Name: _____ Period: _____ Date: _____

Elements and Periodic Table Guided Notes - Student Edition

Elements

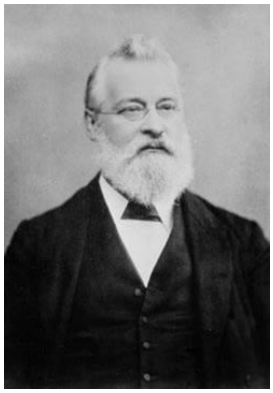
Scientists have found more than 100 different types of _____. Substances which are made of only one type of atom are called _____. Elements cannot be broken down into a simpler substance. For example, gold is an element because it only contains _____ _____. By contrast, water is not an element as it contains _____ _____types of atoms – _____and _____.

Most elements that have been discovered are solids, however, there are also eleven _____and two liquids. There are many more _____than non-metal elements.

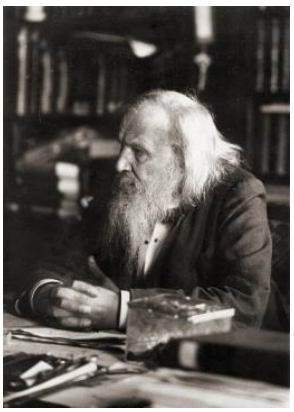
The History of the Periodic Table

As early chemists discovered elements, they realized some elements had _____properties and so they grouped them together. For example, the metals lithium (Li), sodium (Na), and potassium (K) were all shiny, conducted _____and _____well, and reacted violently in water. The gases, fluorine (F), chlorine (Cl), bromine (Br), and iodine (I) also showed similar properties to each other, but these properties were vastly _____from those of any of the metal elements above.

As more information was learned about these elements they were arranged and rearranged many times with the aim of showing the _____between different elements. This is how the periodic table of Elements came about.



John Newlands ordered the periodic table based on increasing atomic weight in 1864.



Dmitri Mendeleev recognized similar properties and reordered the table accordingly in 1870.

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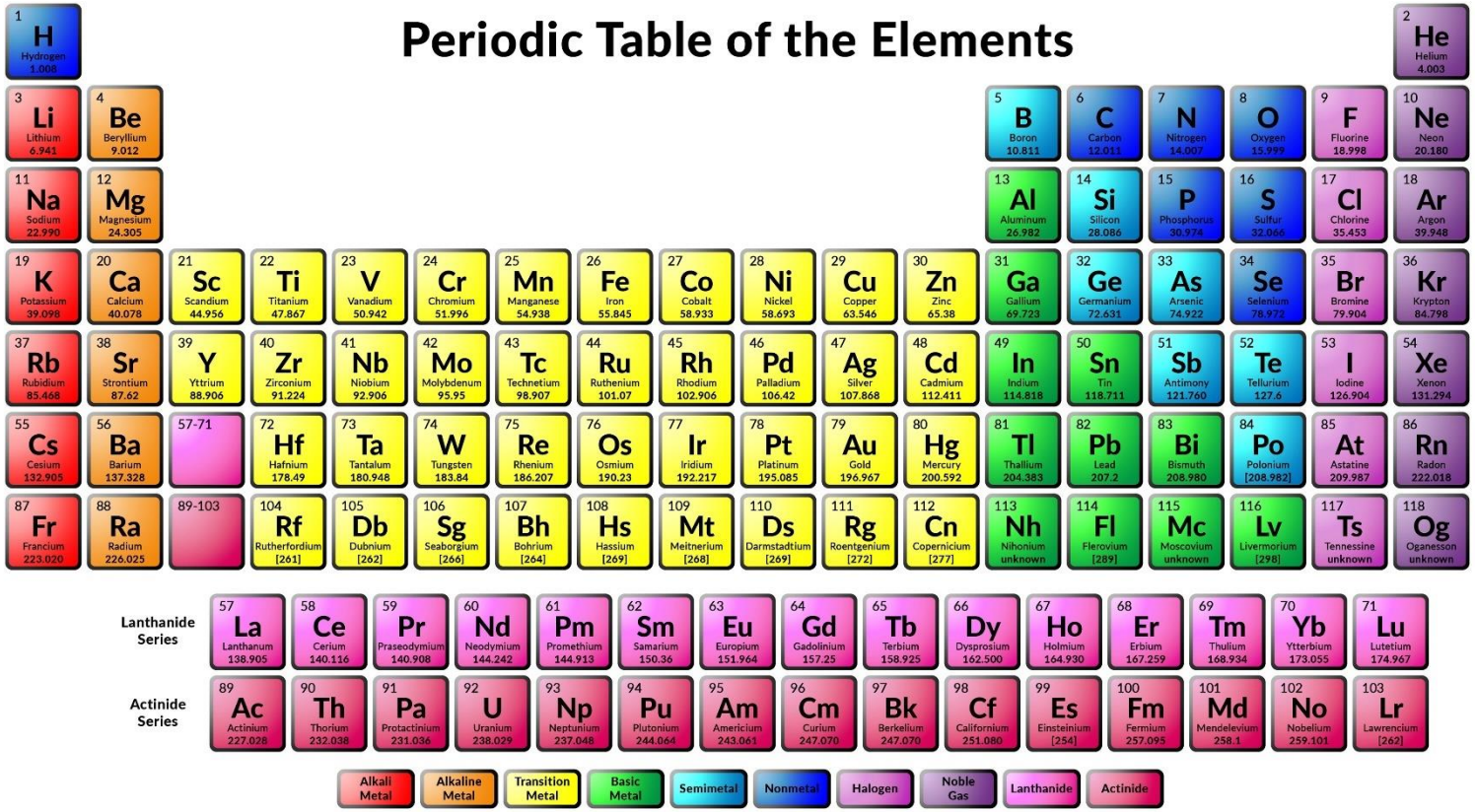
The Modern Periodic Table

By the twentieth century, many elements had been discovered and it was obvious that some of these no longer belonged where Mendeleev had originally placed them. In 1913, Rutherford's research group discovered that each element had a unique number of _____which led to the table to be reordered according to _____ _____. Atoms with similar properties were still placed together. Each element was assigned its own individual _____with its symbol, atomic _____, and atomic _____. This led to the current arrangement of the periodic table seen below.



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Activity 1:

Using the periodic table on page 2 find the symbols for the following elements:

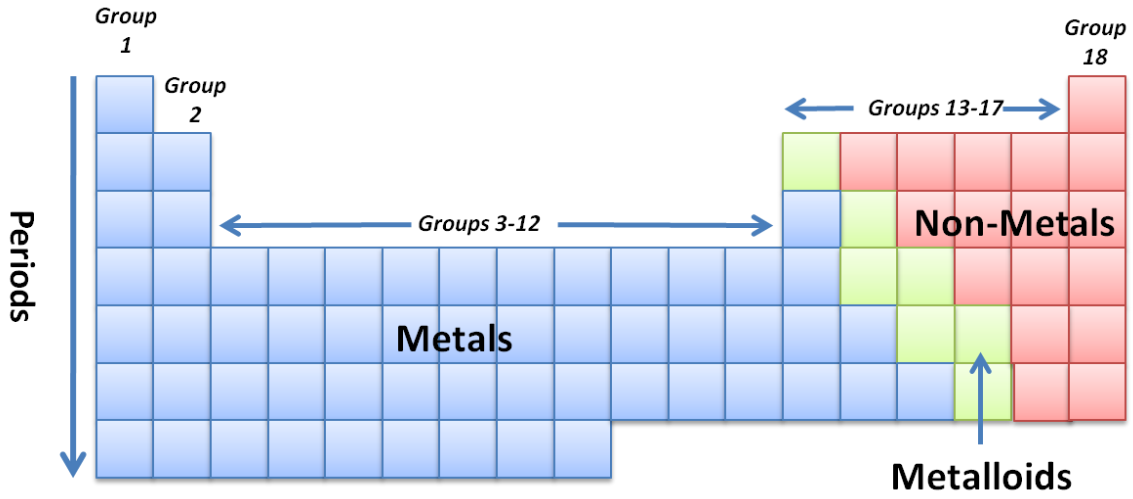
1. Lithium _____	6. Nitrogen _____
2. Boron _____	7. Fluorine_____
3. Carbon _____	8. Hydrogen _____
4. Calcium _____	9. Helium _____
5. Zinc _____	10. Oxygen _____

The Arrangement of the Periodic Table

The periodic table also groups elements based on other features:

- Metals (shaded in blue below) are generally found on the _____-_____ side of the table in groups _____-_____with some also found in groups _____-_____.
- Almost all the non-metals (shaded red), except for hydrogen, are found on the _____-_____side of the periodic table, mainly in groups _____-_____and all of group _____.
- The horizontal rows in the periodic table are called _____. These are based on the number of electron energy levels an element has. For example, the top row (_____) has _____ energy level, while the second row has _____ etc.
- The group which is shaded green on the table below represents the _____. These elements show a combination of properties of both metals and non-metals.

The image below shows the key areas of the periodic table:



Name: _____ Period: _____ Date: _____

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Atomic Number:

The atomic number is how many _____ an atom has. Inside the box for each element is its unique atomic number (the circled number in the image to the right). The periodic table orders the elements by _____ atomic number.

Activity 2:

Use the periodic table on page 2 to find the atomic number for each of the following elements:

1. Beryllium _____	6. Argon _____
2. Carbon _____	7. Chlorine _____
3. Sulfur _____	8. Sodium _____
4. Magnesium _____	9. Hydrogen _____
5. Gold _____	10. Iron _____

The Neutral Atom

For the atoms of an element to have no overall charge (i.e. be _____), they must the _____ number of positively-charged _____ as negatively-charged _____. Therefore, the atomic number also tells us the number of electrons in an atom as well as its number of _____.

Atomic Number = Number of Protons = Number of Electrons

For example:

A carbon atom has _____ protons, therefore, it will also have _____ electrons in order to maintain an overall neutral charge.

Activity 3: Bohr Diagrams

Bohr diagrams show a simplified arrangement of _____ as they orbit the nucleus. To create a Bohr diagram:

1) Find the element and its symbol using the periodic table. The steps below use the element carbon as a worked example.

Name: _____ Period: _____ Date: _____

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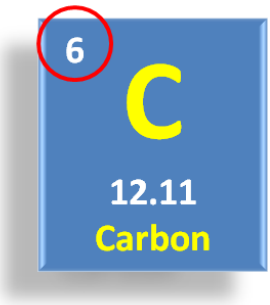


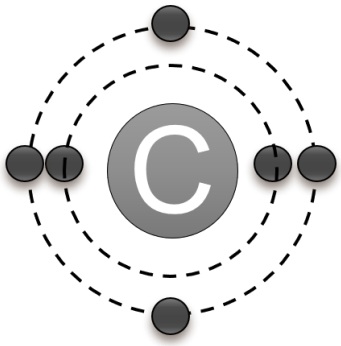
2) Determine the number of electrons using the _____ _____.
   This tells you how many electrons to draw.

3) Determine which period the element is in.
   - Elements in the 1st period have _____ energy level.
   - Elements in the 2nd period have _____ energy levels, and so on.

4) Draw a nucleus with the element symbol inside.

5) Draw the shells around the nucleus.
   - Carbon is in the 2nd period, so it has _____ energy levels, or shells.

6) Draw the electrons.
   - Carbon has _____ electrons. The first shell can only hold 2 electrons.
   - Since you have 2 electrons already drawn, you need to add ____ more electrons. These go in the 2nd shell.
   - These 4 electrons are called _____ electrons because they are found in the _____ shell for this element.



Important:

Only _____ electrons can fit in the 1st shell.

The 2nd shells can hold up to _____ electrons.

The 3rd shell can hold _____, but the elements in the first few periods only use up to 8 electrons.

Draw a Bohr Diagram for the following elements.

a) H **1 electron**	b) He **2 electrons**	c) O **8 electrons**
d) Al **13 electrons**	e) Ne **10 electrons**	f) Ar **18 electrons**

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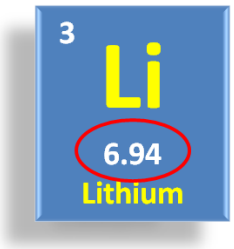
Atomic Mass

Protons are not the only particles which exist in the nucleus. **Neutrons** are also found in the nucleus and contribute to an atom's **mass**. Because the atom's mass is made up of both protons and neutrons, the number of neutrons an atom has can be found by **subtracting** the atomic number (number of **protons**) from the atomic mass. In the image to the right the atomic mass for lithium (Li) has been circled in red.



Atomic Mass = Protons + Neutrons

or

Neutrons = Atomic Mass – Atomic Number

Activity 4:

Use the periodic table on page 2 to complete the summary chart below.

Element	Atomic Number	Atomic Mass	Number of Protons	Number of Neutrons	Number of Electrons
Lithium	3	7			
Aluminum	13			14	
Oxygen	8			8	8
Zinc		65	30		
Cesium	55			78	55
Bromine		80	35		
Lead			82	125	
Gold	79	197			
Nitrogen			7	7	