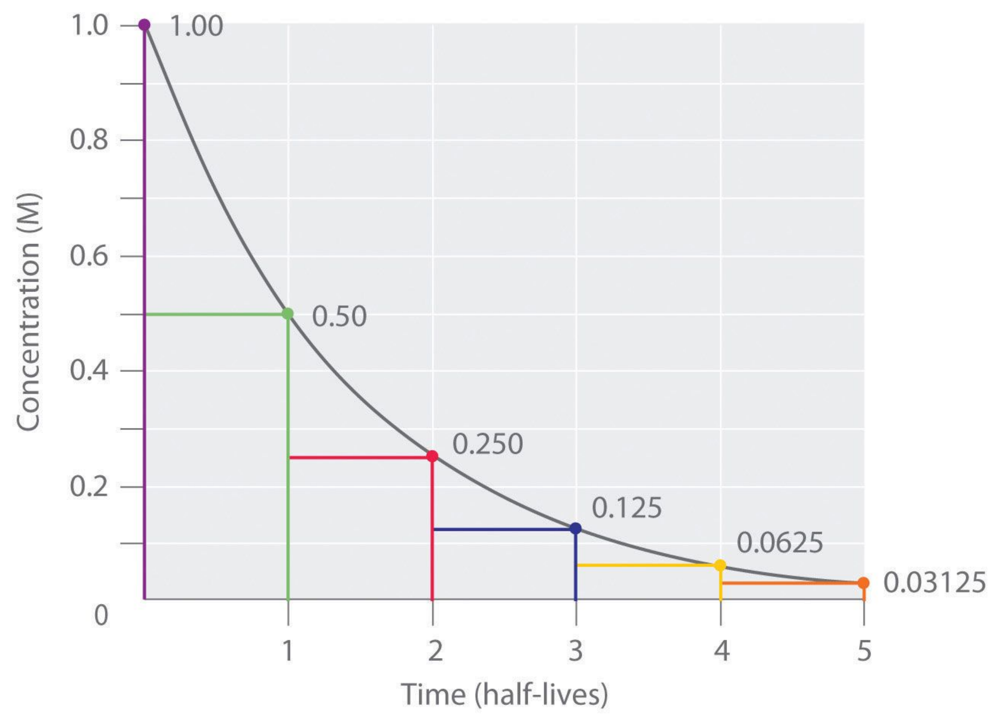
Isotope

The same element with a different <u>number of neutrons</u>



Explain

Half-life graph



Solving half-life problems

2. If you have 100 grams of a radioactive isotope with a half-life of 10 years:
a. How much of the isotope will you have left after 10 years?

STEP 1: Determine the number of half-lives (total time/time for one half-life)

Number of half-lives	Time	Material remaining
0	0	100 g
10/10=1	10	

Solving half-life problems

2. If you have 100 grams of a radioactive isotope with a half-life of 10 years:
a. How much of the isotope will you have left after 10 years?

STEP 2: Each half-life divide the material remaining by 2

Number of half-lives	Time	Material remaining
0	0	100 g
1	10	100/2=

Solving half-life problems

2. If you have 100 grams of a radioactive isotope with a half-life of 10 years:
a. How much of the isotope will you have left after 10 years?

Number of half-lives	Time	Material remaining
0	0	100 g
1	10	50 g

Solving half-life problems

2. If you have 100 grams of a radioactive isotope with a half-life of 10 years:
B. How much of the isotope will you have left after 20 years?

Number of half-lives	Time	Material remaining
0	0	100 g
1	10	50 g
	20	

Solving half-life problems

5. The half-life of plutonium-239 is 24,300 years. After 97,200 years, 500 g remains. How many grams were in the **original sample**?

STEP 1: Determine the number of half-lives

Solving half-life problems

2. If you have 100 grams of a radioactive isotope with a half-life of 10 years:
B. How much of the isotope will you have left after 20 years?

Number of half-lives	Time	Material remaining
0	0	100 g
1	10	50 g
2	20	25 g

Solving half-life problems

5. The half-life of plutonium-239 is 24,300 years. After 97,200 years, 500 g remains. How many grams were in the original sample?

STEP 2: If you're moving up the chart, multiply by 2 for each half-life

Number of half-lives	Time	Amount of plutonium-239 remaining
	97,200	500 g

Evaluate

Work on your practice problems with your group

Carbon-14

Carbon-14 dating is normally used to estimate the age of carbon-bearing materials up to about 58,000 to 62,000 years old. Carbon-14 has a half-life of 5,730 years before decaying into Nitrogen-14. Based on what you learned today, why do you think carbon dating isn't used for items older than 57,300 years?

Half Life Day 2!

Complete the bellwork

1. If you start with 300 grams of Sulfur-32, how many grams of Sulfur-32 will be left after 80 days if the half life is 16 days?

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I DO

A 200.0 g sample of Co-60 decays to 12.5 g in 80 seconds. What's the half-life?

We DO

A sample of Nitrogen-16 decayed to 32.3 g from a starting amount of 258.4 grams. If this took 160 minutes, how long is one half-life?

YOU DO

What is the length of the half-life of an isotope of Pb-214 if it takes 600 minutes to decay from 44 g down to 1.375 grams?

Join the Kahoot with the join code below