

Periodic Table
of the Elements

The History of the Modern Periodic Table

During the nineteenth century, chemists began to categorize the elements according to similarities in their physical and chemical properties. The end result of these studies was our modern periodic table.

Johann Dobereiner

In 1829, he classified some elements into groups of three, which he called triads. The elements in a triad had similar chemical properties and orderly physical properties.

(ex. Cl, Br, I and
Ca, Sr, Ba)

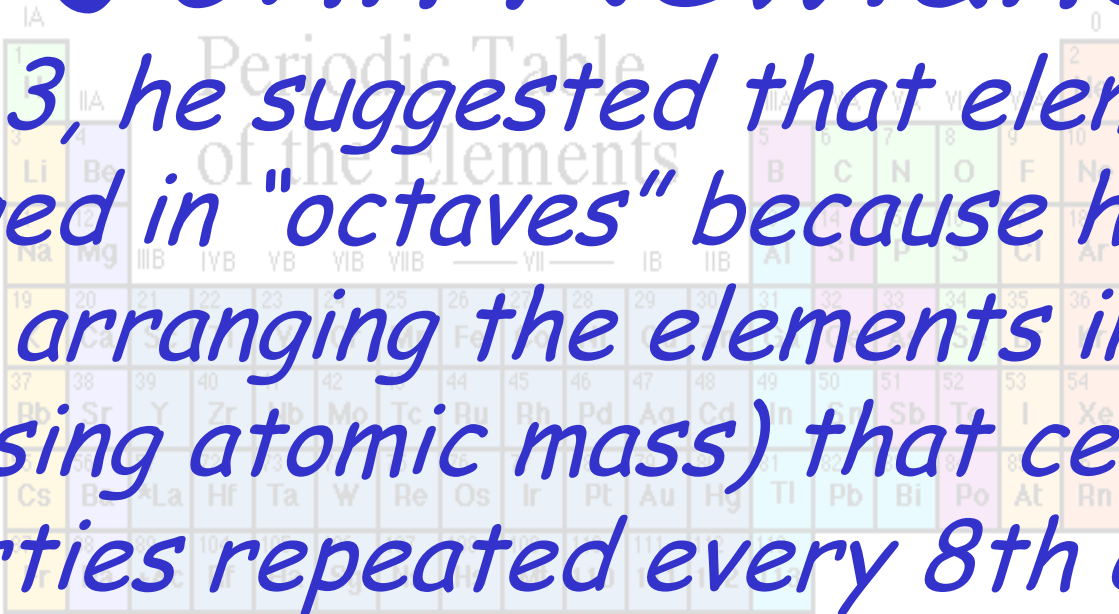
Model of triads

1780 - 1849



John Newlands

In 1863, he suggested that elements be arranged in "octaves" because he noticed (after arranging the elements in order of increasing atomic mass) that certain properties repeated every 8th element.

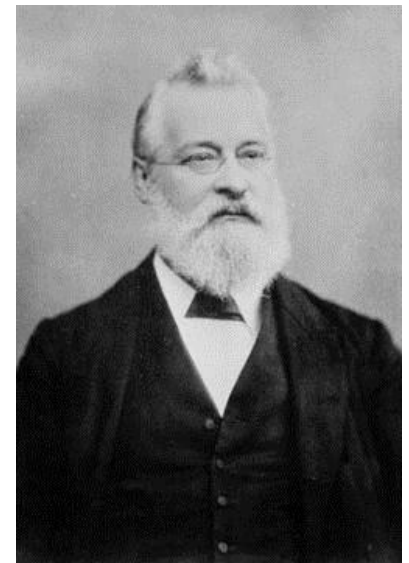


* Lanthanide Series
+ Actinide Series

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

Law of Octaves

1838 - 1898



John Newlands

H 1	Li 7	Be 9	B 11	C 12	N 14	O 16
F 19	Na 23	Mg 24	Al 27	Si 28	P 31	S 32
Cl 35	K 39	Ca 40	Cr 52	Ti 48	Mn 55	Fe 56

Newlands' claim to see a repeating pattern was met with savage ridicule on its announcement. His classification of the elements, he was told, was as arbitrary as putting them in alphabetical order and his paper was rejected for publication by the Chemical Society.

1838 - 1898

Law of Octaves

John Newlands

His law of octaves failed beyond the element calcium.

WHY?

Would his law of octaves work today with the first 20 elements?

Periodic Table
Of the Elements

* Lanthanide Series	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
+ Actinide Series	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

1838 - 1898

Law of Octaves

Lothar Meyer

At the same time, he published his own table of the elements organized by increasing atomic mass.

Periodic Table of the Elements

1	2																	18
H	He																	Ne
3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18			
Li	Be	B	C	N	O	F	Ne	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			
87	88	89	104	105	106	107	108	109	110	111	112	113						
Fr	Ra	+Ac	Rf	Ha	Sg	Ns	Hs	Mt	110	111	112	113						

* Lanthanide Series

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

+ Actinide Series

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



1830 - 1895

Periodic Table of the Elements

IA																		0
1	3	4												5	6	7	8	9
H	Li	Be												B	C	N	O	F
2	11	12												13	14	15	16	17
Na	Mg		III B	IV B	VB	VIB	VIIB	— VII —	IB	IIB			Al	Si	P	S	Cl	
3	19	20		22	23	24	25	26	27	28	29	30			33	34	35	
K	Ca			Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn			As	Se	Br	
4	37	38	39	40	41	42		44	45	46	47	48		50	51	52	53	
Rb	Sr	Y	Zr	Nb	Mo			Ru	Rh	Pd	Ag	Cd		Sn	Sb	Te	I	
5		56			73	74		76	77	78	79	80	81	82	83			
6		Ba			Ta	W		Os	Ir	Pt	Au	Hg	Tl	Pb	Bi			
7													113					

* Lanthanide Series

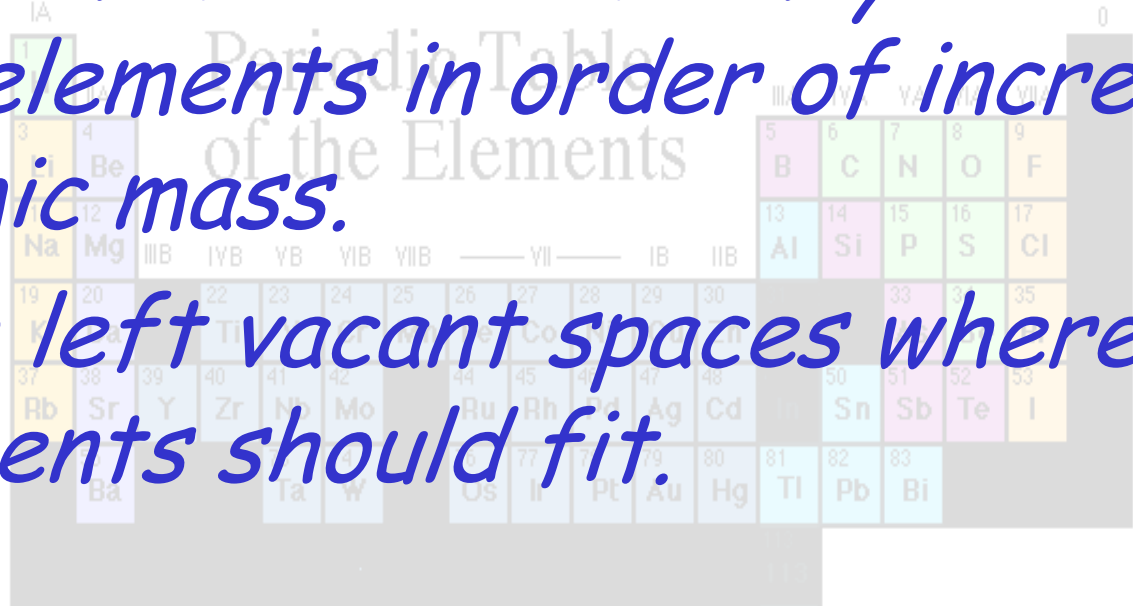
58	59			66	68
Ce	Pr			Dy	Er

+ Actinide Series

	91	93		
	Pa	Np		

Elements known at this time

- *Both Mendeleev and Meyer arranged the elements in order of increasing atomic mass.*
- *Both left vacant spaces where unknown elements should fit.*



So why is Mendeleev called the "father of the modern periodic table" and not Meyer, or both?

Mendeleev...

- *stated that if the atomic weight of an element caused it to be placed in the wrong group, then the weight must be wrong. (He corrected the atomic masses of Be, In, and U)*
- *was so confident in his table that he used it to predict the physical properties of three elements that were yet unknown.*

Periodic Table
of the Elements

1 H																	0					
3 Li	4 Be																	5 B	6 C	7 N	8 O	9 F
11 Na	12 Mg	III B	IV B	V B	VIB	VII B	— VII —			IB	IIB	13 Al	14 Si	15 P	16 S	17 Cl						
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						
37 Rb	38 Sr	39 Y	40 Zr	41 Nb	42 Mo						44 Ru	45 Rh	46 Pd	47 Ag	48 Cd	49 In	50 Sn	51 Sb	52 Te	53 I		

After the discovery of these unknown elements between 1874 and 1885, and the fact that Mendeleev's predictions for Sc, Ga, and Ge were amazingly close to the actual values, his table was generally accepted.

However, in spite of Mendeleev's great achievement, problems arose when new elements were discovered and more accurate atomic weights determined. By looking at our modern periodic table, can you identify what problems might have caused chemists a headache?

* Lanthanide Series	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
+ Actinide Series	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

Ar and K

Co and Ni

Te and I

Th and Pa

Henry Moseley

In 1913, through his work with X-rays, he determined the actual nuclear charge (atomic number) of the elements. He rearranged the elements in order of increasing atomic number.*

**"There is in the atom a fundamental quantity which increases by regular steps as we pass from each element to the next. This quantity can only be the charge on the central positive nucleus."*

1887 - 1915



Henry Moseley

Periodic Table
of the Elements

His research was halted when the British government sent him to serve as a foot soldier in WWI. He was killed in the fighting in Gallipoli by a sniper's bullet, at the age of 28. Because of this loss, the British government later restricted its scientists to noncombatant duties during WWII.

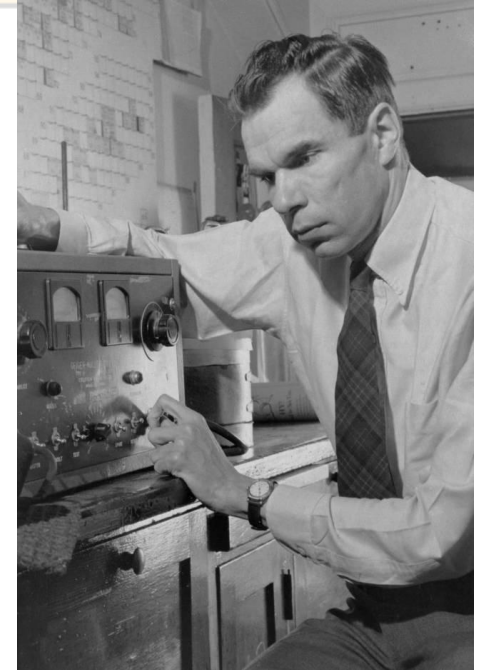
Glenn T. Seaborg

After co-discovering 10 new elements, in 1944 he moved 14 elements out of the main body of the periodic table to their current location below the Lanthanide series. These became known as the Actinide series.

+ Actinide Series

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

1912 - 1999



Glenn T. Seaborg

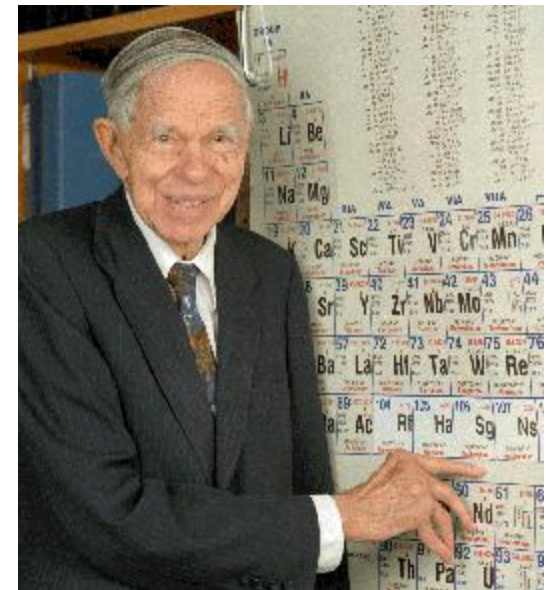
Periodic Table
of the Elements

1	2											10					
H	He											He					
3	4											10					
Li	Be											Ne					
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	Cobalt	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	113					
Fr	Ra	+Ac	Rf	Ha	Sg	Ns	Hs	Mt	110	111	112	113					

He is the only person to have an element named after him while still alive.

"This is the greatest honor ever bestowed upon me - even better, I think, than winning the Nobel Prize."

1912 - 1999



Periodic Table of the Elements

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	*La	57 Hf	58 Ta	59 W	60 Re	61 Os	62 Ir	63 Pt	64 Au	65 Hg	66 Tl	67 Pb	68 Bi	69 Po	70 At	71 Rn
87 Fr	88 Ra	+Ac	89 Rf	90 Db	91 Sg	92 Bh	93 Hs	94 Mt	95 Ds	96 Rg	97 Cn	98 Nh	99 Fl	100 Mc	101 Lv	102 Ts	103 Og

Periodic Table Geography

* Lanthanide Series
+ Actinide Series

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

Periodic Table of the Elements

1	IA																0							
1	H																	He						
2	3	4																	5	6	7	8	9	10
	Li	Be																	B	C	N	O	F	Ne
3	11	12	III B	IV B	V B	VIB	VII B	VII			IB	IIB	13	14	15	16	17	18						
	Na	Mg										Al	Si	P	S	Cl	Ar							
4	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						
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	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						
7	87	88	89	104	105	106	107	108	109	110	111	112	113											
	Fr	Ra	+Ac	Rf	Ha	Sg	Ns	Hs	Mt	110	111	112	113											



* Lanthanide Series	58	59	60	61	62	63	64	65	66	67	68	69	70	71
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+ Actinide Series	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

The horizontal rows of the periodic table are called PERIODS.



Periodic Table

	IA	IIA	III A										IVA	VA	VIA	VIIA	0
1	1 H															2 He	
2	3 Li	4 Be															
3	11 Na	12 Mg															
4	19 K	20 Ca															
5	37 Rb	38 Sr															
6	55 Cs	56 Ba	*La														
7	87 Fr	88 Ra	+Ac														

The elements in any group of the periodic table have similar physical and chemical properties!

* Lanthanide Series	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
+ Actinide Series	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

*The vertical columns of the periodic table are called **GROUPS**, or **FAMILIES**.*

Periodic Law

When elements are arranged in order of increasing atomic number, there is a periodic pattern in their physical and chemical properties.

1	2	3	4	5	6	7	8	9	10
Li	Be	B	C	N	O	F	Ne		
Na	Mg	Al	Si	P	S	Cl	Ar		
K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni
Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd
Cs	Ba	*La	Hf	Ta	W	Re	Os	Ir	Pt
Fr	Ra	+Ac	Rf	Ha	Sg	Ns	Hs	Mt	110
									111
									112
									113

* Lanthanide Series

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

+ Actinide Series

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

Periodic Table of the Elements

1 H																	2 He	
3 Li	4 Be											5 B	6 C	7 N	8 O	9 F	10 Ne	
11 Na	12 Mg	III B	IV B	V B	VI B	VII B	VIII		IX	X	IB	IIB	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	*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	+Ac	104 Rf	105 Ha	106 Sg	107 Ns	108 Hs	109 Mt	110	111	112	113						

* Lanthanide Series
+ Actinide Series



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

Alkali Metals

Periodic Table of the Elements

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 Rf	105 Ha	106 Sg	107 Ns	108 Hs	109 Mt	110	111	112	113					

* Lanthan Series

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

+ Actinide Series

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

Alkaline Earth Metals

Periodic Table of the Elements

1 H																	2 He
3 Li	4 Be											5 B	6 C	7 N	8 O	9 F	10 Ne
11 Na	12 Mg	III B	IV B	V B	VI B	VII B	VIII			IX	X	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 Rf	105 Ha	106 Sg	107 Ns	108 Hs	109 Mt	110 110	111 111	112 112	113					

* Lanthanide Series
+ Actinide Series

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



Transition Metals

These elements are also called the rare-earth elements.

Periodic Table of the Elements

1 H																	2 He
3 Li	4 Be											5 B	6 C	7 N	8 O	9 F	10 Ne
11 Na	12 Mg	III B	IV B	V B	VIB	VII B	VII		IB	IIB	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	*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	+Ac	104 Rf	105 Ha	106 Sg	107 Ns	108 Hs	109 Mt	110	111	112	113					



* Lanthanide Series
+ Actinide Series

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

Inner Transition Metals

Periodic Table of the Elements

1	2											3	4	5	6	7	8	9	10
1	2											3	4	5	6	7	8	9	10
3	4											5	6	7	8	9	10		
11	12	13	14	15	16	17	18												
19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36		
37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54		
55	56	57	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86		
87	88	89	104	105	106	107	108	109	110	111	112	113							

* Lanthanide Series
+ Actinide Series

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



Halogens

Periodic Table of the Elements

1 H																	2 He
3 Li	4 Be											5 B	6 C	7 N	8 O	9 F	10 Ne
11 Na	12 Mg	III B	IV B	V B	VI B	VII B	VIII			IX B	X B	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	*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	+Ac	104 Rf	105 Ha	106 Sg	107 Ns	108 Hs	109 Mt	110	111	112	113					

* Lanthanide Series

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
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+ Actinide Series

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
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Noble Gases

Periodic Table of the Elements

1	2											3	4	5	6	7	8	9	10																														
1	H											He																																					
2	3	4											5	6	7	8	9	10																															
2	Li	Be											B	C	N	O	F	Ne																															
3	11	12	13	14	15	16	17	18											19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36													
3	Na	Mg	Al	Si	P	S	Cl	Ar											K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr													
4	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36																															
4	K	Ca	Sc	Ti	V	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																															
5	Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I	Xe																															
6	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103
6	Cs	Ba	*La	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At	Rn																															
7	87	88	89	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118																															
7	Fr	Ra	+Ac	Rf	Ha	Sg	Bh	Hs	Mt	110	111	112	113	114	115	116	117	118																															
			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																																	

*The s and p block elements
are called*

REPRESENTATIVE ELEMENTS.

The periodic table is the most important tool in the chemist's toolbox!

Periodic Table of the Elements

1 H	IIA																2 He	
3 Li	4 Be	IIIA IVA VA VIA VIIA														10 Ne		
11 Na	12 Mg	13 B	14 C	15 N	16 O	17 F	18 Ar	IIIB IVB VB VIB VIIB VIII										36 Kr
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 Rf	105 Db	106 Sg	107 Bh	108 Hs	109 Mt	110 Ds	111 Rg	112 Cn	113 Nh	114 Fl	115 Mc	116 Lv	117 Ts	118 Og	
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				

