**Introduction:** Breath in…Breath out. Again! When you inhale air, you are not just inhaling a mixture of oxygen, nitrogen, and trace gasses, but a mixture of different oxygen atoms and different nitrogen atoms. It turns out that all oxygen atoms have the same number of protons, but some may have different numbers of neutrons. These different-but-still-oxygen atoms are called isotopes. Some atoms have just two isotopes; some have dozens!

**Procedure:**

1. Go to rustscience.com🡪Chemistry🡪1 Atomic Structure🡪 Click on the Isotopes & Atomic Mass Simulation.
2. Take some time and play with the Make Isotopes simulation. Imagine you are manipulating atoms!
3. Click the following to activate  and 

**Questions**: Manipulate the Simulation to answer the following questions.

1. How does the *number of protons change as atomic number* increase by one?
2. How does the *mass of the atoms change as atomic number* increases by one?
3. What effect does *adding a neutron* have on the atom’s **identity (which element it is)**?
4. What effect does *adding a neutron* have on the atom’s **mass**?
5. **Draw the nucleus of the most abundant isotope** of each of the following atoms in the boxes below. Be sure to count and label the protons and neutrons. Also **show the full atomic symbol**. Hydrogen has been done for you. 

**Hydrogen: H Carbon: C Oxygen: O Neon: Ne**

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |

**Build the following atoms using the simulation**. Complete the chart below. In some cases, you will need to work backwards to fill out missing information.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Isotope Name | Atomic Number | # of Protons | # of Neutrons | Mass Number | Stable?  (Y/N) | % Abundance in Nature |
| **Hydrogen-2** |  |  |  |  |  |  |
| **Helium-3** |  |  |  |  |  |  |
| **Helium-** | 2 |  |  | 5 |  |  |
| **Lithium-6** |  |  |  |  |  |  |
|  | 3 | 3 | 4 | 7 |  |  |
| **Oxygen-16** |  |  |  |  |  |  |
| **Oxygen-17** |  |  |  |  |  |  |
|  |  | 8 | 10 | 18 |  |  |
|  |  | 10 |  | 20 |  |  |
| **Neon-23** |  |  |  |  |  |  |