

Name _____

Chemistry

___/___/___

Periodic Table

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.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1																	2
H																	He
3	4											5	6	7	8	9	10
Li	Be											B	C	N	O	F	Ne
11	12											13	14	15	16	17	18
Na	Mg											Al	Si	P	S	Cl	Ar
19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr
37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54
Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I	Xe
55	56	57	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86
Cs	Ba	La	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At	Rn
87	88	89	104	105	106	107	108	109	110	111	112	114					
Fr	Ra	Ac	Rf	Db	Sg	Bh	Hs	Mt	Ds	Uuu	Uub	Uuq					
		58	59	60	61	62	63	64	65	66	67	68	69	70	71		
		Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	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		

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

Key: Periodic Table Blocks

- s block
 p block
 d block
 f block

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.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1																	2
H																	He
3	4											5	6	7	8	9	10
Li	Be											B	C	N	O	F	Ne
11	12											13	14	15	16	17	18
Na	Mg											Al	Si	P	S	Cl	Ar
19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr
37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54
Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I	Xe
55	56	57	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86
Cs	Ba	La	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At	Rn
87	88	89	104	105	106	107	108	109	110	111	112	114					
Fr	Ra	Ac	Rf	Db	Sg	Bh	Hs	Mt	Ds	Uuu	Uub	Uuq					
		58	59	60	61	62	63	64	65	66	67	68	69	70	71		
		Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	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		

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

Key: Periodic Table State at 298 K

- gas
 liquid
 solid

- **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.
 - 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.
 - Have full outer energy level.
 - 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
1 H																	2 He
3 Li	4 Be											5 B	6 C	7 N	8 O	9 F	10 Ne
11 Na	12 Mg											13 Al	14 Si	15 P	16 S	17 Cl	18 Ar
19 K	20 Ca	21 Sc	22 Ti	23 V	24 Cr	25 Mn	26 Fe	27 Co	28 Ni	29 Cu	30 Zn	31 Ga	32 Ge	33 As	34 Se	35 Br	36 Kr
37 Rb	38 Sr	39 Y	40 Zr	41 Nb	42 Mo	43 Tc	44 Ru	45 Rh	46 Pd	47 Ag	48 Cd	49 In	50 Sn	51 Sb	52 Te	53 I	54 Xe
55 Cs	56 Ba	57 La	72 Hf	73 Ta	74 W	75 Re	76 Os	77 Ir	78 Pt	79 Au	80 Hg	81 Tl	82 Pb	83 Bi	84 Po	85 At	86 Rn
87 Fr	88 Ra	89 Ac	104 Db	105 Sg	106 Bh	107 Hs	108 Mt	109 Ds	110 Uuu	111 Uub	112 Uuq						
		58 Ce	59 Pr	60 Nd	61 Pm	62 Sm	63 Eu	64 Gd	65 Tb	66 Dy	67 Ho	68 Er	69 Tm	70 Yb	71 Lu		
		90 Th	91 Pa	92 U	93 Np	94 Pu	95 Am	96 Cm	97 Bk	98 Cf	99 Es	100 Fm	101 Md	102 No	103 Lr		

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

Key: Periodic Table Groups

- alkali metals
- alkaline earth elements
- transition elements
- lanthanides
- actinides
- chalcogens
- halogens
- noble gases
- 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 1
- name my family quiz 2
- periodic families quiz 1
- periodic families quiz 2
- 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.