

# **Periodic Table of the Elements**

**an elements position on the  
periodic table gives indications  
of its various physical and  
chemical properties**

# **Metals, Nonmetals and Metalloids**

Group	1	2		3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
	1A	2A		3B	4B	5B	6B	7B	8B			1B	2B	3A	4A	5A	6A	7A	8A
Period																			
1	1 H																		2 He
2	3 Li	4 Be												5 B	6 C	7 N	8 O	9 F	10 Ne
3	11 Na	12 Mg												13 Al	14 Si	15 P	16 S	17 Cl	18 Ar
4	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
5	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
6	55 Cs	56 Ba	*	71 Lu	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
7	87 Fr	88 Ra	**	103 Lr	104 Rf	105 Db	106 Sg	107 Bh	108 Hs	109 Mt	110 Uun	111 Uuu	112 Uub	113 Uut	114 Uuq	115 Uup	116 Uuh	117 Uus	118 Uuo
<b>lanthanides</b>			*	57 La	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		
<b>actinides</b>			**	89 Ac	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		

← Metals
Metaloids
→ Nonmetals

In chemical reactions **metals** tend to lose electrons to **nonmetals**

# metals

**good conductors of heat  
and electricity**

**malleable**

**ductile**

**lustrous**

**tend to lose  
electrons in  
chemical reactions**

# nonmetals

**poor conductors**

**brittle**

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**tend to gain  
electrons in  
chemical reactions**

# group



# period



Group	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18						
	1A	2A	3B	4B	5B	6B	7B	8B			1B	2B	3A	4A	5A	6A	7A	8A						
Period																								
1																	2	He						
2													5	B	6	C	7	N	8	O	9	F	10	Ne
3	11	12											13	Al	14	Si	15	P	16	S	17	Cl	18	Ar
4	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36						
	K	Ca	Sc	Ti	Y	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr						
5	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						
6	55	56	*	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86					
	Cs	Ba		Lu	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At	Rn					
7	87	88	**	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118					
	Fr	Ra		Lr	Rf	Db	Sg	Bh	Hs	Mt	Uun	Uuu	Uub	Uut	Uuq	Uup	Uuh	Uus	Uuo					
lanthanides	*																							
		57	58	59	60	61	62	63	64	65	66	67	68	69	70									
		La	Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb									
actinides	**																							
		89	90	91	92	93	94	95	96	97	98	99	100	101	102									
		Ac	Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No									

# Specific Groups

# Main groups

group numbers indentified by suffix A

Group	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	
	1A	2A											3A	4A	5A	6A	7A	8A	
Period																			
1	1 <a href="#">H</a>																		2 <a href="#">He</a>
2	3 <a href="#">Li</a>	4 <a href="#">Be</a>											5 <a href="#">B</a>	6 <a href="#">C</a>	7 <a href="#">N</a>	8 <a href="#">O</a>	9 <a href="#">F</a>	10 <a href="#">Ne</a>	
3	11 <a href="#">Na</a>	12 <a href="#">Mg</a>											13 <a href="#">Al</a>	14 <a href="#">Si</a>	15 <a href="#">P</a>	16 <a href="#">S</a>	17 <a href="#">Cl</a>	18 <a href="#">Ar</a>	
4	19 <a href="#">K</a>	20 <a href="#">Ca</a>											31 <a href="#">Ga</a>	32 <a href="#">Ge</a>	33 <a href="#">As</a>	34 <a href="#">Se</a>	35 <a href="#">Br</a>	36 <a href="#">Kr</a>	
5	37 <a href="#">Rb</a>	38 <a href="#">Sr</a>											49 <a href="#">In</a>	50 <a href="#">Sn</a>	51 <a href="#">Sb</a>	52 <a href="#">Te</a>	53 <a href="#">I</a>	54 <a href="#">Xe</a>	
6	55 <a href="#">Cs</a>	56 <a href="#">Ba</a>											81 <a href="#">Tl</a>	82 <a href="#">Pb</a>	83 <a href="#">Bi</a>	84 <a href="#">Po</a>	85 <a href="#">At</a>	86 <a href="#">Rn</a>	
7	87 <a href="#">Fr</a>	88 <a href="#">Ra</a>											113 Uut	114 Uuq	115 Uup	116 Uuh	117 Uus	118 Uuo	

# Main group metals

Alkali metals



Alkaline earth metals



Group	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
	1A	2A	3B	4B	5B	6B	7B	8B			1B	2B	3A	4A	5A	6A	7A	8A
Period																		
1																		
2	3 <a href="#">Li</a>	4 <a href="#">Be</a>																
3	11 <a href="#">Na</a>	12 <a href="#">Mg</a>																
4	19 <a href="#">K</a>	20 <a href="#">Ca</a>																
5	37 <a href="#">Rb</a>	38 <a href="#">Sr</a>																
6	55 <a href="#">Cs</a>	56 <a href="#">Ba</a>																
7	87 <a href="#">Fr</a>	88 <a href="#">Ra</a>																

13 <a href="#">Al</a>			
31 <a href="#">Ga</a>	32 <a href="#">Ge</a>		
49 <a href="#">In</a>	50 <a href="#">Sn</a>	51 <a href="#">Sb</a>	
81 <a href="#">Tl</a>	82 <a href="#">Pb</a>	83 <a href="#">Bi</a>	84 <a href="#">Po</a>

# Nonmetals

Halogens

Noble gases

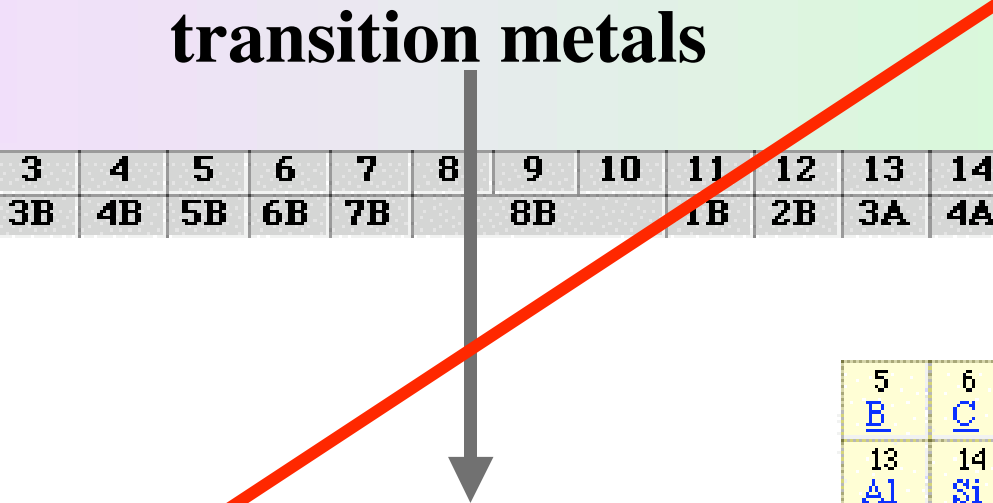
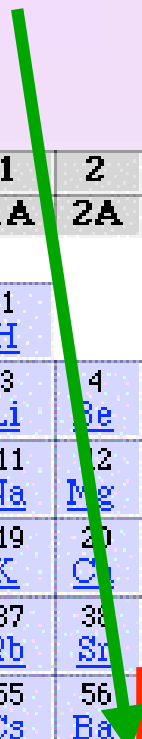
Group	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	
	1A	2A	3B	4B	5B	6B	7B	8B			1B	2B	3A	4A	5A	6A	7A	8A	
Period																			
1	<u>H</u>																		2
2													<u>B</u>	<u>C</u>	<u>N</u>	<u>O</u>	<u>F</u>	<u>Ne</u>	
3														<u>Si</u>	<u>P</u>	<u>S</u>	<u>Cl</u>	<u>Ar</u>	
4															<u>As</u>	<u>Se</u>	<u>Br</u>	<u>Kr</u>	
5																<u>Te</u>	<u>I</u>	<u>Xe</u>	
6																	<u>At</u>	<u>Rn</u>	
7																			

**Actinides**

**Lanthanides**

**transition metals**

Group	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	
	1A	2A	3B	4B	5B	6B	7B		8B		1B	2B	3A	4A	5A	6A	7A	8A	
Period																			
1	1 <a href="#">H</a>																		2 <a href="#">He</a>
2	3 <a href="#">Li</a>	4 <a href="#">Be</a>											5 <a href="#">B</a>	6 <a href="#">C</a>	7 <a href="#">N</a>	8 <a href="#">O</a>	9 <a href="#">F</a>	10 <a href="#">Ne</a>	
3	11 <a href="#">Na</a>	12 <a href="#">Mg</a>											13 <a href="#">Al</a>	14 <a href="#">Si</a>	15 <a href="#">P</a>	16 <a href="#">S</a>	17 <a href="#">Cl</a>	18 <a href="#">Ar</a>	
4	19 <a href="#">K</a>	20 <a href="#">Ca</a>	21 <a href="#">Sc</a>	22 <a href="#">Ti</a>	23 <a href="#">V</a>	24 <a href="#">Cr</a>	25 <a href="#">Mn</a>	26 <a href="#">Fe</a>	27 <a href="#">Co</a>	28 <a href="#">Ni</a>	29 <a href="#">Cu</a>	30 <a href="#">Zn</a>	31 <a href="#">Ga</a>	32 <a href="#">Ge</a>	33 <a href="#">As</a>	34 <a href="#">Se</a>	35 <a href="#">Br</a>	36 <a href="#">Kr</a>	
5	37 <a href="#">Rb</a>	38 <a href="#">Sr</a>	39 <a href="#">Y</a>	40 <a href="#">Zr</a>	41 <a href="#">Nb</a>	42 <a href="#">Mo</a>	43 <a href="#">Tc</a>	44 <a href="#">Ru</a>	45 <a href="#">Rh</a>	46 <a href="#">Pd</a>	47 <a href="#">Ag</a>	48 <a href="#">Cd</a>	49 <a href="#">In</a>	50 <a href="#">Sn</a>	51 <a href="#">Sb</a>	52 <a href="#">Te</a>	53 <a href="#">I</a>	54 <a href="#">Xe</a>	
6	55 <a href="#">Cs</a>	56 <a href="#">Ba</a>	* 71 <a href="#">Lu</a>	72 <a href="#">Hf</a>	73 <a href="#">Ta</a>	74 <a href="#">W</a>	75 <a href="#">Re</a>	76 <a href="#">Os</a>	77 <a href="#">Ir</a>	78 <a href="#">Pt</a>	79 <a href="#">Au</a>	80 <a href="#">Hg</a>	81 <a href="#">Tl</a>	82 <a href="#">Pb</a>	83 <a href="#">Bi</a>	84 <a href="#">Po</a>	85 <a href="#">At</a>	86 <a href="#">Rn</a>	
7	87 <a href="#">Fr</a>	88 <a href="#">Ra</a>	** 103 <a href="#">Lr</a>	104 <a href="#">Rf</a>	105 <a href="#">Db</a>	106 <a href="#">Sg</a>	107 <a href="#">Bh</a>	108 <a href="#">Hs</a>	109 <a href="#">Mt</a>	110 <a href="#">Uun</a>	111 <a href="#">Uuu</a>	112 <a href="#">Uub</a>	113 <a href="#">Uut</a>	114 <a href="#">Uuq</a>	115 <a href="#">Uup</a>	116 <a href="#">Uuh</a>	117 <a href="#">Uus</a>	118 <a href="#">Uuo</a>	
<b>lanthanides</b>			* 57 <a href="#">La</a>	58 <a href="#">Ce</a>	59 <a href="#">Pr</a>	60 <a href="#">Nd</a>	61 <a href="#">Pm</a>	62 <a href="#">Sm</a>	63 <a href="#">Eu</a>	64 <a href="#">Gd</a>	65 <a href="#">Tb</a>	66 <a href="#">Dy</a>	67 <a href="#">Ho</a>	68 <a href="#">Er</a>	69 <a href="#">Tm</a>	70 <a href="#">Yb</a>			
<b>actinides</b>			** 89 <a href="#">Ac</a>	90 <a href="#">Th</a>	91 <a href="#">Pa</a>	92 <a href="#">U</a>	93 <a href="#">Np</a>	94 <a href="#">Pu</a>	95 <a href="#">Am</a>	96 <a href="#">Cm</a>	97 <a href="#">Bk</a>	98 <a href="#">Cf</a>	99 <a href="#">Es</a>	100 <a href="#">Fm</a>	101 <a href="#">Md</a>	102 <a href="#">No</a>			



# **Electronegativity**

# Electronegativity

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**measure of an elements ability to attract electrons toward itself when bonded to another element**

**An electronegative element attracts electrons.**

**An electropositive element releases electrons.**

# Electronegativity

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***Increases*** from left to right in periodic table.

***Decreases*** going down a group.

**Fluorine is the most electronegative element.**

**Francium is the least electronegative element.**

decreasing  
electronegativity

Increasing electronegativity



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Period																			
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2	3 <a href="#">Li</a>	4 <a href="#">Be</a>												5 <a href="#">B</a>	6 <a href="#">C</a>	7 <a href="#">N</a>	8 <a href="#">O</a>	9 <a href="#">F</a>	10 <a href="#">Ne</a>
3	11 <a href="#">Na</a>	12 <a href="#">Mg</a>												13 <a href="#">Al</a>	14 <a href="#">Si</a>	15 <a href="#">P</a>	16 <a href="#">S</a>	17 <a href="#">Cl</a>	18 <a href="#">Ar</a>
4	19 <a href="#">K</a>	20 <a href="#">Ca</a>		21 <a href="#">Sc</a>	22 <a href="#">Ti</a>	23 <a href="#">V</a>	24 <a href="#">Cr</a>	25 <a href="#">Mn</a>	26 <a href="#">Fe</a>	27 <a href="#">Co</a>	28 <a href="#">Ni</a>	29 <a href="#">Cu</a>	30 <a href="#">Zn</a>	31 <a href="#">Ga</a>	32 <a href="#">Ge</a>	33 <a href="#">As</a>	34 <a href="#">Se</a>	35 <a href="#">Br</a>	36 <a href="#">Kr</a>
5	37 <a href="#">Rb</a>	38 <a href="#">Sr</a>		39 <a href="#">Y</a>	40 <a href="#">Zr</a>	41 <a href="#">Nb</a>	42 <a href="#">Mo</a>	43 <a href="#">Tc</a>	44 <a href="#">Ru</a>	45 <a href="#">Rh</a>	46 <a href="#">Pd</a>	47 <a href="#">Ag</a>	48 <a href="#">Cd</a>	49 <a href="#">In</a>	50 <a href="#">Sn</a>	51 <a href="#">Sb</a>	52 <a href="#">Te</a>	53 <a href="#">I</a>	54 <a href="#">Xe</a>
6	55 <a href="#">Cs</a>	56 <a href="#">Ba</a>	*	71 <a href="#">Lu</a>	72 <a href="#">Hf</a>	73 <a href="#">Ta</a>	74 <a href="#">W</a>	75 <a href="#">Re</a>	76 <a href="#">Os</a>	77 <a href="#">Ir</a>	78 <a href="#">Pt</a>	79 <a href="#">Au</a>	80 <a href="#">Hg</a>	81 <a href="#">Tl</a>	82 <a href="#">Pb</a>	83 <a href="#">Bi</a>	84 <a href="#">Po</a>	85 <a href="#">At</a>	86 <a href="#">Rn</a>
7	87 <a href="#">Fr</a>	88 <a href="#">Ra</a>	**	103 <a href="#">Lr</a>	104 <a href="#">Rf</a>	105 <a href="#">Db</a>	106 <a href="#">Sg</a>	107 <a href="#">Bh</a>	108 <a href="#">Hs</a>	109 <a href="#">Mt</a>	110 <a href="#">Uun</a>	111 <a href="#">Uuu</a>	112 <a href="#">Uub</a>	113 Uut	114 Uuq	115 Uup	116 Uuh	117 Uus	118 Uuo
<b>lanthanides</b>			*	57 <a href="#">La</a>	58 <a href="#">Ce</a>	59 <a href="#">Pr</a>	60 <a href="#">Nd</a>	61 <a href="#">Pm</a>	62 <a href="#">Sm</a>	63 <a href="#">Eu</a>	64 <a href="#">Gd</a>	65 <a href="#">Tb</a>	66 <a href="#">Dy</a>	67 <a href="#">Ho</a>	68 <a href="#">Er</a>	69 <a href="#">Tm</a>	70 <a href="#">Yb</a>		
<b>actinides</b>			**	89 <a href="#">Ac</a>	90 <a href="#">Th</a>	91 <a href="#">Pa</a>	92 <a href="#">U</a>	93 <a href="#">Np</a>	94 <a href="#">Pu</a>	95 <a href="#">Am</a>	96 <a href="#">Cm</a>	97 <a href="#">Bk</a>	98 <a href="#">Cf</a>	99 <a href="#">Es</a>	100 <a href="#">Fm</a>	101 <a href="#">Md</a>	102 <a href="#">No</a>		

# Pauling Electronegativity Scale

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**4.0 is maximum (F)**

**Second period of periodic table**

<b>Li</b>	<b>Be</b>	<b>B</b>	<b>C</b>	<b>N</b>	<b>O</b>	<b>F</b>
<b>1.0</b>	<b>1.5</b>	<b>2.0</b>	<b>2.5</b>	<b>3.0</b>	<b>3.5</b>	<b>4.0</b>

# Pauling Electronegativity Scale

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Li	Be	B	C	N	O	F
1.0	1.5	2.0	2.5	3.0	3.5	4.0
Na	Mg	Al	Si	P	S	Cl
0.9	1.2	1.5	1.8	2.1	2.5	3.0

# Points about electronegativity

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**in general:**

**the greater the difference in electronegativity between two bonded atoms, the more polar the bond**

**electronegativity concept is more often applied in a qualitative sense than a quantitative one**