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Periodic Table Puzzle Lab Background Reading

An element is the smallest part of matter that cannot be broken down into simpler forms by chemical means. In the early 19th century, scientists began to arrange elements according to similar physical and chemical properties. The scientist who had the greatest success with this was Dmitri Mendeleev, a Russian chemist. He arranged the elements according to increasing atomic mass, as well as in columns according to similar properties. In this way, he was able to predict elements that were as yet undiscovered through the gaps in his chart. In the early 1900's, Henri Mosely improved Mendeleev's periodic table by arranging it according to similar properties as well as increasing atomic number.

Today's periodic table is arranged according to increasing atomic number and increasing atomic mass (for the most part). It can also be categorized according to the location of metals (the left side of the table), non-metals (the right side of the table), and metalloids (elements that exhibit the properties of both metals and non-metals). For example, some metalloids are poor conductors of electricity at low temperatures, but when heated, they become very good conductors. The metalloid elements are Si, Ge, As, Sb, Te, Po, and At.

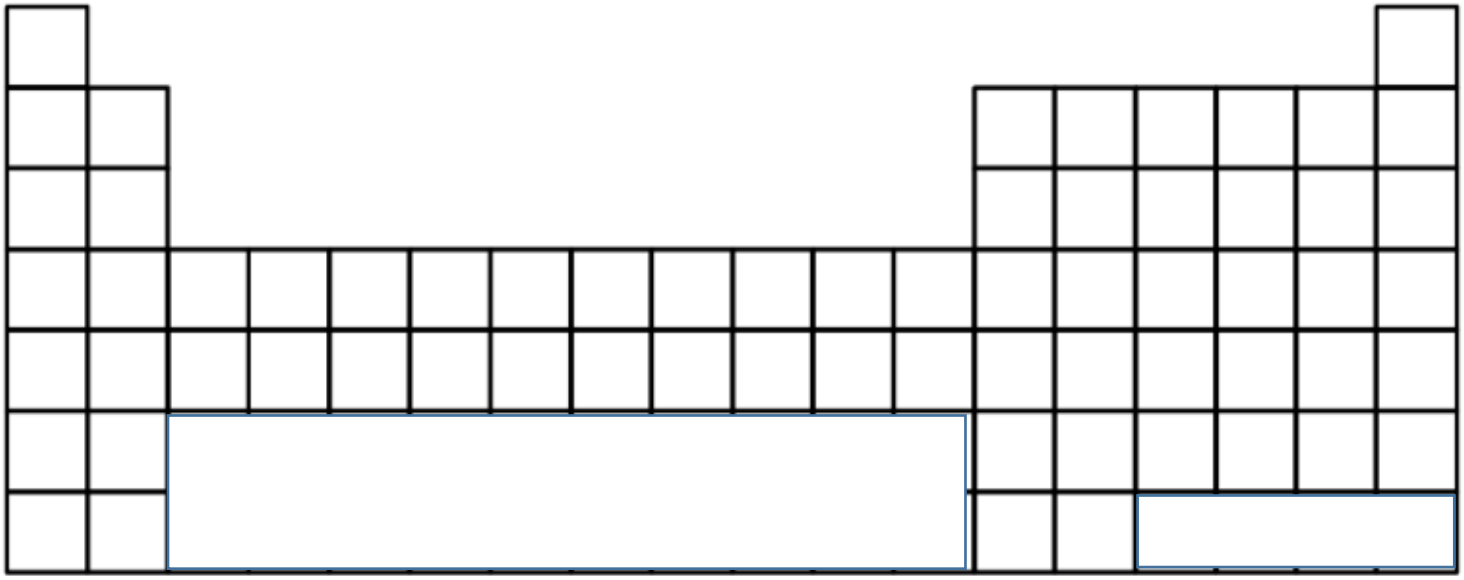
The table has 7 periods, or horizontal rows, and 18 groups.. The groups are the vertical columns. If you look closely at the periods, you will see that all of the elements in a period have the same number of electron energy levels. The first period has 1 electron energy level, the second period has 2 electron energy levels, etc. There is a pattern in the groups as well. All of the elements in group 1 have 1 electron in their outer energy level. All of the elements in group 2 have 2 electrons in their outer energy level; the elements in group 13 have 3 electrons in their outer energy level; the elements in group 14 have 4 electrons in their outer energy level, etc. You might have noticed that groups 3-12 were not included in the trend. That is because they are the transition elements, and the transition elements follow a slightly different trend due to the overlap of energy levels and the way those energy levels fill. The number of electrons in the outer energy level determines the element's chemical properties. Therefore, since all of the elements of a group have the same number of electrons, they will react similarly to each other. The elements in the first group have a special name; they are called the alkali metals. The alkali metals are the most reactive group of metals on the periodic table. Francium is the most reactive of the group; reactivity increases as you go from the top to the bottom of this column.

Group 17 also has a special name. This is the halogen group. The halogen group is the most reactive non-metal group on the periodic table. Fluorine is the most reactive non-metal in this group, and reactivity decreases as you go from the top of the column to the bottom.

Group 18 is known as the noble gas or inert gas group. It has been named this because all of its elements are stable, and unlikely to react or bond with other elements. Notice that all of these elements have 8 electrons in their outer shell (with the exception of He that only has 2 electrons in its outer energy level. This, however, is not really an exception as Helium's single energy level (unexcited) can only hold a maximum of 2 electrons.)

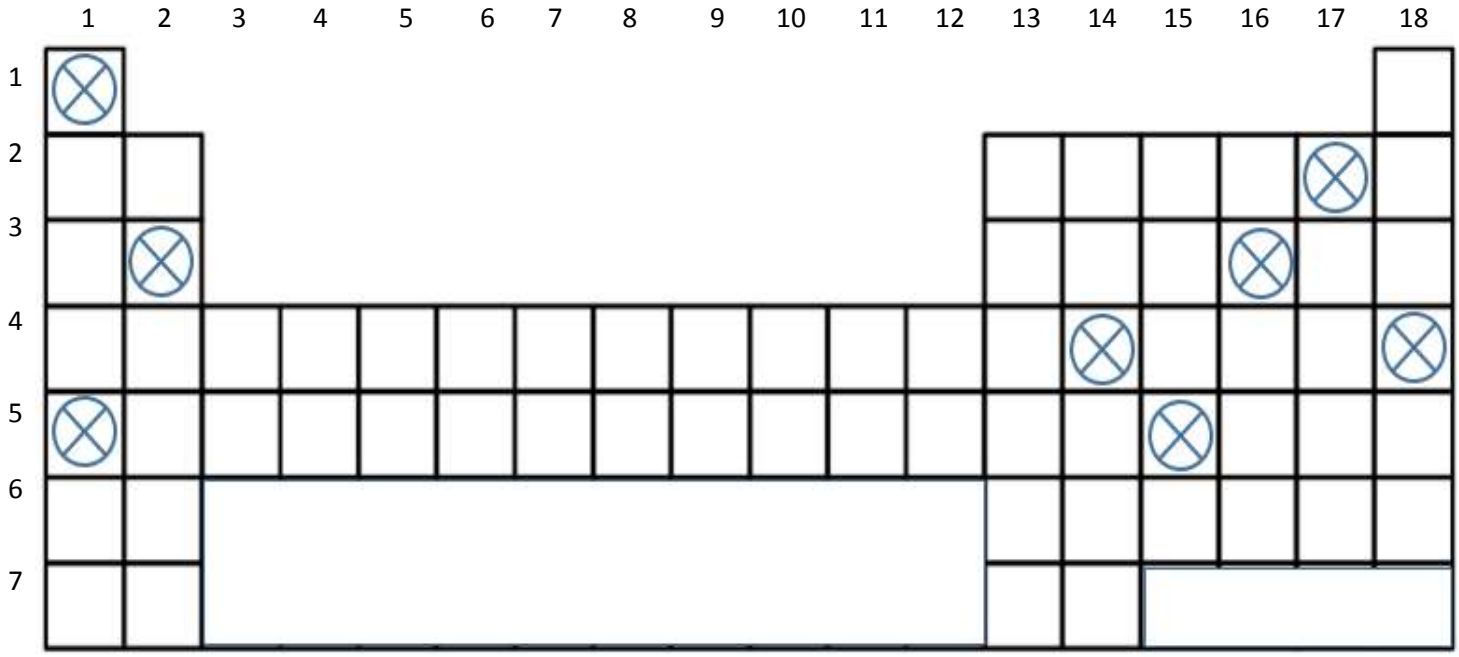
Write you're the **NUMBERS of unknown element squares** in the appropriate boxes below.

Be sure to debate a thoroughly review your selection with peers.



Unknown	Identity	Evidence? (list at least two relevant things from our periodic puzzle)
1		
2		
3		
4		
5		
6		
7		
8		

Notes:



Analyzing the Periodic Table See website if missing any lab data

1. What is the trend for **mass** of the elements as you move across the periods?

   _____

2. What trend do you see regarding **melting point** as you move down the Alkali Metal Group?

   _____

3. What trend to see regarding **melting point** as you move down the Alkaline Metal Group?

   _____

4. What is the general trend regarding **reactivity** as you move from left to right across Periods 4 or 5 (Transition Metal Groups 3-12)?

   _____

5. What is the trend in **ionization** as you move down the Noble Gases Group?

   _____

_____

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Multiple Choice: WRITE ANSWER ON THE LINE

___ Unknown #1 - The strongest evidence for identifying Unknown #1 is …….

A. the *2 outer valence electrons* and *ionization energy falling* between that of **Be and Ca**

B. the *1 outer valence electron* and *high reactivity*

___ Unknown #2 - The strongest evidence for identify Unknown #2 is …….

A. the color *yellow* and that it is a *very poor conductor*

B. *low reactivity and increasing ionization energies as you move down the Group*

___ Unknown #3 - The strongest evidence for identifying Unknown #3 is …….

A. Reactivity listed as *very reactive, good conductivity and density between* ***K and Cs.***

B. Reactivity is very reactive placing it in Group 17 above **Cl**

___ Unknown #4 - The **strongest** evidence for identifying Unknown #4 is …….

A. that the ionization energy alone is clear evidence to classify it as a Noble Gas.

B. that it is a gas, is colorless, has little reactivity & 8 valence electrons.

___ Unknown #5 - The strongest evidence for identifying Unknown #5 is …….

A. the high melting point and yellow color

B. the similar *reactivity* with others in the group along with *density and melting point* falling between ***O* and Se**.

___ Unknown #6 - The evidence for identifying Unknown #6 **based on what we had in lab** is …….

A. a density close to that of *Arsenic* and *decreasing ionization energy* within Group 15.

B. the *valence electrons* and *atomic mass.*

___ Unknown #7 - The strongest evidence for identifying Unknown #7 is …….

A. *ionization energy & melting point* falling between that of *Silicon (Si) and Tin (Sn).*

B. the color similarities found in the Group and same conductivities.

___ ___ Unknown #8 - The strongest evidence for placing or associating Hydrogen with the Alkali metals is …….

A. the *1 outer valence electron* and *high reactivity*

B. its color and metallic properties

C. its density and conductivity

D. its Atomic Mass and Atomic Number

E. the *2 electrons in the outer valence electron* shell and *high reactivity*