Alchemy Unit Isotopia gpb video: Chem Std: 11c

(42) **ChemCatalyst:**

Q: Which of the following are isotopes of Cu?

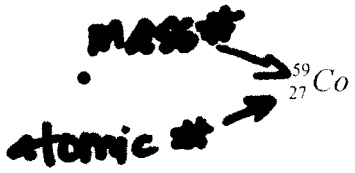
A. $^{63}_{29}Cu$ B. $^{197}_{79}Au$ C. $^{63}_{28}Cu$ D. $^{87}_{29}Cu$ E. $^{34}_{29}Cu$ F. $^{65}_{29}Cu$

Answers: A & F (D gives too many neutrons and E gives too few neutrons)

**Notes:**

- What does $^{59}_{27}Co$ tell you?

59
27 Co




(Co is the element, Cobalt)

-- This represents ONE isotope of Co
-- 59
-27
32 neutrons in this isotope

Practice: Hydrogen = 1.01

- What is another way to name this isotope of Cu?

- Cobalt-59
(use the mass #)

- How are the words "atom", "isotope" & "element" interrelated?

- 1. All matter is made up of elements
2. Elements are made up of atoms
3. All atoms of an element are identical, except some atoms of an element have different #'s of neutrons, called isotopes.

LESSON 14

# Isotopia

## Stable and Radioactive Isotopes

Name _____

Date _____ Period _____

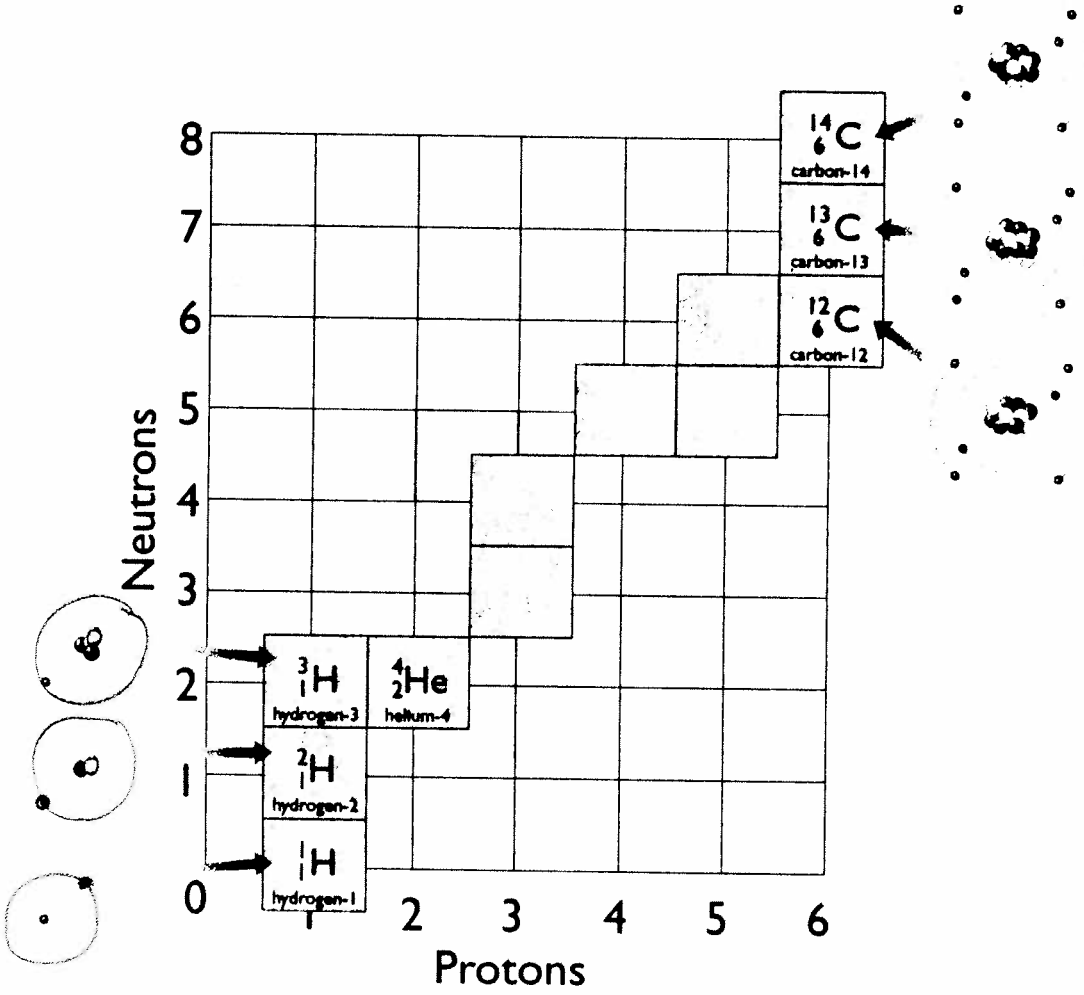
### ChemCatalyst

Which of the following are isotopes of copper, Cu? Explain your reasoning.

**A.** $^{63}_{29}Cu$ **B.** $^{197}_{79}Au$ **C.** $^{63}_{28}Cu$ **D.** $^{87}_{29}Cu$ **E.** $^{34}_{29}Cu$ **F.** $^{65}_{29}Cu$

Activity p. 43

The chart shows the isotopes that exist for the first six elements. Use your periodic table to fill in the shaded boxes. Then answer the questions about the graph.




1. How many isotopes does hydrogen have? How do they differ?

2. If you had a sample of beryllium, would all the atoms be identical? What about a sample of lithium? Explain your answers.

3. Next to the chart on the first page, draw a simple atomic model of beryllium, Be.

## Part 2: All the Naturally Occurring Isotopes

Look at the Handout: Chart of Naturally Occurring Isotopes.

1. Phosphorus has one naturally occurring isotope. Write its name and symbol.

2. Which element has the most isotopes? How many does it have?

3. Write the isotope name and symbol for the most abundant isotope of nickel.

4. Do you expect to find an atom with 26 protons and mass number 52? Explain your thinking.

5. Imagine that a chemist is trying to establish whether a piece of rock is from a meteorite that fell from outer space. The rock contains more copper-65 atoms than copper-63 atoms. What can you conclude?

6. Where on the periodic table are the majority of radioactive isotopes found? Write the isotope symbol for one example of a radioactive isotope.

7. Which elements have isotopes with the same number of protons and neutrons?

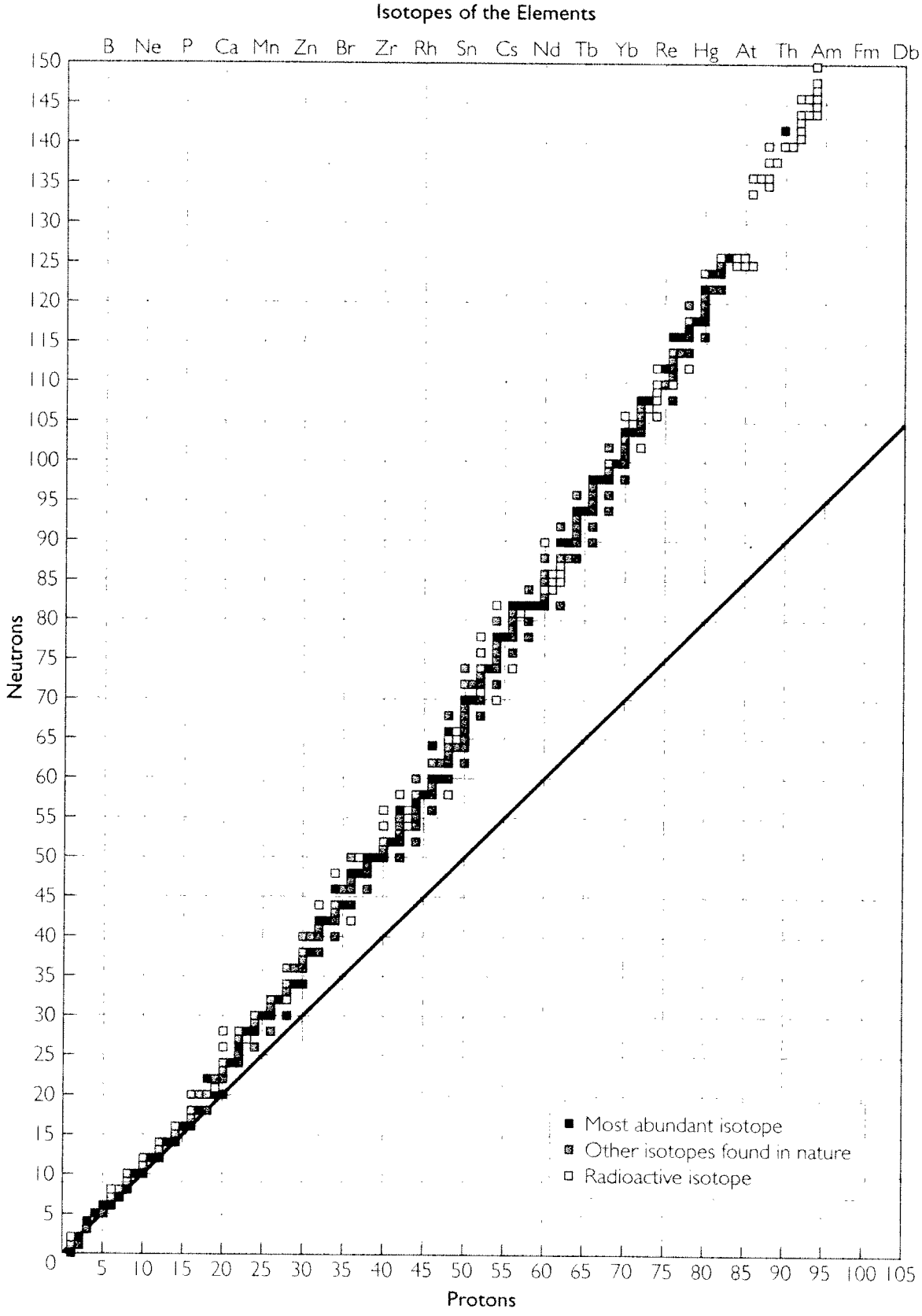
8. **Making Sense** List four types of general information that you can obtain from the isotope graph on the handout.

9. **If You Finish Early** What do you think nuclear chemists mean when they say that 8, 20, and 50 are magic numbers for isotopes?

### Check-in

1. Use the chart to determine how many neutrons you would need to make a stable element with 79 protons.
2. What element is this? Write its isotope symbol.

# CHART OF NATURALLY OCCURRING ISOTOPES



(44)

**Making Sense Notes:**

- What did you learn about isotopes today?

- Some elements have only one naturally occurring isotope
  --others have several
- Many atoms have at least 1 neutron for every proton (1:1 ratio)
  --large atoms have more neutrons than protons (3:2 ratio)➔ they need more "glue" to hold the repelling protons together
  *isotope stability is related to its ratio of neutrons to protons
  Ex: Hydrogen has 3 isotopes:
  Hydrogen-1
  Hydrogen-2
  Hydrogen-3 ← radioactive
  Tritium is rare: about 1 in a billion
- Some isotopes are unstable/radioactive
  --they decay over time (emit particles from the nucleus)
- All isotopes after bismuth (with atomic #84 and up) are radioactive