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Periodic Table

Name

Today you will learn about the organization of the elements of the periodic table into groups (or families) and periods and the properties of these groups. **Groups (or families)** refer to the **vertical columns** on the periodic table and **periods** refer to the **horizontal rows** on the periodic table. There are **eighteen groups** and **seven periods** on the periodic table.

Periodic Table – Blocks

Elements can be classified by the last energy level that their electrons fill. The first organization you will look at is by blocks. Last chapter you learned about the 4 types of electron orbitals (s, p, d & f) and where these orbitals are on the periodic table.

- Color the elements in **groups 1 & 2** red. In addition, also color Helium (He) red. These are the **s block** elements. Color the s block key box red.
- Color the **two rows at the bottom of the periodic table**, detached from the table, purple. These are the **f block** elements. Color the f block box in the key purple.
- Color the elements in **groups 13-18 (except Helium)** yellow. These are the p block elements. Color the **p** block box in the key yellow.
- Color the elements in **groups 3-12** blue. These are the d block elements. Color the **d block** box in the key blue.

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Periodic Table - State at 298 K

Elements can be classified by their state at room temperature (298 K). Most elements are solid at room temperature but there are 2 elements that are liquid and 11 elements that are gases at 298 K.

- Hydrogen (H), Helium (He), Nitrogen (N), Oxygen (O), Fluorine (F), Neon (Ne), Chlorine (Cl), Argon (Ar), Krypton (Kr), Xenon (Xe) and Radon (Rn) are all gases at room temperature. Color these elements & the key for gas red.
- Mercury (Hg) & Bromine (Br) are liquid at room temperature. Color these elements & the key for liquid blue.
- All remaining elements are solid at room temperature. Color these elements & the key for solid green.

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L	Rb	Sr	Υ	Zr	Nb	Mo	Тс	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Те	1	Xe	🗌 liquid
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L	Cs	Ba	La	Hf	Та	W	Re	Os	Ir	Pt	Au	Hg	TI	Pb	Bi	Po	At	Rn	
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			Ce	Pr	Nd	Pm	Sm	Eu	Gd	Тb	Dy	Ho	Er	Τm	Yb	Lu			
			90	91	92	93	94	95	96	97	98	99	100	101	102	103			
			Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No	Lr			

• Number the seven periods on the left side of the periodic table.

Key: Periodic	Table	State	at 298	Κ
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Periodic Table - Metallic Character

Elements can be classified by their metallic character as being a metal, metalloid (semi-metal) or nonmetal.

- **Metals** include all elements that are not considered a metalloid or nonmetal. Metals have the following properties:
 - Shiny metallic appearance.
 - Solid at room temperature (except Mercury).
 - High melting point.
 - o High densities.
 - Malleable & ductile.
 - o Good conductors of heat & electricity.
 - Metalloids (also known as semi-metals) include Boron (B), Silicon (Si), Germanium (Ge), Arsenic (As), Antimony (Sb), Tellurium (Te) and Astatine (At). Some tables also list Polonium (Po) as a metalloids, we will not. Metalloids have the following properties:
 - Have properties of both metals and nonmetals.
 - Often used as semiconductors.
- Nonmetals include all elements to the right of the metalloids and Hydrogen (H). Nonmetals have the following properties:
 - Solid nonmetals have little to no metallic luster.

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- Solid nonmetals are brittle.
- High ionization energy.
- o Poor conductors of heat & electricity.

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	ĸ	Ca	Sc	Ti.	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr	
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ľ	55	56	57	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	Character
	Cs	Ва	La	Hf	Та	w	Re	Os	lr -	Pt	Au	Hg	ТΙ	Pb	Bi	Po	At	Rn	
ľ	87	88	89	104	105	106	107	108	109	110	111	112		114					🗆 metal
	Fr	Ra	Ac	Rf	Db	Sa	Bh	Hs	Mt	Ds	Uuu	Uub		Uuq					
																			🗀 metalloid
			58	59	60	61	62	63	64	65	66	67	68	69	70	71			🗆 nonmetal
			Ce	Pr	Nd	Pm	Sm	Eu	Gd	Тb	Dy	Ho	Er	Tm	Yb	Lu			
			90	91	92	93	94	95	96	97	98	99	100	101	102	103			
			Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No	Lr			
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Periodic Table - Groups

The elements of the periodic table can also be classified by groups of similar properties.

- Alkali Metals include all elements in group 1 except Hydrogen (H). Color the alkali metals red. Alkali metals have the following properties:
 - o Lower densities than other metals.
 - React with water & air.
 - o Stored in oil.
 - One valence electron.
 - Easily lose their valence electron to form a univalent cation (1+ charge)
- Alkaline Earth elements include all elements in group 2. Color the alkaline earth elements orange. Alkaline earth elements have the following properties:
 - Harder, denser & stronger than alkali metals.
 - o Two valence electrons.
 - o Easily lose valence electrons to form divalent cations (2+ charge).
- **Transition Elements** refer to **groups 3 through 12**. Color the transition elements green. Transition elements have the following properties:
 - Referred to as B group elements.
 - o Very Hard.
 - High melting & boiling points.
 - High electrical conductivity.

- Lanthanides include elements 58-71. Color the lanthanides yellow. Lanthanides are:
 - Known as Rare Earth elements because they are rare on earth.
- Actinides include elements 90-103. Color the actinides purple. Actinides are:
 - Known as Rare Earth elements because they are rare on earth.
- Chalcogens include all elements in group 16. Color the chalcogens brown.
- Halogens include all elements in group 17. Color the halogens blue. Halogens have the following properties:
 - Have 7 valence electrons and only need 1 electron to fill their outer energy level.
 - High electronegativities.
 - o Most reactive nonmetals, especially with alkali metals and alkaline earth metals.
- Noble Gases include all elements in group 18. Color the noble gases grey. Noble gases have the following properties:
 - Known as inert gases.
 - All gases at room temperature.
 - o Have full outer energy level.
 - o High ionization energies but very low electronegativities.
- Synthetic elements
 - There are **90 naturally occurring elements**. The other elements on the periodic table are man-made and referred to as synthetic elements. The synthetic elements are: **Technetium (Tc), Promethium (Pm)** and **all elements with atomic numbers greater than Uranium (U)**. Put a black border around all synthetic elements.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	Number the same paris do on the left side
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	кI	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr	🖵 alkali metals
	97	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	\Box alkaline earth elements
1E	d	Sr	Y	Zr	Nb	Mo	Тс	Ru	Rh	Pd	Aa	Cd	In	Sn	Sb	Те	11	Xe	
	5	56	57	72	73		75	76	77	78	79	80	81	82	83	84	85	86	L transition elements
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			Th	Pa	U	Np	Pu	Am	Cm	BK	Cf	Es	Fm	Md	NO	Lľ			
												All and a second							Synthetic elements

At the completion of this assignment you will be prepared to take the following Chapter 3 on-line quizzes:

- metal nonmetal or metalloid quiz
- name my family quiz 2
- periodic families quiz 2

- name my family quiz 1
- periodic families quiz 1
- periodic families quiz 3

Homework: Answer each of the following questions about the elements on the periodic table.

1. _____ What is the third period metalloid?

2. _____ What is the halogen element with the greatest atomic weight?

3. _____ What is the fifth period alkaline earth element?

- 4. _____ What is the group 18 s block element?
- 5. _____ What is the metalloid element with the greatest number of protons?
- 6. _____ What is the group 16 gas?
- 7. _____ What is the synthetic element with the fewest protons?
- 8. _____ What is the actinide with the greatest atomic weight?
- 9. _____ What is the liquid d block element?

10	What is the d block element with the smallest atomic number?
11	What is the metalloid with 7 valence electrons?
12	What is the alkaline earth element with the smallest atomic weight?
13	What is the actinide with the smallest atomic number?
14	What is the synthetic actinide with the smallest atomic weight?
15	What is the noble gas with two valence electrons?
16	What is the halogen with the smallest atomic weight?
17	What is the chalcogen metalloid?
18	What is the transition element with the smallest atomic weight?
19	What is the third period element with 4 valence electrons?
20	What is the fourth period element with 5 valence electrons?
21	What is the second period element with 8 valence electrons?
22	What is the first period element with the smallest atomic weight?
23	What is the fifth period element the greatest atomic number?
24	What is the third period element with 2 valence electrons?
25	What is the fourth period element whose electron configuration ends in 4p ³ ?
26	What is the second period element with an oxidation number of 3+?
27	What is the third period element with an oxidation number of 2-?
28	What is the fifth period metalloid with the smallest atomic weight?
29	What is the third period chalcogen?
30	What is the element that is both a chalcogen and a metalloid?
31	What is the oxidation number of all alkaline earth elements?
32	How many valence electrons do halogens have?
33	What is the charge of an alkali element?
34	What is the oxidation number of the second period metalloid?
35	What element is both a chalcogen and a metal?
36	What is the fifth period transition element with the greatest atomic number?
37	What is the fifth period synthetic element?
38	What is the oxidation number for gallium?
39.	How many valence electrons does polonium have?
40	What is the oxidation number of barium?
41.	How many valence electrons does krypton have?
42.	What is the oxidation number of radon?
43	What is the only synthetic lanthanide?
44	What do you do with dead people?
45	What is the sixth period noble gas?
46	What is the first period s block element with the greatest atomic weight?
47	What is the oxidation number for boron?
48	How many valence electrons does astatine have?

- 49. _____ What is the group 1 gas?
- 50. _____ What is the fourth period liquid?
- 51. _____ What is the nonmetal with a 1+ oxidation number?
- 52. _____ What is the fifth period transition element with the fewest protons?
- 53. _____ What is the halogen that is a liquid at room temperature?
- 54. _____ What is the oxidation number of alkaline earth elements?
- 55. _____ What is the nonmetal with the greatest atomic weight?
- 56. _____ What is the chalcogen with the fewest protons?
- 57. _____ What is the period 5 element with the second greatest atomic weight?

For each of the following statements, determine which term it best describes. Use: alkali, halogen, chalcogen, metalloid, alkaline earth, lanthanide, actinide, transition elements, noble gas, or synthetic. You will use some terms more than once.

58	_ This group contains a metal, metalloid and non-metals.
59	_ The elements in this group are harder and denser than the alkali metals.
60	_ This term refers to elements that have properties of both metals and non-metals.
61	_ This group has a one valence electron.
62	_ This group contains solid, liquid & gaseous elements at room temperature.
63	_ This group of elements loses 2 electrons when they form ions.
64	_ These elements are metals with high electrical conductivity.
65	_ This group reacts with water and air.
66	_ This group contains the most reactive non-metals.
67	_ The elements in this group are inert.
68	_ All of the members in this family are gases.
69	These two series of elements are known as Rare Earth elements.
70	_ This group of elements contains mostly synthetic elements.
71	These elements are stored in oil.
72.	These elements are man-made.
73	_ These elements are referred to as B group elements.
74	This group has an oxidation number of 2+.
75	_ These elements have the highest electronegativities in their period.