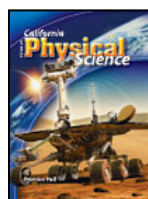


<b>Grade Level/Course:</b> Grade 8 Physical Science
<b>Lesson/Unit Plan Name:</b> Isotopes Card Sort
<b>Rationale/Lesson Abstract:</b> This card sort is a short activity to provide reinforcement for understanding isotopes. Students will be given cards with the name of an isotope, and add other cards to it based on the mass, number of protons, and number of neutrons. This can be done in partners or small groups.
<b>Timeframe:</b> 10-15 minutes
<b>Standard(s):</b>  <ol style="list-style-type: none"> <li>3. Each of the more than 100 elements of matter has distinct properties and a distinct atomic structure. All forms of matter are composed of one or more of the elements. As a basis for understanding this concept: <ol style="list-style-type: none"> <li>a. <i>Students know</i> the structure of the atom and know it is composed of protons, neutrons, and electrons.</li> </ol> </li>   <li>4. The organization of the periodic table is based on the properties of the elements and reflects the structure of atoms. As a basis for understanding this concept: <ol style="list-style-type: none"> <li>b. <i>Students know</i> each element has a specific number of protons in the nucleus (the atomic number) and each isotope of the element has a different but specific number of neutrons in the nucleus.</li> </ol> </li> </ol>

### Instructional Resources/Materials:

Optional: Prentice Hall 2008 Physical Science textbook  
p. 130  
or similar textbook resource



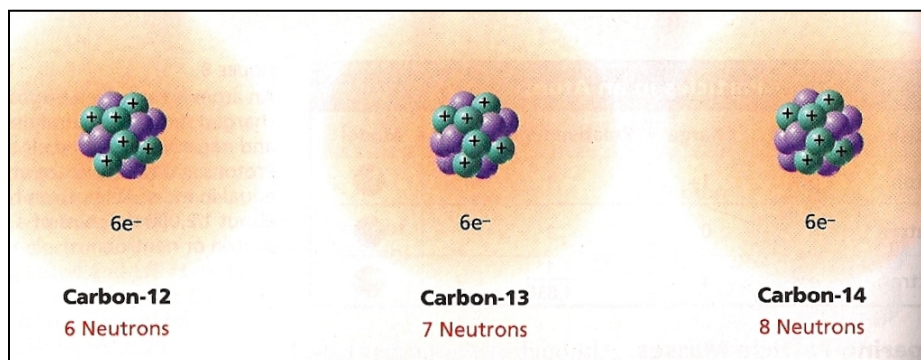
- You will need a paper cutter (or scissors) to cut out cards for each group.
- Students will need a Periodic Table.
- Sets of 32 cards for each group of students (see below).

Review the definition of an **isotope**:

*Atoms of the same element with different numbers of neutrons.*

Remember that the number of protons does NOT change for atoms of the same element. All atoms of oxygen will always have 8 protons. But they may have 8, 9, or 10 neutrons. These isotopes will consequently have different mass numbers. **The mass number is the sum of the protons and the neutrons.** (Electrons can be ignored, as their mass is nearly 0).

Diagram from  
Prentice Hall  
Physical Science  
2008, page 130



The mass shown on the periodic table is the average mass of all isotopes of that element. For example, the average mass shown on the Periodic Table for all boron atoms is 10.81. Boron has stable isotopes with 5 neutrons and 6 neutrons. Since Boron-11 is more common than Boron-10, the average mass is closer to 11.

5
<b>B</b>
Boron
10.81

### Activity/Lesson:

Make enough copies so that each group has a full set of 32 cards.

Cut the cards out, keeping each set of 32 separate.

Cards in each set of 32 cards should be mixed up randomly.

Divide students into pairs or small groups.

Show an example, either from the set, or better to use an example of another isotope.

Students will then put cards into groups based on the name of the isotope.

For example,

Carbon-14

Atomic mass = 14

6 protons

8 neutrons

To modify the lesson:

- You may remove a few of the isotopes (and their corresponding cards) so there are fewer to choose from.
- You may make more isotopes (and corresponding cards) to make it more challenging.
- You may remove cards or add unneeded cards as foils.
- You may include blank cards for students to write missing information.

### Assessment:

Students should have correctly categorized the cards into eight groups, each with the isotope name, mass, protons, and neutrons.

Oxygen - 16

atomic  
mass =  
16

8 protons

8 neutrons

Oxygen - 17

atomic  
mass =  
17

8 protons

9 neutrons

Sulfur - 32

atomic  
mass =  
32

16 protons

16 neutrons

Sulfur - 33

atomic  
mass =  
33

16 protons

17 neutrons

Carbon - 13

atomic  
mass =  
13

6 protons

7 neutrons

Carbon - 14

atomic  
mass =  
14

6 protons

8 neutrons

Lithium - 7

atomic  
mass =  
7

3 protons

4 neutrons

Lithium - 5

atomic  
mass =  
5

3 protons

2 neutrons