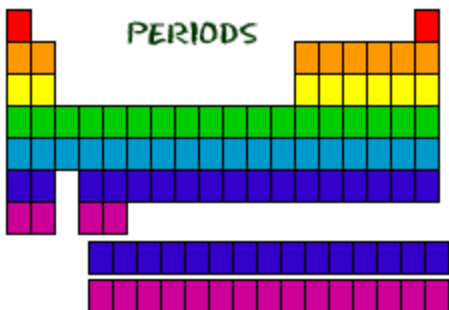


## Chemistry Lecture #29: Sections of the Periodic Chart

The periodic chart is divided into many sections. You need to memorize the location and names of the sections.

Horizontal rows are called periods. There are seven periods on the periodic chart.



PERIODIC TABLE OF THE ELEMENTS

1A																2A																3A										4A										5A										6A										7A										8A	
1		2		3		4		5		6		7		8		9		10		11		12		13		14		15		16		17		18		19		20																																													
H 1.008		He 4.003		Li 6.939		Be 9.0122		B 10.811		C 12.011		N 14.007		O 15.999		F 18.998		Ne 20.183		Na 22.99		Mg 24.312		Al 26.982		Si 28.086		P 30.974		S 32.064		Cl 35.453		Ar 39.948		K 39.102		Ca 40.08		Sc 44.956		Ti 47.9		V 50.942		Cr 51.996		Mn 54.938		Fe 55.847		Co 58.933		Ni 58.71		Cu 63.546		Zn 65.37		Ga 69.72		Ge 72.59		As 74.922		Se 78.96		Br 79.904		Kr 83.8													
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													
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													
85.47		87.62		88.905		91.22		92.906		95.94		97.90		101.07		102.91		106.4		107.87		112.4		114.82		118.69		121.75		127.6		128.9		131.3		132.91		137.34		138.91		178.49		180.95		183.85		186.2		190.2		192.2		195.08		196.97		200.59		204.37		207.19		208.98		210		210		210		222											
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																					
Cs		Ba		La		Ce		Pr		Nd		Pm		Sm		Eu		Gd		Tb		Dy		Ho		Er		Tm		Yb		Lu		Hf		Ta		W		Re		Os		Ir		Pt		Au		Hg		Tl		Pb		Bi		Po		At		Rn																					
132.91		137.34		138.91		140.91		144.24		145		150.35		151.96		157.25		168.92		173.04		175.07		178.49		180.95		183.85		186.2		188.91		191.22		193.04		195.08		196.97		198.91		200.59		201.09		202.03		203.07		204.09		205.09		206.03		207.03		208.03		209.03		210.03																			
87		88		89		90		91		92		93		94		95		96		97		98		99		100		101		102		103		104		105		106		107		108		109		110		111		112		113		114		115		116		117		118																					
Fr		Ra		Ac		Th		Pa		U		Np		Pu		Am		Cm		Bk		Cf		Es		Fm		Md		No		Lr		Rf		Ta		W		Re		Os		Ir		Pt		Au		Hg		Tl		Pb		Bi		Po		At		Rn																					
215		226.03		227.03		232.04		231		238.03		237.05		239.05		241.06		244.06		249.08		252.08		257.1		262.1		267.1		272.1		277.1		282.1		287.1		292.1		297.1		302.1		307.1		312.1		317.1		322.1		327.1		332.1		337.1		342.1																									

■ Gaseous at room temperature  
■ Liquid at room temperature  
■ Gallium metal at 29.76 deg. C.  
■ Synthetic elements  
 All other elements are solid at room temperature

Period 1 (red) contains elements H and He.

Period 2 (orange) contains elements Li, Be, B, C, N, O, and F.

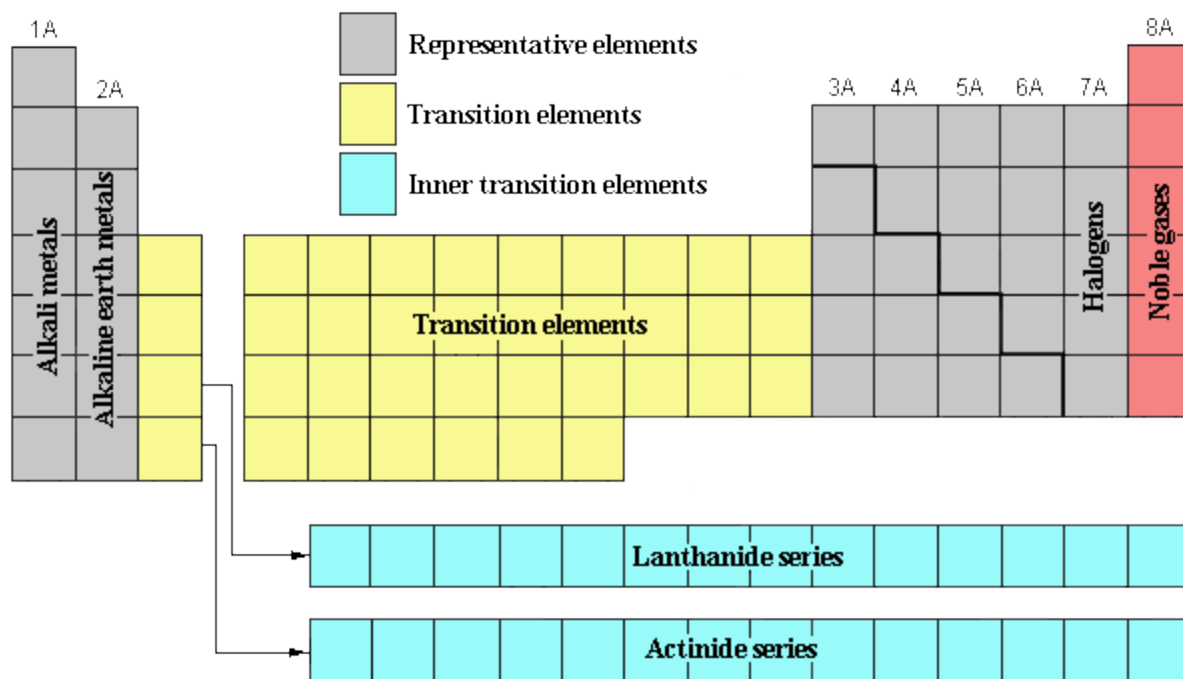
Period 3 (yellow) contains elements Na, Mg, Al, Si, P, S, Cl, and Ar.

Period 4 (green) contains K, Ca, Sc, Ti, V, Cr, Mn, Fe, Co, Ni, Cu, Zn, Ga, Ge, As, Se, Br, and Kr

And so on.

There are two horizontal rows below the main chart, but these have separate names that we'll get to later.





Representative elements include groups 1, 2, and 13 through 18. These elements appear in the above picture shaded in grey or red (noble gases are also representative elements). These are sometimes called the main group elements.

Notice that the numbers above the columns are different: group 1 is labeled 1A, group 2 is labeled 2A, and columns 13 through 18 are labeled 3A through 8A. On some periodic charts, Roman numerals are used to label the columns (e.g., VI A is used instead of 6A). This is an older style of labeling the representative elements that you need to know.

Group 1 or 1A elements are called alkali metals.

Group 2 or 2A elements are called alkali earth metals.

Group 17 or 7A elements are called halogens (ever heard of halogen lamps?).

Group 18 or 8A elements are known as the noble gases.

Transition elements include groups 3 through 12. This is the block of elements that is in the middle of the chart between the two taller columns.

TRANSITION ELEMENTS (highlighted in green)

1 1A	2 2A																13 3A	14 4A	15 5A	16 6A	17 7A	18 8A	
		3 3B	4 4B	5 5B	6 6B	7 7B	8 8B	9 8B	10 8B	11 1B	12 2B												
		Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn												
		Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd												
		La	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg												
		Ac	Rf	Db	Sg	Bh	Hs	Mt															


Notice again that alternate labels are used on the columns. Groups 3 through 7 are labeled 3B through 7B. Groups 8, 9, and 10 are collectively labeled 8B. And groups 11 and 12 are labeled 1B and 2B. This is also an older form of labeling that does not appear on all periodic charts.

Look for Ba and Hf on your periodic chart. In between these two elements is either a blank box, La, Lu, or La-Lu. This indicates that elements 57 through 71 are all crammed into the box

that is between Ba and Hf. These elements are called the lanthanide series. They are written as a separate row below the main chart.

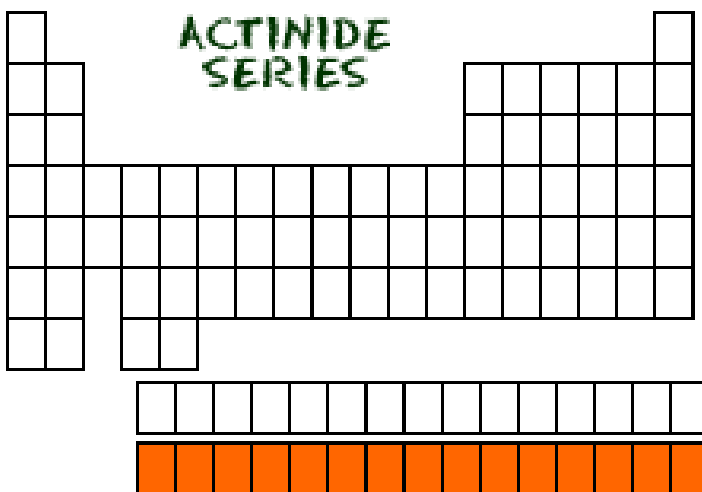
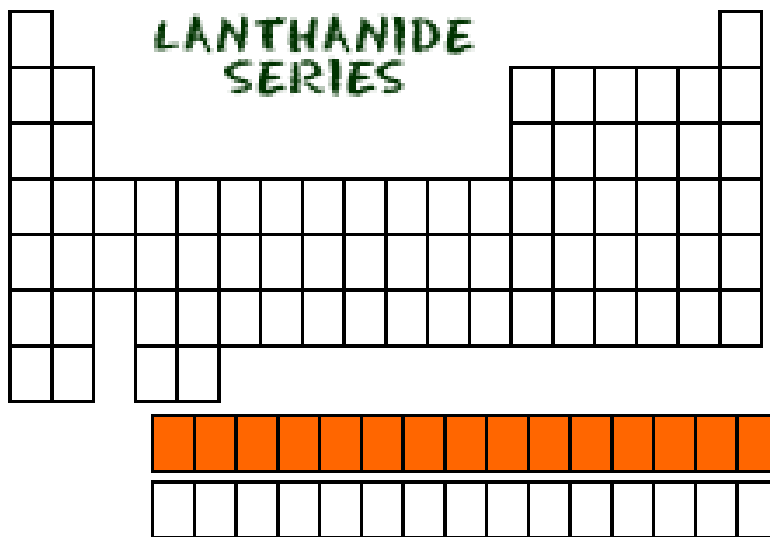
Likewise, look for Ra and Rf on the periodic chart. In between these two elements is either a blank box, Ac, Lr, or Ac-Lr. This indicates that elements 89 through 103 are all crammed into the box that is between Ra and Rf. These elements are called the actinide series. They are also written as a separate row below the main chart (beneath the lanthanide series).

CLOSE UP OF AREA BETWEEN Ba and Hf, & Ra and Rf.

19 <b>K</b> 39.098 POTASSIUM	20 <b>Ca</b> 40.078 CALCIUM	21 <b>Sc</b> 44.956 SCANDIUM	22 <b>Ti</b> 47.867 TITANIUM	23 <b>V</b> 50.942 VANADIUM
37 <b>Rb</b> 85.468 RUBIDIUM	38 <b>Sr</b> 87.62 STRONTIUM	39 <b>Y</b> 88.906 YTTRIUM	40 <b>Zr</b> 91.224 ZIRCONIUM	41 <b>Nb</b> 92.906 NIOBIUM
55 <b>Cs</b> 132.905 CESIUM	56 <b>Ba</b> 137.327 BARIUM	57-71 <b>La-Lu</b> LANTHANIDES	72 <b>Hf</b> 178.49 HAFNIUM	73 <b>Ta</b> 180.95 TANTALUM
87 <b>Fr</b> 223.020 FRANCIUM	88 <b>Ra</b> 226.0254 RADIUM	89-103 <b>Ac-Lr</b> ACTINIDES	104 <b>Rf</b> 263.113 RUTHERFORDIUM	105 <b>Db</b> 262.114 DUBNIUM

57 <b>La</b> 138.905 LANTHANUM	58 <b>Ce</b> 140.116 CERIUM	59 <b>Pr</b> 140.908 PRASEODYMIUM	60 <b>Nd</b> 144.242 NEODYMIUM	61 <b>Pm</b> 144.913 PROMETHIUM	62 <b>Sm</b> 150.362 SAMARIUM	63 <b>Eu</b> 151.964 EUROPIUM	64 <b>Gd</b> 157.253 GADOLINIUM
89 <b>Ac</b> 227.027 ACTINIUM	90 <b>Th</b> 232.038 THORIUM	91 <b>Pa</b> 231.036 PROTACTINIUM	92 <b>U</b> 238.029 URANIUM	93 <b>Np</b> 237.048 NEPTUNIUM	94 <b>Pu</b> 244.064 PLUTONIUM	95 <b>Am</b> 243.061 AMERICIUM	96 <b>Cm</b> 247.070 CURIUM



Lanthanides and actinides are separated from the main chart because they have distinct electron configurations, and because the chart is easier to look at when these groups are placed on the bottom.

The periodic chart can also be divided into metals, nonmetals, and semi-metals (also called metalloids).

Metals are shiny, malleable, and conduct heat and electricity.

Non-metals are dull, brittle, and do not conduct heat and electricity.

Metalloids have characteristics in between those of metals and non-metals. They are not quite shiny, and are poor conductors of heat and electricity (like a semiconductor).

Some periodic charts have a thick jagged, diagonal line on the right side of the chart that runs down from boron (B) to astatine (At). In general, metals are on the left of the jagged line. Non-metals are on the right of the jagged line. And semi-metals (or metalloids) exist along the jagged line.

																		Nonmetals													
																		Semimetals													
																		Metals													
H																	H	He													
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	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	Unq	Unp	Unh	Uns	Uno	Une																							
																		Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu
																		Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No	Lr