[***Isotopes‌ ‌and‌ ‌Atomic‌ ‌Mass‌‌***](https://phet.colorado.edu/sims/html/isotopes-and-atomic-mass/latest/isotopes-and-atomic-mass_en.html) **‌Lab ‌**

**(This‌ ‌lesson‌ is designed ‌for‌ ‌a‌ ‌student‌ ‌working‌ remotely‌.)‌**

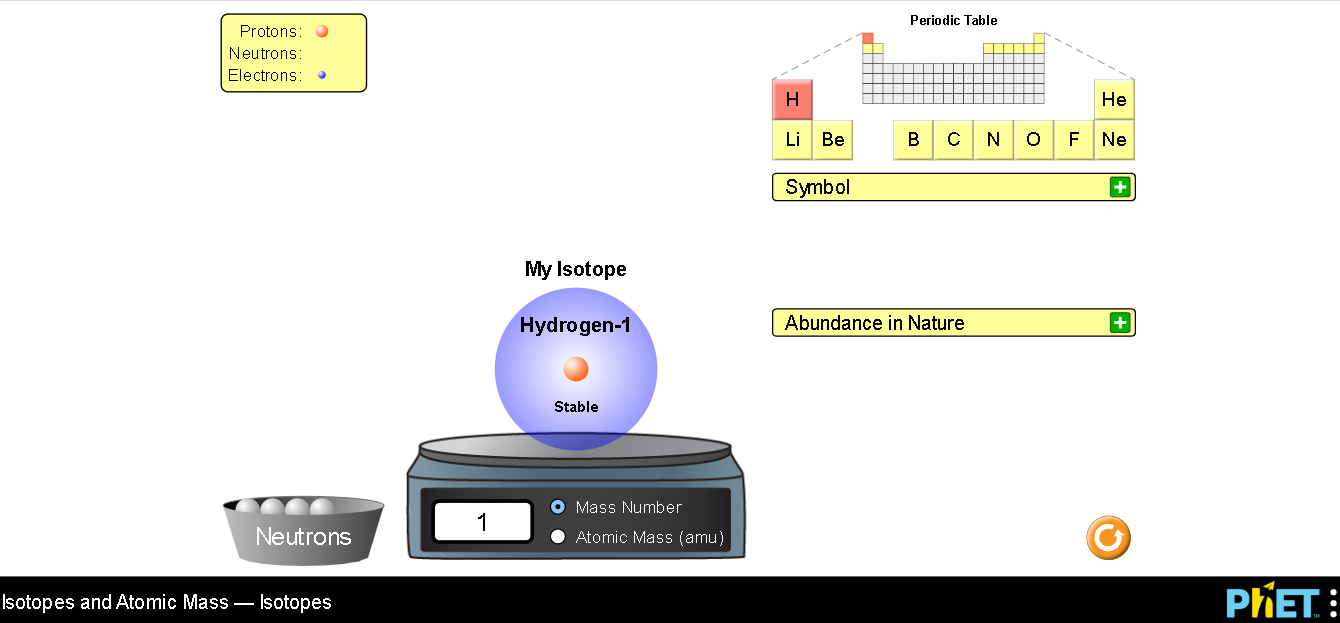
This lab uses the **Isotopes and Atomic Mass** simulation from PhET Interactive Simulations at University of Colorado Boulder, under the CC-BY 4.0 license.

https://phet.colorado.edu/sims/html/isotopes-and-atomic-mass/latest/isotopes-and-atomic-mass\_en.html

**Learning Goals:** Students will be able to:

1. Define “isotope” using mass number, atomic number, number of protons, neutrons and electrons.
2. Compare and contrast: element, atom, isotope
3. Given the number of protons, neutrons and electrons, find the mass and name of an isotope
4. Given the name of an element and the number of neutrons, find the mass of an isotope
5. Give evidence to support or dispute: “In nature, the chance of finding one isotope of an element is the same for all elements.”
6. Find the average atomic mass of an element given the abundance and mass of its isotopes

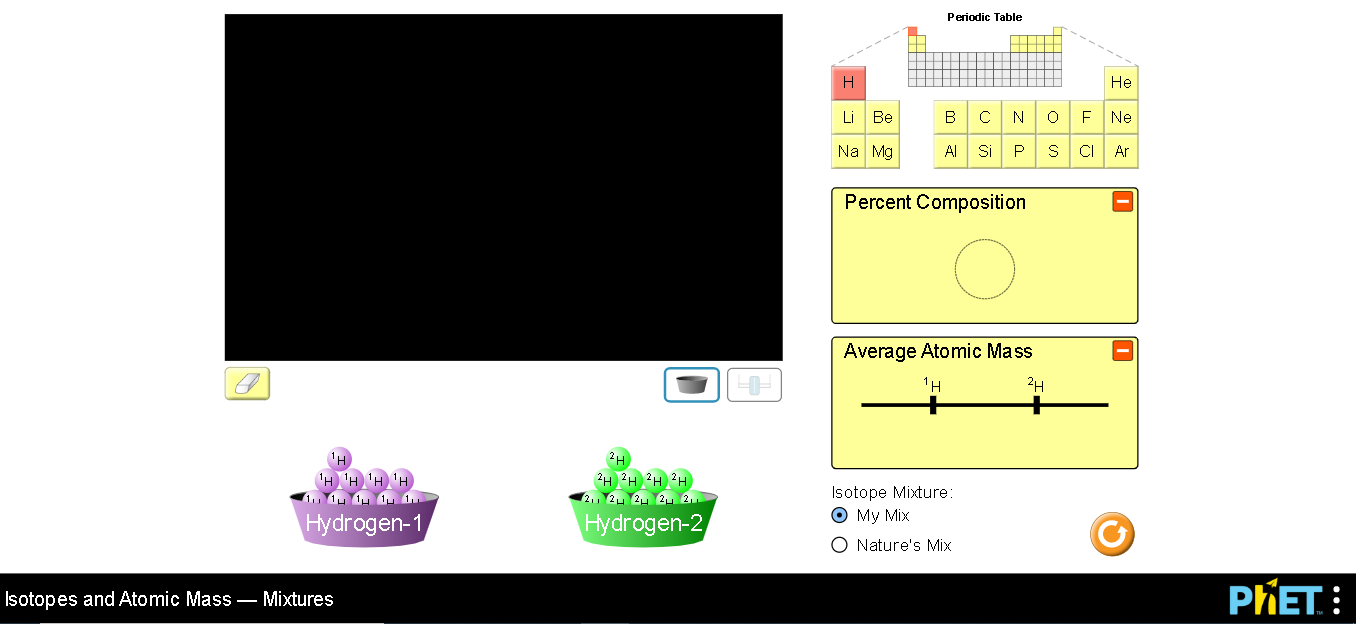
**Develop your understanding:** Open the [**Isotopes**](https://phet.colorado.edu/sims/html/isotopes-and-atomic-mass/latest/isotopes-and-atomic-mass_en.html?screens=1) screen, then explore to develop your own ideas about “isotopes”.

[](https://phet.colorado.edu/sims/html/isotopes-and-atomic-mass/latest/isotopes-and-atomic-mass_en.html?screens=1)

**Explain your understanding:** Use your own words and captured images from the simulation to show you can:

1. Define “isotope” using mass number, atomic number, number of protons, neutrons and electrons.
2. Compare and contrast: element, atom, isotope
3. Given the number of protons, neutrons and electrons, find the mass and name of an isotope
4. Given the name of an element and the number of neutrons, find the mass of an isotope

**Develop your understanding:** Explore the [**Mixtures**](https://phet.colorado.edu/sims/html/isotopes-and-atomic-mass/latest/isotopes-and-atomic-mass_en.html?screens=2) screen to develop your ideas about isotope mixtures are related to Average Atomic Mass. Make sure to explore both **My Mix** and **Nature’s Mix**

[](https://phet.colorado.edu/sims/html/isotopes-and-atomic-mass/latest/isotopes-and-atomic-mass_en.html?screens=2)

**Explain your understanding:**

1. What are the differences between My Mix and Nature’s Mix? Include screen captures in your explanation.
2. Give evidence to support or dispute: “In nature, the chance of finding one isotope of an element is the same for all elements.” use the sim and cite references to write a paragraph for your argument.

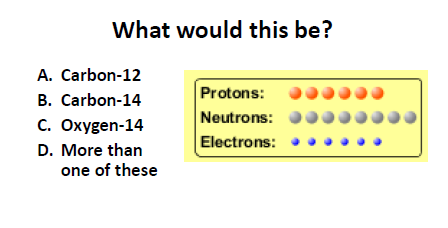
### Test your understanding:

**Open the full simulatio**n [**Isotopes and Atomic Mass**](https://phet.colorado.edu/sims/html/isotopes-and-atomic-mass/latest/isotopes-and-atomic-mass_en.html)

1. You and your friend, Bill, are given a rock that you know has some Silicon. You just learned that there are 3 common isotopes of silicon- Silicon-28, Silicon-29, and Silicon-30. Bill suggests that the rock might have equal parts of each isotope.
2. What would be the average mass of Silicon in the rock? Capture your screen from the sim to show a solution that would support Bill’s idea.
3. How could you check to see if Bill’s ideas are correct?
4. Iron has many isotopes but only 4 are found in significant amounts in naturally found mixtures. The amounts by mass percent are: 5.845% of 54 Fe(53.9396 amu) 91.754% of 56Fe (55.9349 amu), 2.119% of 57Fe (56.9354 amu) and 0.282% of 58Fe (57.9333 amu).
5. What would you determine the average mass of iron to be? Include your work

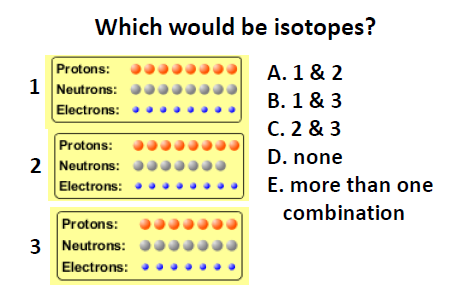
1. How do your results compare to the information on the periodic table ?

Question 9:



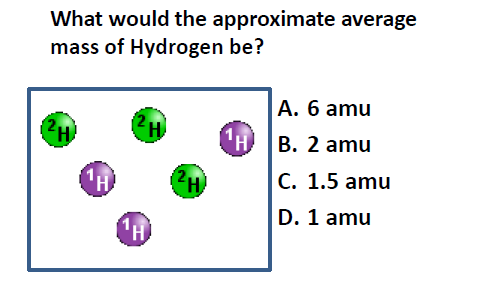
Your answer and explanation:

Question 10:



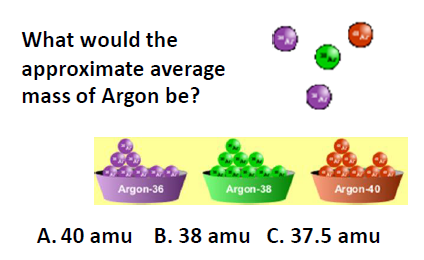
Your answer and explanation:

Question 11:



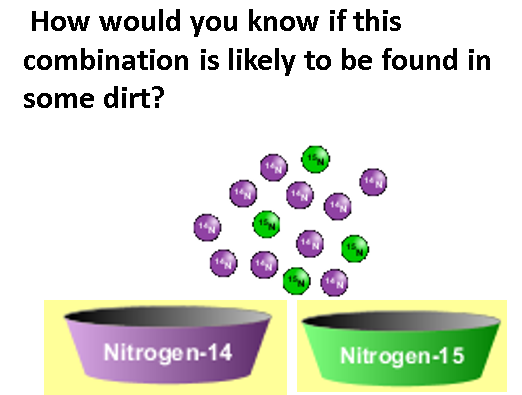
Your answer and explanation:

Question 12:



Your answer and explanation:

Question 13:



Your answer and explanation: