

# Chemistry Packet

## Periodic Table, Valence Electrons, Periods, Groups, Lewis Diagrams and More!

The collage features a variety of chemistry resources:

- Periodic Tables:** Multiple versions of the periodic table, including a large one with element names and symbols, and several smaller ones with specific elements highlighted or labeled.
- Lewis Diagrams:** Several diagrams showing the arrangement of valence electrons for various elements, including hydrogen, helium, lithium, beryllium, boron, carbon, nitrogen, oxygen, fluorine, neon, sodium, magnesium, aluminum, silicon, phosphorus, sulfur, chlorine, and argon.
- Element Cards:** Numerous cards for individual elements, each showing the element's name, symbol, atomic number, and a small illustration.
- Chemical Symbols:** A list of chemical symbols for various elements, including H, He, Li, Be, B, C, N, O, F, Ne, Na, Mg, Al, Si, P, S, Cl, Ar, K, Ca, Sc, Ti, V, Cr, Mn, Fe, Co, Ni, Cu, Zn, Ga, Ge, As, Se, Br, Kr, Rb, Sr, Y, Zr, Nb, Mo, Tc, Ru, Rh, Pd, Ag, Cd, In, Sn, Sb, Te, I, Xe, Ba, La, Ce, Pr, Nd, Pm, Sm, Eu, Gd, Hf, Ta, W, Re, Os, Ir, Pt, Au, Hg, Tl, Pb, Bi, Po, At, Rn, Fr, Ra, Ac, Th, Pa, U, Np, Pu, Am, Cm, Bk, Cf, Es, Fm, Md, No, Lr, and 104.
- Chemical Formulas:** Several chemical formulas are listed, including H<sub>2</sub>O, CO<sub>2</sub>, CH<sub>4</sub>, NH<sub>3</sub>, HCl, H<sub>2</sub>SO<sub>4</sub>, HNO<sub>3</sub>, H<sub>2</sub>O<sub>2</sub>, H<sub>2</sub>CO<sub>3</sub>, H<sub>2</sub>PO<sub>4</sub><sup>-</sup>, H<sub>2</sub>PO<sub>3</sub><sup>-</sup>, H<sub>2</sub>PO<sub>2</sub><sup>-</sup>, H<sub>2</sub>PO<sub>4</sub><sup>2-</sup>, H<sub>2</sub>PO<sub>3</sub><sup>2-</sup>, H<sub>2</sub>PO<sub>2</sub><sup>2-</sup>, H<sub>2</sub>PO<sub>4</sub><sup>3-</sup>, H<sub>2</sub>PO<sub>3</sub><sup>3-</sup>, H<sub>2</sub>PO<sub>2</sub><sup>3-</sup>, H<sub>2</sub>PO<sub>4</sub><sup>4-</sup>, H<sub>2</sub>PO<sub>3</sub><sup>4-</sup>, H<sub>2</sub>PO<sub>2</sub><sup>4-</sup>, H<sub>2</sub>PO<sub>4</sub><sup>5-</sup>, H<sub>2</sub>PO<sub>3</sub><sup>5-</sup>, H<sub>2</sub>PO<sub>2</sub><sup>5-</sup>, H<sub>2</sub>PO<sub>4</sub><sup>6-</sup>, H<sub>2</sub>PO<sub>3</sub><sup>6-</sup>, H<sub>2</sub>PO<sub>2</sub><sup>6-</sup>, 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H<sub>2</sub>PO<sub>4</sub><sup>121-</sup>, H<sub>2</sub>PO<sub>3</sub><sup>121-</sup>, H<sub>2</sub>PO<sub>2</sub><sup>121-</sup>, H<sub>2</sub>PO<sub>4</sub><sup>122-</sup>, H<sub>2</sub>PO<sub>3</sub><sup>122-</sup>, H<sub>2</sub>PO<sub>2</sub><sup>122-</sup>, H<sub>2</sub>PO<sub>4</sub><sup>123-</sup>, H<sub>2</sub>PO<sub>3</sub><sup>123-</sup>, H<sub>2</sub>PO<sub>2</sub><sup>123-</sup>, H<sub>2</sub>PO<sub>4</sub><sup>124-</sup>, H<sub>2</sub>PO<sub>3</sub><sup>124-</sup>, H<sub>2</sub>PO<sub>2</sub><sup>124-</sup>, H<sub>2</sub>PO<sub>4</sub><sup>125-</sup>, H<sub>2</sub>PO<sub>3</sub><sup>125-</sup>, H<sub>2</sub>PO<sub>2</sub><sup>125-</sup>, H<sub>2</sub>PO<sub>4</sub><sup>126-</sup>, H<sub>2</sub>PO<sub>3</sub><sup>126-</sup>, H<sub>2</sub>PO<sub>2</sub><sup>126-</sup>, H<sub>2</sub>PO<sub>4</sub><sup>127-</sup>, H<sub>2</sub>PO<sub>3</sub><sup>127-</sup>, H<sub>2</sub>PO<sub>2</sub><sup>127-</sup>, H<sub>2</sub>PO<sub>4</sub><sup>128-</sup>, 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H<sub>2</sub>PO<sub>4</sub><sup>143-</sup>, H<sub>2</sub>PO<sub>3</sub><sup>143-</sup>, H<sub>2</sub>PO<sub>2</sub><sup>143-</sup>, H<sub>2</sub>PO<sub>4</sub><sup>144-</sup>, H<sub>2</sub>PO<sub>3</sub><sup>144-</sup>, H<sub>2</sub>PO<sub>2</sub><sup>144-</sup>, H<sub>2</sub>PO<sub>4</sub><sup>145-</sup>, H<sub>2</sub>PO<sub>3</sub><sup>145-</sup>, H<sub>2</sub>PO<sub>2</sub><sup>145-</sup>, H<sub>2</sub>PO<sub>4</sub><sup>146-</sup>, H<sub>2</sub>PO<sub>3</sub><sup>146-</sup>, H<sub>2</sub>PO<sub>2</sub><sup>146-</sup>, H<sub>2</sub>PO<sub>4</sub><sup>147-</sup>, H<sub>2</sub>PO<sub>3</sub><sup>147-</sup>, H<sub>2</sub>PO<sub>2</sub><sup>147-</sup>, H<sub>2</sub>PO<sub>4</sub><sup>148-</sup>, H<sub>2</sub>PO<sub>3</sub><sup>148-</sup>, H<sub>2</sub>PO<sub>2</sub><sup>148-</sup>, H<sub>2</sub>PO<sub>4</sub><sup>149-</sup>, H<sub>2</sub>PO<sub>3</sub><sup>149-</sup>, H<sub>2</sub>PO<sub>2</sub><sup>149-</sup>, H<sub>2</sub>PO<sub>4</sub><sup>150-</sup>, H<sub>2</sub>PO<sub>3</sub><sup>150-</sup>, H<sub>2</sub>PO<sub>2</sub><sup>150-</sup>, H<sub>2</sub>PO<sub>4</sub><sup>151-</sup>, H<sub>2</sub>PO<sub>3</sub><sup>151-</sup>, H<sub>2</sub>PO<sub>2</sub><sup>151-</sup>, H<sub>2</sub>PO<sub>4</sub><sup>152-</sup>, H<sub>2</sub>PO<sub>3</sub><sup>152-</sup>, H<sub>2</sub>PO<sub>2</sub><sup>152-</sup>, H<sub>2</sub>PO<sub>4</sub><sup>153-</sup>, H<sub>2</sub>PO<sub>3</sub><sup>153-</sup>, H<sub>2</sub>PO<sub>2</sub><sup>153-</sup>, H<sub>2</sub>PO<sub>4</sub><sup>154-</sup>, H<sub>2</sub>PO<sub>3</sub><sup>154-</sup>, H<sub>2</sub>PO<sub>2</sub><sup>154-</sup>, H<sub>2</sub>PO<sub>4</sub><sup>155-</sup>, H<sub>2</sub>PO<sub>3</sub><sup>155-</sup>, H<sub>2</sub>PO<sub>2</sub><sup>155-</sup>, H<sub>2</sub>PO<sub>4</sub><sup>156-</sup>, H<sub>2</sub>PO<sub>3</sub><sup>156-</sup>, H<sub>2</sub>PO<sub>2</sub><sup>156-</sup>, H<sub>2</sub>PO<sub>4</sub><sup>157-</sup>, H<sub>2</sub>PO<sub>3</sub><sup>157-</sup>, H<sub>2</sub>PO<sub>2</sub><sup>157-</sup>, H<sub>2</sub>PO<sub>4</sub><sup>158-</sup>, H<sub>2</sub>PO<sub>3</sub><sup>158-</sup>, H<sub>2</sub>PO<sub>2</sub><sup>158-</sup>, H<sub>2</sub>PO<sub>4</sub><sup>159-</sup>, H<sub>2</sub>PO<sub>3</sub><sup>159-</sup>, H<sub>2</sub>PO<sub>2</sub><sup>159-</sup>, H<sub>2</sub>PO<sub>4</sub><sup>160-</sup>, H<sub>2</sub>PO<sub>3</sub><sup>160-</sup>, H<sub>2</sub>PO<sub>2</sub><sup>160-</sup>, H<sub>2</sub>PO<sub>4</sub><sup>161-</sup>, H<sub>2</sub>PO<sub>3</sub><sup>161-</sup>, H<sub>2</sub>PO<sub>2</sub><sup>161-</sup>, H<sub>2</sub>PO<sub>4</sub><sup>162-</sup>, H<sub>2</sub>PO<sub>3</sub><sup>162-</sup>, H<sub>2</sub>PO<sub>2</sub><sup>162-</sup>, H<sub>2</sub>PO<sub>4</sub><sup>163-</sup>, H<sub>2</sub>PO<sub>3</sub><sup>163-</sup>, H<sub>2</sub>PO<sub>2</sub><sup>163-</sup>, H<sub>2</sub>PO<sub>4</sub><sup>164-</sup>, H<sub>2</sub>PO<sub>3</sub><sup>164-</sup>, H<sub>2</sub>PO<sub>2</sub><sup>164-</sup>, H<sub>2</sub>PO<sub>4</sub><sup>165-</sup>, H<sub>2</sub>PO<sub>3</sub><sup>165-</sup>, H<sub>2</sub>PO<sub>2</sub><sup>165-</sup>, H<sub>2</sub>PO<sub>4</sub><sup>166-</sup>, H<sub>2</sub>PO<sub>3</sub><sup>166-</sup>, H<sub>2</sub>PO<sub>2</sub><sup>166-</sup>, H<sub>2</sub>PO<sub>4</sub><sup>167-</sup>, H<sub>2</sub>PO<sub>3</sub><sup>167-</sup>, H<sub>2</sub>PO<sub>2</sub><sup>167-</sup>, H<sub>2</sub>PO<sub>4</sub><sup>168-</sup>, H<sub>2</sub>PO<sub>3</sub><sup>168-</</sup>

As you know, we love hands-on activities and I want to show you some of the fun ways we explored the periodic table and touched on topics like valence electrons, Bohr Diagrams, Lewis Diagrams (electron dot diagrams), ions, isotopes, and more!

Some of the topics we explored included:

- **Building the Periodic Table**
- **Bohr Diagrams & Understanding Valence Electrons**
- **Periods, Groups & Families**
- **hydrogen & the alkali metals, alkaline Earth metals, halogens, noble gases**
- **Atomic Number, Atomic Mass & Chemical Symbols**
- **Lewis Diagrams**
- **Metals, Metalloids and Nonmetals**
- **Unusual Element Symbols**
- **Trends of the Periodic Table**
- **Electron Configuration**

We did this unit together when the kids were 10, 12 and 14. I think this unit is best for middle school and up (perhaps as a supplement to for high schoolers being introduced to chemistry for the first time).

# Chemistry Packet

Building the Periodic Table; Bohr Diagrams & Understanding Valence Electrons; Periods, Groups & Families; hydrogen & the alkali metals, alkaline Earth metals, halogens, noble gases; Atomic Number, Atomic Mass & Chemical Symbols; Lewis Diagrams; Metals, Metalloids and Nonmetals; Covalent and Ionic Bonds; Unusual Element Symbols; Trends of the Periodic Table

## Who came up with the periodic table?

The periodic table was first developed by the Siberian chemist, Dmitri Mendeleev in 1869. It was constructed to organize the elements by their properties.

He knew a lot more about the properties of the elements than you might (or the scientist), so he gave you some hints as you start organizing the periodic table for yourself!

## Build your own periodic table:

One of our first activities will be to build our own simple periodic table. This will include only the first 38 elements.

You will need a large piece of butcher paper or a blank poster board.

Print out the elements:

## Color the elements:

You can color the images (pictures) any way you want to, but color the background areas these colors:

**Yellow:** Li (Lithium), Na (Sodium)

**Orange:** H (Hydrogen), C (Carbon), N (Nitrogen), O (Oxygen), P (Phosphorus), S (Sulfur), Se (Selenium)

**Grey:** Be (Beryllium), Mg (Magnesium), Ca (Calcium)

**Blue:** B (Boron), Ti (Titanium), V (Vanadium), Cr (Chromium), Mn (Manganese), Fe (Iron), Co (Cobalt), Ni (Nickel), Cu (Copper), Zn (Zinc)

**Green:** Al (Aluminum), Si (Silicon), Ge (Germanium), As (Arsenic)

**Bright Pink:** F (Fluorine), Cl (Chlorine), Br (Bromine)

**Silver:** He (Helium), Ne (Neon), Ar (Argon)

**Turquoise:** K (Potassium), Ga (Gallium)

## Group and Observe:

Cut out all your cards. Group them together by color. On the Observation Sheet, write down anything you notice about the elements that are in that color group. (Take a look at the picture below)

## Construction:

Draw, left to right, and top to bottom, what you see when you look at the elements.

The Periodic Table of Elements

## Group 1: Hydrogen and the Alkali Metals

Hydrogen is the simplest and lightest of all the elements.

Hydrogen is extremely flammable.

It is the least abundant element in the universe. On Earth, hydrogen exists as a gas. Hydrogen is not an alkali metal, but is placed above group 1 in the periodic table because it has an electron configuration that is similar to the alkali metals.

**Alkali Metals** are all low-density, soft metals. They include:

Li  
Na  
K  
Rb  
Cs  
Fr

Alkali metals are extremely reactive!

As soon as they come into contact with moist air, a violently explosive reaction occurs. These metals are characterized by their soft texture and silvery color. (Alkali is produced in the right.)

They also have low boiling and melting points and are less dense than most elements.

They need to donate their electrons in reactions and have an oxidation state of +1. (Alkali is produced in the right.)

What do you notice about the diagrams below? What do each of the diagrams show?

Look at the periodic table. Which elements are placed?

The diagrams shown are called Bohr Diagrams. They were introduced by Niels Bohr in 1913. We will talk about them in more detail a little later in this unit!

## Group 2: Alkaline Earth Metals

The Alkaline Earth Metals are another group of soft metals. They include:

Be  
Mg  
Ca  
Sr  
Ba  
Ra

These are also found right below hydrogen.

Look at the Bohr Diagrams below. How many electrons do you see in the outer shell?

Look at the periodic table. Which elements are placed?

Look at the periodic table. Which elements are placed?

Look at the periodic table. Which elements are placed?

Look at the periodic table. Which elements are placed?

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# Chemistry Unit, Activity 1: Building the Periodic Table

Who came up with the periodic table?

The periodic table was first developed by the Siberian chemist, Dmitri Mendeleev in 1869. It was constructed to organize the elements by their properties.

Do have a lot more about the properties of the elements than you might (at the moment), so we'll give you some hints as you start organizing the periodic table for yourself!

**Build your own periodic table:**

One of our first activities will be to build our own simple periodic table. This will include only the first 26 elements.

You will need a large piece of butcher paper or a blank poster board.

Take the print out of the elements and color them as instructed below:

**Color the elements:**

You can color the images (pictures) any way you want to, but color the background areas these colors:

**Yellow:** Li (Lithium), Na (Sodium), K (Potassium)

**Orange:** H (Hydrogen), C (Carbon), N (Nitrogen), O (Oxygen), P (Phosphorus), S (Sulfur), Se (Selenium)

**Grey:** Be (Beryllium), Mg (Magnesium), Ca (Calcium)

**Blue:** Si (Silicon), Ti (Titanium), V (Vanadium), Cr (Chromium), Mn (Manganese), Fe (Iron), Co (Cobalt), Ni (Nickel), Cu (Copper), Zn (Zinc)

**Green:** B (Boron), Al (Aluminum), Ga (Gallium), In (Indium)

**Bright Pink:** F (Fluorine), Cl (Chlorine), Br (Bromine)

**Silver:** He (Helium), Ne (Neon), Ar (Argon), Kr (Krypton)

**Transparent or Light Blue:** Li (Lithium), Cs (Cesium)

**Group and Observe:**

Cut out all your cards. Group them together by color. On the Observation Sheet, write down anything you notice about the elements that are in that color group. (Take a look at the pictures too!)

1 HYDROGEN H	2 HELIUM He	3 LITHIUM Li
4 BERYLLIUM Be	5 BORON B	6 CARBON C
7 NITROGEN N	8 OXYGEN O	9 FLUORINE F

19 POTASSIUM K	20 CALCIUM Ca	21 SCANDIUM Sc
22 TITANIUM Ti	23 VANADIUM V	24 CHROMIUM Cr
25 MANGANESE Mn	26 IRON Fe	27 COBALT Co

Print out student worksheet, **Examine the Bohr Diagrams**, (page 24) and have them do the activity together.

Day 6: Information on the Periodic Table - Atomic Number, Atomic mass, symbol. Print out the periodic table on page 28 for the students to use as a reference page for this activity.

Day 7 & 8: You can have the students complete the quiz on page 29. There are two copies, since it is quite short. The answers are provided on page 30.

**Colors of the Periodic Table:** (student pages are on 15, 16, 17, 18, 19) Go over some of the colors of the periodic table in more detail. Alkali metals, alkaline Earth metals, halogens, noble gases, transition metals, etc.

**Element Observation Page:** Write down anything you notice about the elements that are in each color group. Can you figure out which groups are the metals, nonmetals, noble gases, transition metals, etc.?

Yellow	Orange	Grey
Blue	Green	Bright Pink
Silver	Transparent	

There are colors for the elements of these groups:

- Alkali metals
- Alkaline earth metals
- Transition metals
- Nonmetals
- Metals
- Metalloids
- Noble gases

## Chemistry Packet

### Notes to Teacher:

In the "Build the Periodic Table" activity before bringing out the actual Periodic Table! We did not spend time looking at the Periodic Table before doing this activity, though they learn what it is because we have talked about chemistry before. I found the kids to understand how complicated it was to devise a system that was logical and made sense!

### General Teaching Plan for this Unit:

Day 1: Materials for the Students: Print out pages 4, 7, 8, 10, 11, 12.

Have the students color and cut out the elements. (Perhaps do this beforehand.)

Build the Periodic Table & the Observation Sheet.

Day 2: Materials for the Students: Print out page 13.

Go over the parts of the atom, try to identify some of the elements. Have the students build the periodic table before this previous day.

Day 3: Have the students construct their periodic table again & give the elements onto a large piece of butcher paper or poster board. Have the students bring out their Element Observation Page (page 6) and explain that the groups have different names. Have the students write the names of the groups on their page (i.e. the yellow group is the Alkali Metals). Each group has different properties. The Alkali Metals, for example are very reactive.

Day 4: Materials for the Students: Print out pages 17, 18, 19 on cardstock and cut out.

Bohr Diagrams - Mix the cards up, have them lay the cards on top of the elements on their Periodic Table Project.

What do they notice about the diagrams? (Each Bohr diagram adds one electron. The colors each have the same number of electrons in the outer shell.)

Day 5: Materials for the Students: Print out pages 20-22 Have the students cut out the Bohr Diagrams on the sheet provided.

Print out student worksheet, **Examine the Bohr Diagrams**, (page 24) and have them do the activity together.

Day 6: Information on the Periodic Table - Atomic Number, Atomic mass, symbol. Print out the periodic table on page 28 for the students to use as a reference page for this activity.

Day 7 & 8: You can have the students complete the quiz on page 29. There are two copies, since it is quite short. The answers are provided on page 30.

**Colors of the Periodic Table:** (student pages are on 15, 16, 17, 18, 19) Go over some of the colors of the periodic table in more detail. Alkali metals, alkaline Earth metals, halogens, noble gases, transition metals, etc.

Teacher Notes:

### Build the Periodic Table Activity

#### Notes to Teacher:

Be sure to do this activity before bringing out the Periodic Table! I wanted the kids to understand how complicated it was to devise a system that was logical and made sense! So, we did not spend time looking at the Periodic Table before doing this activity.

**Getting Ready for the Activity:** I had my kids spend several days coloring the elements (using the "Color the Elements" key on the previous page) while we did other readings.

We only colored one set of elements, though you can have each of your kids color and build their own periodic table if you want (or a teacher can do this in small groups).

The colors that I chose correspond with the printable chart I included in this packet on page 20, but DO NOT show this to your kids yet!



#### About the cards:

In the lower right corner, the elements in the first group (column) (Alkali Metal Group) has one small electron in the lower left corner. This is there to help the kids to realize why H (Hydrogen) will go in the first column. Let them figure that out for themselves, though!

All the cards have a S, G, or L in the right hand corner - this stands for solid, liquid or gas (at room temperature).

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# Hands-On Chemistry Activities

## The Periodic Table



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# Chemistry Unit: Learning about the parts of the atom & valence electrons

What is an atom? \_\_\_\_\_

What parts make up an atom?

Central part of the atom: \_\_\_\_\_

Positively charged particle found in the nucleus: \_\_\_\_\_

Negatively charged particle found in the cloud region of the atom: \_\_\_\_\_

Neutral charge: \_\_\_\_\_

For years, scientists have been looking for pure substances that they call \_\_\_\_\_  
These elements have just one kind of \_\_\_\_\_

Do you know any of the elements? We'll give you a hint with some of the symbols below of the first 20 elements!

H	He								
Li	Be	B	C	N	O	F	Ne		
Na	Mg	Al	Si	P	S	Cl	Ar		
K	Ca								

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

The columns on the periodic table are called \_\_\_\_\_ Elements in similar electron structure, so they exhibit similar chemical behavior.

The rows on the periodic table are called \_\_\_\_\_

The periodic table above only has the first 20 elements. It does not include any of the \_\_\_\_\_

Elements that exhibit similar chemical behavior are called \_\_\_\_\_

of the different families has a different color.

## Introducing Valence Electrons with Bohr Diagrams:

Over the years, scientists have developed different models of atoms. Two thousand years ago, philosopher, Democritus, pictured atoms as solid and indivisible.

In the 1600s and 1700s early chemists started performing different experiments and new models developed such as the "plum pudding" model developed by J.J. Thomson.

In the late 18th and early 19th century, John Dalton summarized the works of earlier chemists theory:

1. All matter is made of tiny indivisible particles called atoms.
2. All atoms of the same element have identical properties including identical mass.
3. Atoms of different elements have different properties, including different mass.
4. Atoms combine in the fixed whole number ratios to form compounds.
5. A specific compound is always made up of atoms in a specific proportion.

Valence electrons are electrons in the highest energy level of an atom. These are probably the most important part of the atom because they determine the reactivity of the element.

In 1913 Niels Bohr and Ernest Rutherford depicted the atom with electrons orbiting the nucleus, just as a planet orbits the sun. Bohr used the term energy levels (or shells) to describe these orbits of differing energy.

Lewis, G.N. and his colleagues' "Chemical Principles" showed this planetary model is too specific, but it is still useful because this model is simpler and easier to understand. The Bohr model is still commonly taught to introduce students to quantum mechanics or energy level diagrams before moving on to the more accurate, but more complex, valence shell model.

## Using the Bohr Diagram Cards

We used Bohr Diagrams to help the kids see the patterns (of valence electrons) that emerge when they lay them out on top of their Periodic Table.

Print out the cards on the next page on cardstock. Cut them out.

Have students construct their periodic table with their colored element cards.

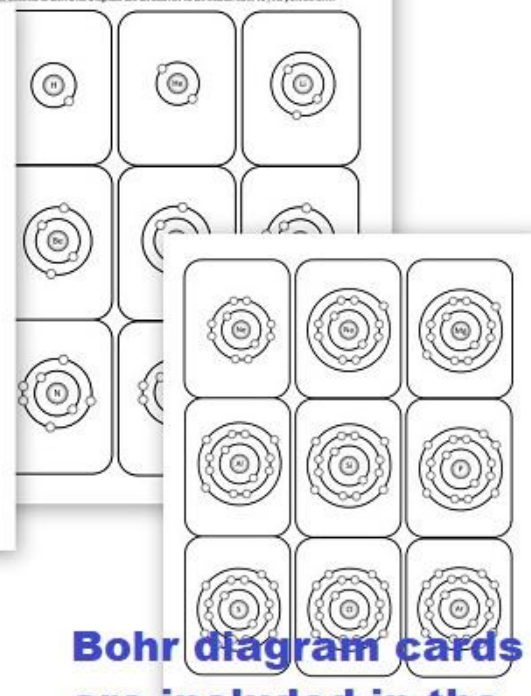
Then have students place the 20 Bohr Diagram cards on top of the elements.

Observe. What patterns do they notice? Have students jot down any patterns they see on their element observation page.

The will probably quickly notice that the elements in group 1, each have 1 electron in the outer shell. Group 2 has two electrons in the outer shell and so forth.



Place these cards on top of the elements on your Periodic Table. What do you notice about the number of electrons in these Bohr Diagrams and the numbers on the element cards on your periodic table?

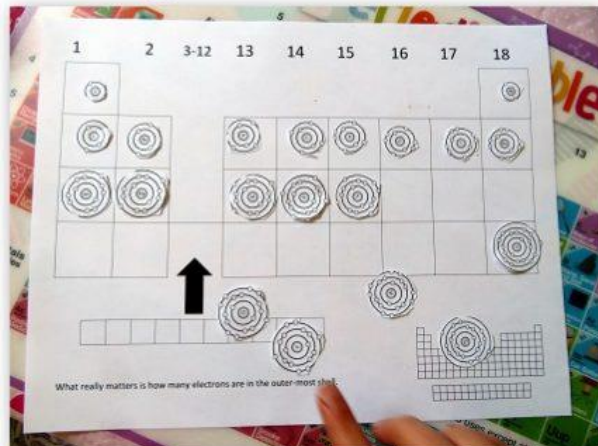


**Bohr diagram cards are included in the packet - 1 (hydrogen) thru 20 (calcium)**

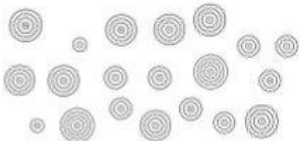
## Hands-On Chemistry Cards!



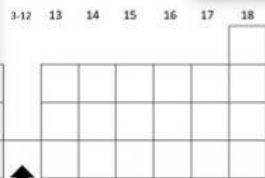
# Bohr Diagrams & Valence Electrons - Cut & Paste Activity; Worksheet



Cut out the Bohr Diagrams below and glue them into the blank periodic table on the next page.



These Bohr diagrams will be used to determine the number of valence electrons in each element. They will be used to determine the number of valence electrons in each element.



What really matters is how many electrons are in the outer-most shell.

Examine the Bohr Diagrams

How many electrons are in the outer shell of the...

1st Group? \_\_\_\_\_

2nd Group? \_\_\_\_\_

3rd Group? \_\_\_\_\_

4th Group? \_\_\_\_\_

5th Group? \_\_\_\_\_

What is the pattern? \_\_\_\_\_

How many shells are in the first period? \_\_\_\_\_

2nd period? \_\_\_\_\_

3rd period? \_\_\_\_\_

4th period? \_\_\_\_\_

What is the pattern? \_\_\_\_\_

How many valence electrons does each element below have?

oxygen \_\_\_\_\_

nitrogen \_\_\_\_\_

calcium \_\_\_\_\_

potassium \_\_\_\_\_

carbon \_\_\_\_\_

aluminum \_\_\_\_\_

chlorine \_\_\_\_\_

calcium \_\_\_\_\_

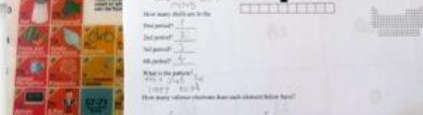
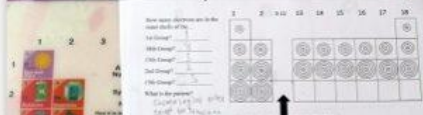
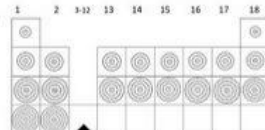
magnesium \_\_\_\_\_

arsenic \_\_\_\_\_

iodine \_\_\_\_\_

hydrogen \_\_\_\_\_

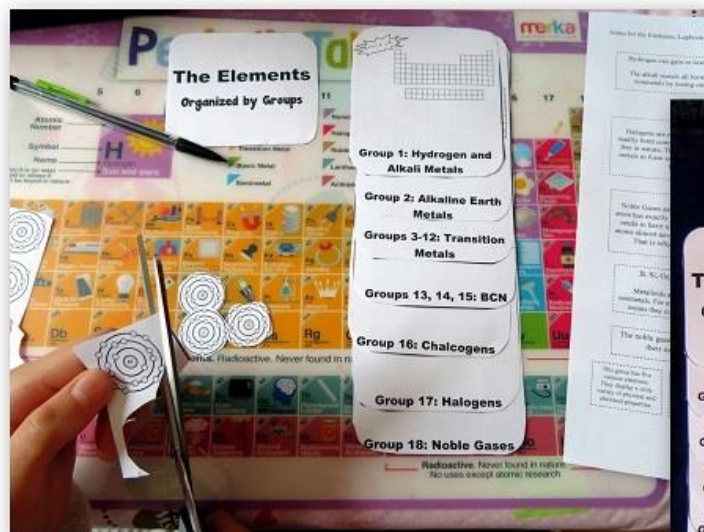
beryllium \_\_\_\_\_



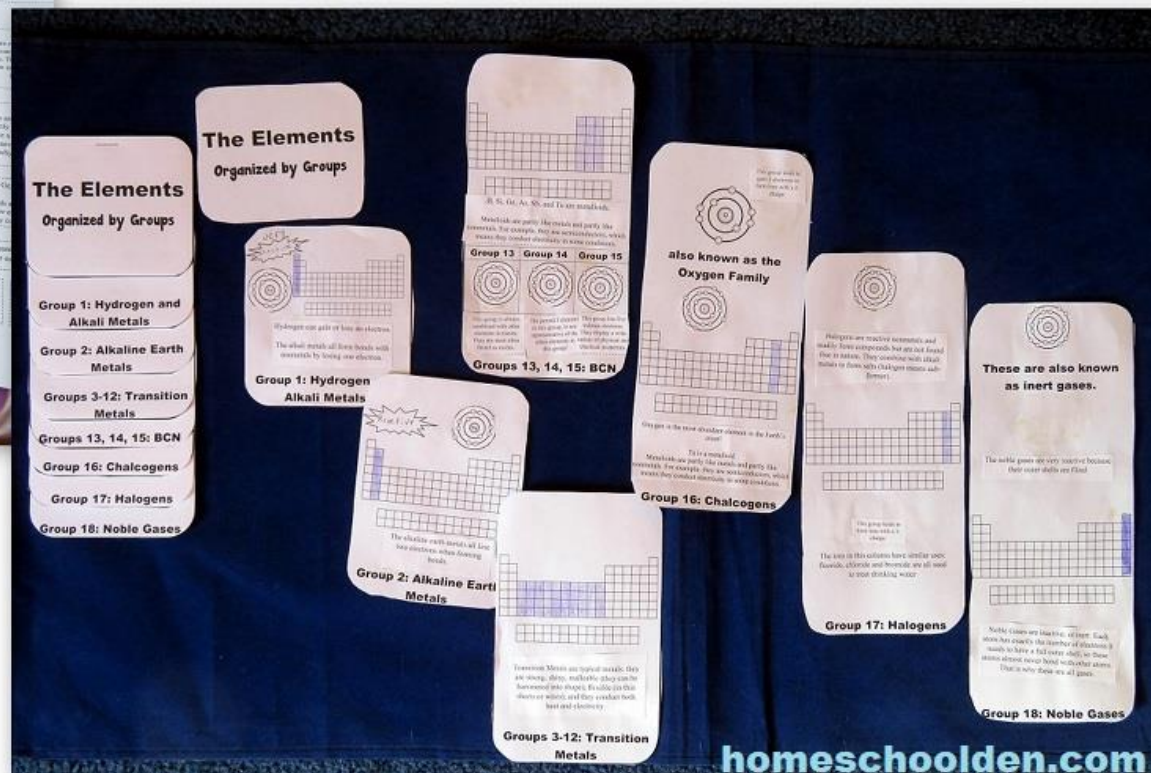
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# Chemistry - Interactive Notebook Piece



## The Elements Organized by Groups





# Chemistry Worksheets on Hydrogen & the Alkali Metals, the Alkaline Earth Metals, Halogens & the Noble Gases

**Group I: Hydrogen and the Alkali Metals** Name: \_\_\_\_\_


**I** Hydrogen is the simplest and lightest of all the elements. Hydrogen is extremely \_\_\_\_\_. It is the most abundant element in the \_\_\_\_\_. On Earth, hydrogen exists as a \_\_\_\_\_. Hydrogen is not an alkali metal but is placed above group in the periodic table because it has an \_\_\_\_\_ configuration that is similar to the alkali metals. Alkali Metals are all low-density, \_\_\_\_\_ metals. They include \_\_\_\_\_.

Alkali metals are extremely reactive! As soon as they come into contact with most anything, a violently explosive reaction follows! Each element in this family burns a different color: lithium flames are crimson, sodium flames are \_\_\_\_\_, potassium flames are violet, rubidium flames are reddish-violet, and cesium flames are \_\_\_\_\_. These metals are characterized by their \_\_\_\_\_ texture and \_\_\_\_\_ color. (Lithium is pictured to the right.) They also have low \_\_\_\_\_ and \_\_\_\_\_ points and are less dense than most elements. They tend to donate their electrons in reactions and have an oxidation state of +1. This sounds complicated, but if you look at the diagrams below, you might be able to figure out what this means!!!

What do you notice about the diagrams below? What do each of the diagrams have in common?

Which elements are pictured in the diagram above?

The diagrams above are called Bohr Diagrams. They were introduced by Niels Bohr and Ernest Rutherford in 1913. We will talk about them in more detail a little later in this unit!




**Group II: Alkaline Earth Metals** Name: \_\_\_\_\_

**II** The Alkaline Earth Metals are another group of soft metals. Magnesium is pictured to the right. The alkaline earth metals react easily and burn brightly, though they are slightly less reactive than the alkali metals. These are often found tightly bonded to oxygen.

Look at the Bohr Diagrams below: How many electrons do you see in the outer ring?

Look at the symbols above. Which elements are pictured?

Beryllium	Magnesium	Calcium
Strontium	Barium	Radium



**Group XVII: Halogens** Name: \_\_\_\_\_


**XVII** The halogens are poisonous \_\_\_\_\_. Halogens are very \_\_\_\_\_ and are never found in their pure form in nature. The reactivity of the halogens \_\_\_\_\_ as the atomic number increases. They are poor conductors of electricity. When halogens combine with \_\_\_\_\_ metals, they form a family of chemical compounds called \_\_\_\_\_. Halogen means "salt-former."

Look at the Bohr Diagrams below:

What is the name of the element above?

Which element is this?

\_\_\_\_\_ is very rare, very radioactive and has no uses. \_\_\_\_\_ is added to salt to reduce thyroid disease. It wounds. It can also be used as a film developer and as a disinfectant. \_\_\_\_\_ is added to toothpaste and water to prevent yellowish potassium gas. \_\_\_\_\_ is added to water supplies and swimming pools used in bleach and salt. It is a greenish poisonous gas. \_\_\_\_\_ is used as a gasoline additive, photographic insecticide. It is used to kill germs in water supplies. It is a dark \_\_\_\_\_.



**Group XVIII: Noble Gases** Name: \_\_\_\_\_

**XVIII** The noble gases are \_\_\_\_\_. They are extremely \_\_\_\_\_. Helium and neon will not join with any other elements. A few of the others can be caused into combining with another element. When an electrical current is passed through one of these gases it will glow in a characteristic color. Neon has an orange-red glow. Why are the noble gases so stable? Their outer shells are complete and they do not want to lose or become electrons.


Look at the Bohr Diagrams below: How many electrons do you see in the outer ring? How many shells does each atom have?

What is the name of the element above?

Which period is each in?

Which element is this?

\_\_\_\_\_ is used in lights because it gives an orange or red color. \_\_\_\_\_ is a toxic gas that can build up in homes. There are special detectors that people can use to detect this gas in their houses. It can cause lung cancer. They use isotopes of \_\_\_\_\_ used in camera flashes and x-ray machines. \_\_\_\_\_ can also be used to fill balloons, weather balloons and weather balloons. \_\_\_\_\_ is the gas used to fill light bulbs and fluorescent tubes. It is used as a gas in welding. It is used in Geiger counters, which are devices that detect radiation.



iron Fe lead Pb

mercury Hg copper Cu

silver Ag

gold Au

potassium K

## Unusual Element Symbols Matching

1. tin a. K  
2. silver b. Sn  
3. antimony c. Au  
4. potassium d. Fe  
5. iron e. Sb  
6. tungsten f. Cu  
7. lead g. Ag  
8. gold h. W  
9. mercury i. Pb  
10. copper j. Hg

## Unusual Element Symbols Matching

1. Fe a. gold  
2. Au b. tungsten  
3. Cu c. potassium  
4. Hg d. silver  
5. Ag e. copper  
6. K f. antimony  
7. W g. tin  
8. Pb h. mercury  
9. Sb i. lead  
10. Sn j. iron

## Trends in the Periodic Table

## Trends in chemical activity:

Metals tend to become more chemically active to the left and as you go down. As you go to the left, elements don't have to lose as many electrons in order to fill their outer shells.

Nonmetals tend to be more chemically active as you go to the right and up the periodic table.

## Which is more active?

- carbon or oxygen? **oxygen**  
beryllium or lithium? **lithium**  
nitrogen or fluorine? **fluorine**  
rubidium or cesium? **cesium**  
copper or iron? **iron**  
chlorine or iodine? **chlorine**  
calcium or aluminum? **calcium**  
rubidium or strontium? **rubidium**

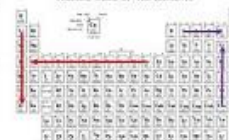
## Trends in mass:

Molar mass increases as you go right and down the periodic table?

## which has more mass?

- lithium or fluorine? **fluorine**  
iron or gold? **gold**  
calcium or barium? **barium**  
oxygen or krypton? **krypton**

PERIODIC TABLE OF THE ELEMENTS



PERIODIC TABLE OF THE ELEMENTS



## Trends in size:

Going down a group, size becomes larger because electrons occupy more distant shells.

However, in the same period, atoms become smaller. Why? Because the nucleus contains more positive charge, so each electron feels a greater attraction to the nucleus.



## Unusual Abbreviations:

lead	Pb
gold	Au
silver	Ag
iron	Fe
mercury	Hg
potassium	K
sodium	Na
tin	Sn

## Family, Period, Group:

The family group of

neon **noble gas**

The period for

magnesium **2**

The group for

iron **8**

sodium **alkali metal**

chlorine **halogen**

lithium **1**

silver **11**

hydrogen **1**

iodine **17**

helium **18**

potassium **1**

tungsten **6**



# Periodic Table -- atomic number, atomic weight, chemical symbols & the element names

Periodic Table

Name: \_\_\_\_\_

Atomic Number

Chemical Symbol

Atomic Mass

Element Name

The atomic number is the number of protons in an atom. This determines the chemical properties of the atom. Normally, an atom has equal numbers of protons and electrons. An ion is a charged atom with more or fewer electrons than protons.

The atomic weight of an element is the average mass of all the isotopes of a certain type. The average number of protons plus neutrons. You can easily estimate the atomic weight: it is usually 2 to 2.5 times the atomic number.

Au	29	00	200.59
		30.974	
sodium	iron	Ca	132.91
Sn	24	126.90	silver
lead	238.029	88	S

Periodic Table

Name: \_\_\_\_\_

Atomic Number

Chemical Symbol

Atomic Mass

Element Name

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79	29	15	80	8
Au	Cu	P	Hg	O
196.97	63.546	30.974	200.59	15.999
gold	copper	phosphorus	mercury	oxygen
11	26	20	55	6
Na	Fe	Ca	Cs	C
22.990	55.845	40.078	132.91	12.011
sodium	iron	calcium	cesium	carbon
50	24	53	47	28
Sn	Cr	I	Ag	Ni
118.710	51.996	126.90	107.87	58.693
tin	chromium	iodine	silver	nickel
82	92	86	16	37
Pb	U	Rn	S	Cl
207.2	238.03	222	32.065	35.453
lead	uranium	radon	sulfur	chlorine

# PERIODIC TABLE OF THE ELEMENTS

The periodic table is organized into groups and periods. The groups are labeled as follows:

- Group 1: Alkali
- Group 2: Alkaline Earth
- Groups 3-10: Transition
- Group 11: Coinage
- Group 12: Coinage
- Groups 13-18: Main Group

The periods are labeled as follows:

- Period 1: 1st
- Period 2: 2nd
- Period 3: 3rd
- Period 4: 4th
- Period 5: 5th
- Period 6: 6th
- Period 7: 7th

The elements are arranged in a grid, with each element represented by its atomic number, symbol, and name. The table is color-coded to show different groups and periods.

# Lewis Diagram Worksheet

Check out the fun way we used this worksheet below!!

**Lewis Diagrams (Electron Dot Diagram)**

In these diagrams, electrons in the outermost energy level of an atom are represented as dots around the element's symbol. These diagrams show the valence electrons (similar to the outer shells of the Bohr Diagrams we talked about earlier).

**How to create your diagram:** Draw an imaginary square around the element's symbol. Place the dots along the edges of the square, placing one dot on each side, then adding a second dot once all the sides are filled.

Ne C As

Li	O	Si	B	Rn
Mg	P	Ca	N	Ge
Cl	S	Ne	Al	Ar
K	F	Si	Kr	B

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Ne C As

Li	O	Si	B	Rn
Mg	P	Ca	N	Ge
Cl	S	Ne	Al	Ar
K	F	Si	Kr	Be

**Answers**

F	Si	Cl
	N	Br
	As	Ga
I	Li	O
P	Ar	S

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## Lewis Diagram Activity!






# Periodic Table - Metals - Nonmetals - Metalloids

Metals, Nonmetals, Metalloids - Ionic & Covalent Bonds

Color in the metals, nonmetals and metalloids.



Atoms combine with other atoms in different ways. There are two types of bonds, ionic and covalent bonds.

**Ionic Bonds are...**

Bonds between \_\_\_\_\_ and \_\_\_\_\_

Metals \_\_\_\_\_ their valence electrons to Nonmetals

Metals become positively charged = \_\_\_\_\_

Non-Metals become more negative = \_\_\_\_\_

**Covalent Bonds are...**

Bonds between \_\_\_\_\_ and \_\_\_\_\_

\_\_\_\_\_ (their electrons to have a full valence shell)

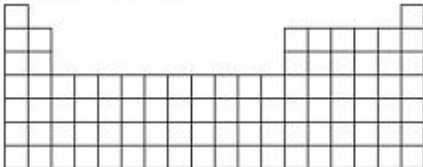
\_\_\_\_\_ bond than ionic

**Ionic Bond**  
Salt - NaCl

**Covalent Bond**  
Water - H<sub>2</sub>O

Metals, Nonmetals, Metalloids - Ionic & Covalent Bonds

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Salt - NaCl

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Water - H<sub>2</sub>O

Metals, Nonmetals, Metalloids - Ionic & Covalent Bonds

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\_\_\_\_\_ (their electrons to have a full valence shell)

\_\_\_\_\_ bond than ionic

**Ionic Bond**  
Salt - NaCl

**Covalent Bond**  
Water - H<sub>2</sub>O

# Chemistry Unit Review!



## Review Card Chemistry - 1

an outer shell electron	valence electron	The groups 3-12 are strong, shiny, malleable, flexible, and conduct both heat and electricity.	transition metals
bonds between metals and nonmetals give their valence electrons to nonmetals	ionic bond	the most abundant element in the Universe	hydrogen
bonds between nonmetals and nonmetals share their electrons to have a full valence shell.	covalent bond	This term means "salt-former."	halogen

these are very reactive and form bonds with nonmetals by losing one electron	alkali metals	These are very reactive and form bonds with nonmetals by losing two electrons when forming bonds	alkaline earth metals
--	---------------	--	-----------------------

## Chemistry Terms Matching

1. alkali earth metals
2. anion
3. valence electron
4. electron
5. transition metals
6. hydrogen
7. ionic bond
8. halogen
9. noble gases
10. neutron
11. atom
12. atomic mass
13. metalloids
14. isotope
15. ion
16. cation
17. proton
18. atomic number
19. covalent bond
20. alkali metals

- a. the number of protons in the nucleus of an atom of an element
- b. an outer shell electron
- c. bonds between metals and nonmetals; metals give their valence electrons to nonmetals
- d. the average mass of all the naturally occurring isotopes in a sample of the element
- e. the most abundant element in the Universe
- f. there are very reactive and form bonds with nonmetals by losing one electron
- g. there are some properties of both metals and nonmetals
- h. positively charged subatomic particle
- i. positive ion which is created by electron loss
- j. The groups 3-12 are strong, shiny, malleable, flexible, and conduct both heat and electricity
- k. there are two electrons when forming bonds
- l. These elements are inactive as ions
- m. bonds between nonmetals and nonmetals; there their electrons to have a full valence shell
- n. smallest particle of an element that retains its identity in a chemical reaction
- o. different forms of an element that have different numbers of neutrons
- p. an electrically charged atom or group of atoms formed by the loss or gain of one or more electrons
- q. negatively charged subatomic particle
- r. this term means "salt-former"
- s. no charge, found in the nucleus of an atom
- t. (negative ion) which is created by electron gain

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# Chemistry: Electron Configuration, Electron Notation

## Electron Configuration

Electron Configuration is the distribution of electrons of an atom in atomic orbitals. Basically, it is a list that shows you where electrons are located.

The electron configuration of hydrogen is  $1s^1$ . The first number, 1, is the energy level of the orbital. The letter, s, is the type of orbital the electron is in. The superscript, 1, tells us how many electrons are in that type of orbital.

Let's build the next electron, helium: helium is still in the 1st energy level and still has the s type of orbital, but there are 2 electrons in that type of orbital.  $1s^2$ .

Lithium will be  $1s^2, 2s^1$  and beryllium will be  $1s^2, 2s^2$ .

When we get to boron, you can see there is a new type of orbital (p). So, boron will be  $1s^2, 2s^2, 2p^1$ .

What will the electron configuration be for...

carbon? \_\_\_\_\_  
nitrogen? \_\_\_\_\_  
oxygen? \_\_\_\_\_  
fluorine? \_\_\_\_\_  
neon? \_\_\_\_\_



You've probably made a logical conclusion... that you are adding one electron referred to as the Aufbau principle.

Aufbau principle:

1. Electrons are placed in the lowest energetically available sublevel.
2. An orbital can hold at most 2 electrons.
3. If two or more energetically equivalent orbitals are available (e.g., spread out before they are paired up (Hund's rule)).

## Electron Notation

Wait! Aufbau Principle, number 2 says, "An orbital can hold at most 2 electrons." But on the previous page, didn't we just write  $1s^2, 2s^2, 2p^2$  for neon?

It will help if we look at Orbital Notation for a moment.

In orbital configuration, we don't have any information about where the electrons are located. Orbital notation shows us that information.

The s sublevels each contain 1 orbital. So, this sublevel can hold a maximum of \_\_\_\_\_ electrons. (Re-read the Aufbau principle above!)

The p sublevels each contain 3 orbitals. This sublevel can hold a maximum of \_\_\_\_\_ electrons.

The d sublevels each contain 5 orbitals. This sublevel can hold a maximum of \_\_\_\_\_ electrons.

The f sublevels each contain 7 orbitals. This sublevel can hold a maximum of \_\_\_\_\_ electrons.

Here is neon again. We're going to spread it out:

$1s^2 \quad 2s^2 \quad 2p^6$

We will draw the orbitals as circles.

We're going to add in the orbitals (circles). We need to draw one circle above the s sublevel and three above the p sublevel. Then we fill them with electrons! One arrow is placed up in the circle, the other arrow is facing down.



Some chemistry courses will have you draw these arrows on a line:



**More about Hund's Rule:** The most stable arrangement of electrons in sublevels is the one with the greatest number of parallel spins.

So, if we create the electron notation for boron it would look like this:



Let's go back and build the electron notation for carbon, nitrogen, oxygen and fluorine. Because of Hund's rule, we add an electron to each orbital before adding a second electron.

carbon:



## Electron Notation

ANSWERS

Wait! Aufbau Principle, number 2 says, "An orbital can hold at most 2 electrons." But on the previous page, didn't we just write  $1s^2, 2s^2, 2p^2$  for neon?

It will help if we look at Orbital Notation for a moment.

In orbital configuration, we don't have any information about where the electrons are located. Orbital notation shows us that information.

The s sublevels each contain 1 orbital. So, this sublevel can hold a maximum of 2 electrons.

The p sublevels each contain 3 orbitals. This sublevel can hold a maximum of 6 electrons.

The d sublevels each contain 5 orbitals. This sublevel can hold a maximum of 10 electrons.

The f sublevels each contain 7 orbitals. This sublevel can hold a maximum of 14 electrons.

Here is neon again. We're going to spread it out:

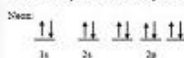
$1s^2 \quad 2s^2 \quad 2p^6$

We will draw the orbitals as circles.

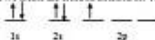
Here is neon again. We're going to add in the orbitals (circles). Then we fill them with electrons! One arrow is placed up in the circle, the other arrow is facing down.



Some chemistry courses will have you draw these arrows on a line:

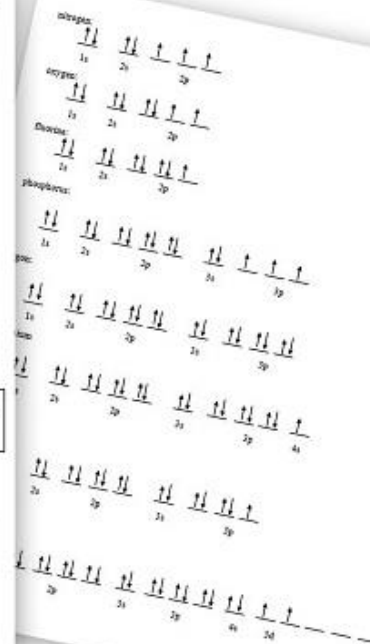
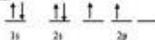


So, if we create the electron notation for boron it would look like this:



Let's go back and build the electron notation for carbon, nitrogen, oxygen and fluorine. Because of Hund's rule, we add an electron to each orbital before adding a second electron. (Why? Atoms are more stable if they have electrons with parallel spins, so we place one electron in each of the orbitals before adding a second electron to the orbital.)

carbon:



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**Who came up with the periodic table?**

The periodic table was first developed by the Russian chemist, Dmitri Mendeleev in 1869. It was constructed in response to the elements for their properties. He knew a lot about the properties of the elements that were known (at the moment), so he gave you some hints as to how they might be related.

**Build your own periodic table:**

One of our first activities will be to build our own simple periodic table. This will include only the first 18 elements.

You will need a large piece of butcher paper or a blank poster board.

Print out the elements.

**Periodic Table of Elements**

**Color the elements:**

You can color the elements (pictures) any way you want to, but color the background areas these colors:

Yellow: 1st (main) Group (Hydrogen)  
Orange: 2nd (main) Group (Helium), 3rd (main) Group (Lithium), 4th (main) Group (Beryllium), 5th (main) Group (Boron), 6th (main) Group (Carbon), 7th (main) Group (Nitrogen), 8th (main) Group (Oxygen), 9th (main) Group (Fluorine), 10th (main) Group (Neon)  
Green: 11th (main) Group (Sodium), 12th (main) Group (Magnesium), 13th (main) Group (Aluminum), 14th (main) Group (Silicon), 15th (main) Group (Phosphorus), 16th (main) Group (Sulfur), 17th (main) Group (Chlorine), 18th (main) Group (Argon)  
Blue: 19th (main) Group (Potassium), 20th (main) Group (Calcium), 21st (main) Group (Scandium), 22nd (main) Group (Titanium), 23rd (main) Group (Vanadium), 24th (main) Group (Chromium), 25th (main) Group (Manganese), 26th (main) Group (Iron), 27th (main) Group (Cobalt), 28th (main) Group (Nickel), 29th (main) Group (Copper), 30th (main) Group (Zinc)  
Red: 31st (main) Group (Gallium), 32nd (main) Group (Germanium), 33rd (main) Group (Arsenic), 34th (main) Group (Selenium), 35th (main) Group (Bromine), 36th (main) Group (Krypton)  
Silver: 37th (main) Group (Rubidium), 38th (main) Group (Strontium), 39th (main) Group (Yttrium), 40th (main) Group (Zirconium), 41st (main) Group (Niobium), 42nd (main) Group (Molybdenum), 43rd (main) Group (Technetium), 44th (main) Group (Ruthenium), 45th (main) Group (Rhodium), 46th (main) Group (Palladium), 47th (main) Group (Silver), 48th (main) Group (Cadmium), 49th (main) Group (Indium), 50th (main) Group (Tin), 51st (main) Group (Antimony), 52nd (main) Group (Tellurium), 53rd (main) Group (Iodine), 54th (main) Group (Xenon)  
Grey: 55th (main) Group (Cesium), 56th (main) Group (Barium), 57th (main) Group (Lanthanum), 58th (main) Group (Cerium), 59th (main) Group (Praseodymium), 60th (main) Group (Neodymium), 61st (main) Group (Promethium), 62nd (main) Group (Samarium), 63rd (main) Group (Europium), 64th (main) Group (Gadolinium), 65th (main) Group (Terbium), 66th (main) Group (Dysprosium), 67th (main) Group (Holmium), 68th (main) Group (Erbium), 69th (main) Group (Thulium), 70th (main) Group (Ytterbium), 71st (main) Group (Lutetium), 72nd (main) Group (Hafnium), 73rd (main) Group (Tantalum), 74th (main) Group (Tungsten), 75th (main) Group (Rhenium), 76th (main) Group (Osmium), 77th (main) Group (Iridium), 78th (main) Group (Platinum), 79th (main) Group (Gold), 80th (main) Group (Mercury), 81st (main) Group (Thallium), 82nd (main) Group (Lead), 83rd (main) Group (Bismuth), 84th (main) Group (Polonium), 85th (main) Group (Astatine), 86th (main) Group (Radon)

**Group and Observe:**

Get out your cards. Group them together by color. On the Observation Sheet, write down anything you notice about the elements that are in that color group. (Take a look at the picture list!)

**Constructing your periodic table:**

We are going to start with the first 18 elements. (See the list of elements in the next page.)

**Periodic Table of Elements**

**Periodic Table of Elements**

**Group 1: Hydrogen and the Alkali Metals**

Hydrogen is the simplest and lightest of all the elements.

Hydrogen is extremely flammable.

In its most abundant natural state, the element, the alkali metals are a gas. Hydrogen is not an alkali metal, but a special group in the periodic table known as the noble gases.

**Alkali Metals** are all very reactive, soft metals. They include:

Li, Na, K, Rb, Cs, Fr

Alkali metals are extremely reactive.

As soon as they come into contact with water, they react violently to produce hydrogen gas.

These metals are characterized by their soft texture and shiny color. (Lithium is a silvery white metal.)

They also have low melting and boiling points and are less dense than most elements.

They react with water to produce hydrogen gas and form an alkaline solution of +1. This makes compounds, but from both the alkali metals, you might be able to figure out what they are!

**What do you notice about the diagrams below?** What do each of the diagrams have in common?

Look at the symbols above. Which elements are present?

The diagrams show an alkali metal. They were introduced by Dmitri Mendeleev and his team in 1869.

**Group 2: Alkaline Earth Metals**

The Alkaline Earth Metals are a group of elements in the periodic table.

These elements are very reactive and form compounds with other elements.

They are also known as the earth metals.

Look at the symbols above. Which elements are present?

Be, Mg, Ca, Sr, Ba, Ra

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**Group 3: Transition Metals**

Transition metals are a group of elements in the periodic table.

These elements are very reactive and form compounds with other elements.

They are also known as the transition metals.

Look at the symbols above. Which elements are present?

Sc, Ti, V, Cr, Mn, Fe, Co, Ni, Cu, Zn, Ga, Ge, As, Se, Br, Kr

**Group 4: Noble Gases**

Noble gases are a group of elements in the periodic table.

These elements are very unreactive and form compounds with other elements.

They are also known as the noble gases.

Look at the symbols above. Which elements are present?

He, Ne, Ar, Kr, Xe, Rn

# Chemistry Packet

## Elements and the Periodic Table

### Groups, Bohr Diagrams, Electron Configuration



**The Elements**

Organized by Groups

These are also known as inert gases.

He, Ne, Ar, Kr, Xe, Rn

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## Chemistry - Interactive Notebook Piece



The Elements Organized by Groups

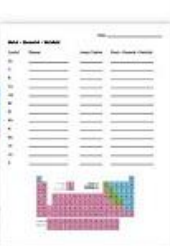
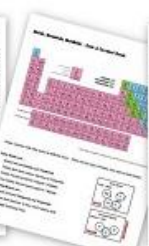
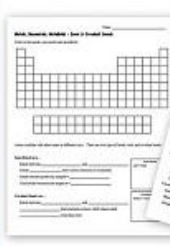
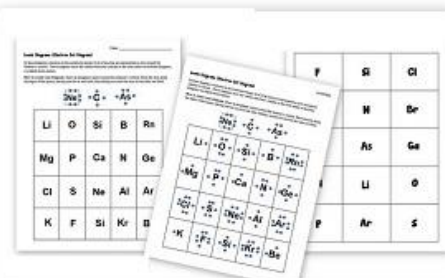


# 75+ page Chemistry Packet

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Bohr diagram cards are included in the packet - 1 (hydrogen) thru 20 (calcium)



## Bohr Diagrams



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## Lewis Diagram Activity!

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