

The Periodic Table Study Guide

1. The development of the Periodic Table

- Dmitri Mendeleev (arranged by atomic weight)

PERIODIC SYSTEM OF THE ELEMENTS IN GROUPS AND SERIES.

GROUPS OF ELEMENTS

Series	I	II	III	IV	V	VI	VII	VIII
1	H 1.008							
2	Li 7.00	Be 9.01	B 10.81	C 12.01	N 14.01	O 16.00	F 19.00	Ne 20.18
3	Na 23.00	Mg 24.31	Al 27.00	Si 28.09	P 31.00	S 32.07	Cl 35.46	Ar 39.95
4	K 39.10	Ca 40.08	Sc 44.96	Ti 47.88	V 50.94	Cr 51.99	Mn 54.94	Fe 55.85 Co 58.93 Ni 58.71 Cu 63.55 Zn 65.39
5	Rb 85.47	Sr 87.62	Y 88.91	Zr 91.22	Nb 92.91	Mo 95.94	Tc 98.91	Ru 101.1 Rh 102.9 Pd 106.4 Ag 107.9 Cd 112.4 In 114.8 Sn 117.4 Sb 121.8 Te 127.6 I 126.9 Xe 131.3
6	Cs 132.9	Ba 137.3	La 138.9	Ce 140.1	Pr 140.9	Nd 144.2	Pm 145.0	Sm 150.4 Eu 151.9 Gd 157.3 Tb 158.9 Dy 162.5 Ho 164.9 Er 167.3 Tm 168.9 Yb 173.1
7	Fr 223.0	Ra 226.0	Ac 227.0	Th 232.0	Pa 231.0	U 238.0	Np 237.0	Pu 244.1 Am 243.1 Cm 247.1 Bk 247.1 Cf 251.1 Es 252.0 Fm 257.1 Md 258.1 No 259.1

HIGHER SALINE OXIDES
| R | R₂O | RO | RO₂ | RO₃ | R₂O₃ | RO₃ | R₂O₅ | RO₅

HIGHER GASEOUS HYDROGEN COMPOUNDS
| RH₄ | RH₃ | RH₂ | RH

- Henry Mosely (arranged by atomic number)

Atomic number

Symbol

Atomic weight

■ Metal
■ Semimetal
■ Nonmetal

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
H 1.008	He 4.003	Li 6.941	Be 9.012	B 10.81	C 12.01	N 14.01	O 16.00	F 19.00	Ne 20.18	Na 22.99	Mg 24.31	Al 26.98	Si 28.09	P 30.97	S 32.07	Cl 35.45	Ar 39.95
K 39.10	Ca 40.08	Sc 44.96	Ti 47.88	V 50.94	Cr 51.99	Mn 54.94	Fe 55.85	Co 58.93	Ni 58.71	Cu 63.55	Zn 65.39	Ga 69.72	Ge 72.61	As 74.92	Se 78.96	Br 79.90	Kr 83.80
Rb 85.47	Sr 87.62	Y 88.91	Zr 91.22	Nb 92.91	Mo 95.94	Tc 98.91	Ru 101.1	Rh 102.9	Pd 106.4	Ag 107.9	Cd 112.4	In 114.8	Sn 117.4	Sb 121.8	Te 127.6	I 126.9	Xe 131.3
Cs 132.9	Ba 137.3	La 138.9	Ce 140.1	Pr 140.9	Nd 144.2	Pm 145.0	Sm 150.4	Eu 151.9	Gd 157.3	Tb 158.9	Dy 162.5	Ho 164.9	Er 167.3	Tm 168.9	Yb 173.1	Lu 175.0	
Fr 223.0	Ra 226.0	Ac 227.0	Th 232.0	Pa 231.0	U 238.0	Np 237.0	Pu 244.1	Am 243.1	Cm 247.1	Bk 247.1	Cf 251.1	Es 252.0	Fm 257.1	Md 258.1	No 259.1	Lr 261.0	

(c)1999
Kremer Paul

- Metals, nonmetals, and metalloids (properties/characteristics, trends, location)
Metals are to the left of the steps on the periodic table. They are shiny and have a silvery color. Nonmetals are to the right of the steps on the periodic table. Their properties are the opposite of metals. Metalloids border the staircase. Aluminum borders the staircase, but it is a metal.
- Period vs. Family (group)
The periods are the rows that go across horizontally and the families or groups go vertically (down).
- How are valence electrons and reactivity related?
Valence electrons and reactivity are related because the less the valence electrons, the more the reactivity.

5. What are the most reactive metals? Nonmetals?

Metals are most reactive and the most reactive element is Francium. The further to the left and to the bottom the more the reactive an element is.

6. Why is Hydrogen not part of any family?

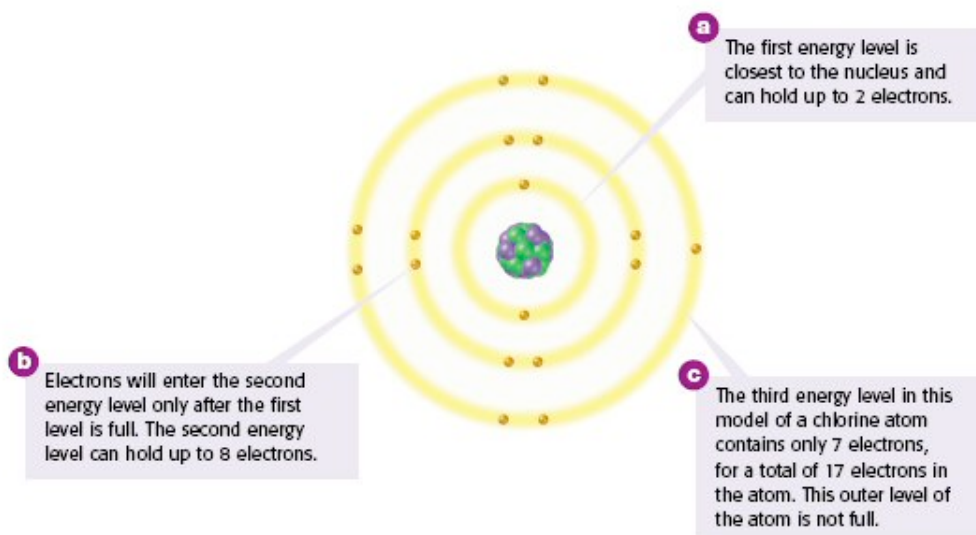
Hydrogen is not part of any family because its characteristics are like no other group. It is located in family one, which are metals, but has properties of nonmetals.

7. Know the family names! Be able to locate elements on the Periodic table when given the family name.

<u>Group Name</u>	<u>Valence Electrons</u>
Group 1: Alkali Metals	1 Valence electron
Group 2: Alkaline Earth Metals	2 Valence Electrons
Groups 3-12: Transition Metals	Varies 1 or 2 Valence Electrons
Group 13: Boron Group	3 Valence Electrons
Group 14: Carbon Group	4 Valence Electrons
Group 15: Nitrogen Group	5 Valence Electrons
Group 16: Oxygen Group	6 Valence Electrons
Group 17: Halogens	7 Valence Electrons
Group 18: Noble Gases (unreactive because it is happy)	8 Valence Electrons (except for Helium that has 2)
Hydrogen (by itself)	1 Valence Electron (doesn't share characteristics of any other group)

The Periodic Table and Valence Electrons

Electron Arrangement in an Atom



Valence Electrons and the Periodic Table

Atoms of elements in Groups 1 and 2 have the same number of valence electrons as their group number.

Atoms of elements in Groups 3–12 do not have a general rule relating their valence electrons to their group number.

Atoms of elements in Groups 13–18 have 10 fewer valence electrons than their group number. However, helium atoms have only 2 valence electrons.

1	2												13	14	15	16	17	18
H													B	C	N	O	F	He
Li	Be												Al	Si	P	S	Cl	Ar
Na	Mg	3	4	5	6	7	8	9	10	11	12							
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	
Cs	Ba	La	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At	Rn	
Fr	Ra	Ac	Rf	Db	Sg	Bh	Hs	Mt	Uun	Uuu	Uub							

The Families on the Periodic Table

Chemistry of the Elements

I	II																		
H ¹																			He ²
Alkali metals	Alkaline earths	Transition Metals										B ⁵	C ⁶	N ⁷	O ⁸	F ⁹	Ne ¹⁰		
		IIIB	IVB	VB	VIB	VII B	VIII B			IB	IIB	Al ¹³	Si ¹⁴	P ¹⁵	S ¹⁶	Cl ¹⁷			
		Sc ²¹	Ti ²²	V ²³	Cr ²⁴	Mn ²⁵	Fe ²⁶	Co ²⁷	Ni ²⁸	Cu ²⁹	Zn ³⁰	Al Group	C Group	N Group	O Group	Halogens	Noble Gases		
		Y ³⁹	Zr ⁴⁰	Nb ⁴¹	Transition Elements						Ag ⁴⁷	Cd ⁴⁸							
Fr ⁸⁷			Hf ⁷²	Ta ⁷³	W ⁷⁴	Re ⁷⁵	Os ⁷⁶	Ir ⁷⁷	Pt ⁷⁸	Au ⁷⁹	Hg ⁸⁰								
			Rf ¹⁰⁴	Ha ¹⁰⁵	106	107	108	109											
Lanthanides			La ⁵⁷	Ce ⁵⁸	Pr ⁵⁹	Nd ⁶⁰	Pm ⁶¹	Sm ⁶²	Eu ⁶³	Gd ⁶⁴	Tb ⁶⁵	Dy ⁶⁶	Ho ⁶⁷	Er ⁶⁸	Tm ⁶⁹	Yb ⁷⁰	Lu ⁷¹		
Actinides			Ac ⁸⁹	Th ⁹⁰	Pa ⁹¹	U ⁹²	Np ⁹³	Pu ⁹⁴	Am ⁹⁵	Cm ⁹⁶	Bk ⁹⁷	Cf ⁹⁸	Es ⁹⁹	Fm ¹⁰⁰	Md ¹⁰¹	No ¹⁰²	Lr ¹⁰³		

Metal
 Metalloid
 Nonmetal