

The Periodic Table

Periodic Table of the Elements

1A																	0		
1	H																	2	
2	Li	Be																	10
3	Na	Mg	III B	IV B	V B	VIB	VII B	VII		IB	IB	III A	IV A	V A	VIA	VII A	18		
4	K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br		
5	Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I		
6	Cs	Ba	*La	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At		
7	Fr	Ra	+Ac	Rf	Ha	106	107	108	109	110									

* 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

Why is the Periodic Table important to me?



The periodic table is the most useful tool to a chemist.

You get to use it on every test.

It organizes lots of information about all the known elements.

Pre-Periodic Table Chemistry ...

...was a mess!!!

No organization of elements.

Imagine going to a grocery store with no organization!!

Difficult to find information.

Chemistry didn't make sense.

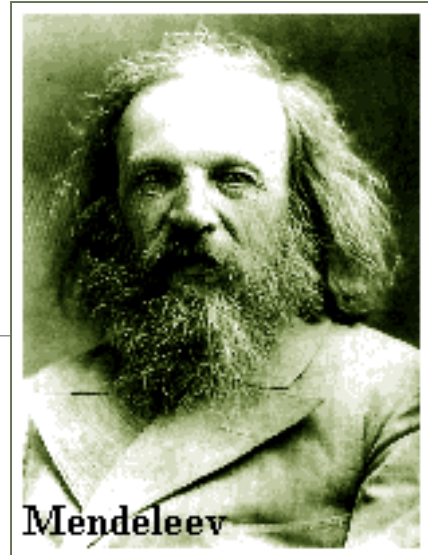


Dmitri Mendeleev: Father of the Table

HOW HIS WORKED...

Put elements in rows by
increasing atomic weight.

Put elements in columns
by the way they reacted.



SOME PROBLEMS...

He left blank spaces for what he said
were undiscovered elements.
(Turned out he was right!)

He broke the pattern of increasing
atomic weight to keep similar reacting
elements together.




The Current Periodic Table

Mendeleev wasn't too far off.

Now the elements are put in rows by increasing

ATOMIC NUMBER!!

It is also separated by metals, metalloids, and non-metals.



METALS are on the
LEFT (GREEN)

METALLOIDS are in
between , along the
staircase (**BLUE**)

NON-METALS are on
the **RIGHT (YELLOW)**

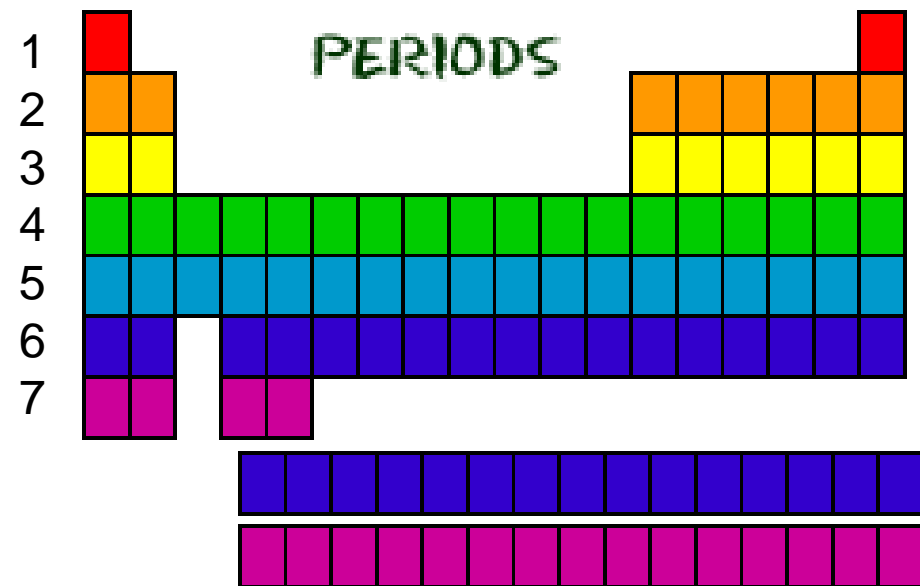
1 H																	2 He
3 Li	4 Be											5 B	6 C	7 N	8 O	9 F	10 Ne
11 Na	12 Mg											13 Al	14 Si	15 P	16 S	17 Cl	18 Ar
19 K	20 Ca	21 Sc	22 Ti	23 V	24 Cr	25 Mn	26 Fe	27 Co	28 Ni	29 Cu	30 Zn	31 Ga	32 Ge	33 As	34 Se	35 Br	36 Kr
37 Rb	38 Sr	39 Y	40 Zr	41 Nb	42 Mo	43 Tc	44 Ru	45 Rh	46 Pd	47 Ag	48 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	110 110	111 111	112 112	113 113					
		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		

Grouping elements together according to their properties helps predict how they might react!

list the properties for each group of elements below.

	METALS	NON-METALS	METALLOIDS
Lustre			
Malleability			
Ductility			
Conductivity			
State			
Density			
Reactivity			

The Periods...



Even though they skip some squares in between, all of the rows go left to right. When you look at a periodic table, each of the rows is considered to be a different **period**.

Periods = Rows

- In the periodic table, elements have something in common if they are in the same row.
- All of the elements in a period have the same number of atomic orbitals.
- Every element in the top row (the first period) has one orbital for its electrons. All of the elements in the second row (the second period) have two orbitals for their electrons. It goes down the periodic table like that.

Families on the Periodic Table

Elements on the periodic table can be grouped into families (vertical columns) based on their similar **chemical** properties.

Each family has a **specific name** to differentiate it from the other families in the periodic table.

Elements in each family
react differently with
other elements.

[illegible]

* 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

On your Periodic Table...

Color each family a specific color (you may choose which colors to use, but don't use the same one twice!)

Lightly shade in the corresponding family box from your notes with the same color that you used for that family on your table. This will serve as your key.

ALKALI METALS

Group 1

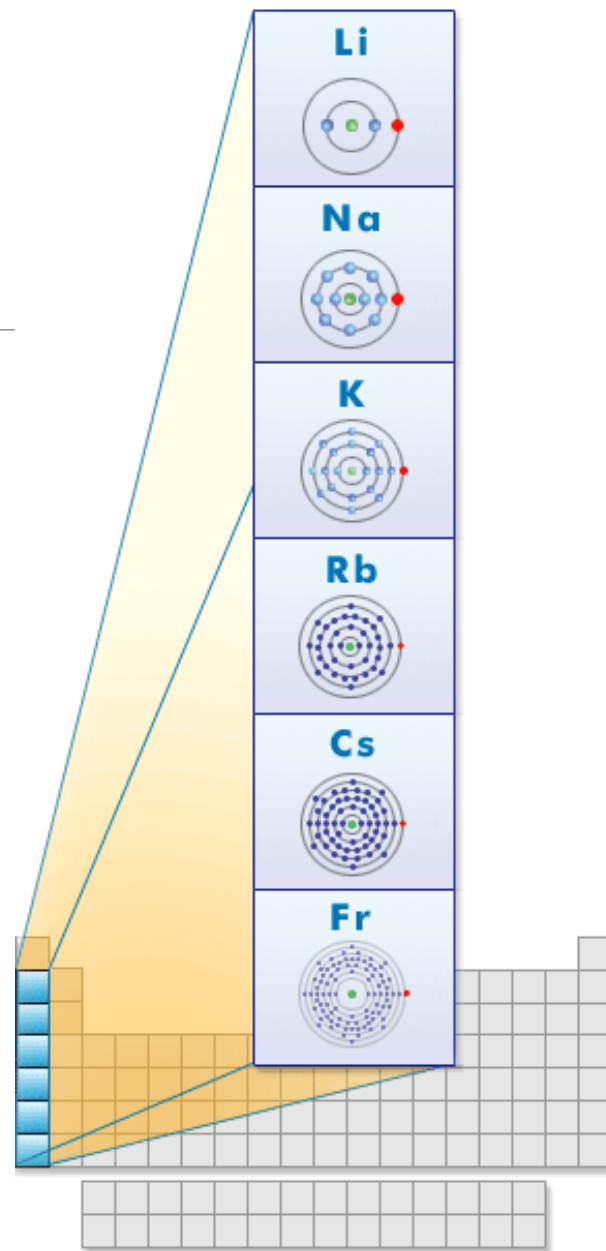
Hydrogen is *not* a member, it is a non-metal

1 electron in the outer shell

Soft metals; soft enough to cut with a butter knife

Very reactive, can explode when they are exposed to water

Conduct electricity



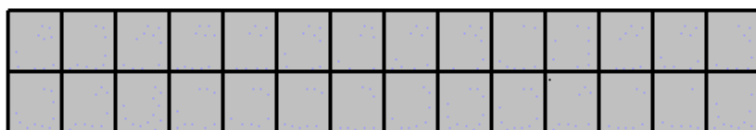
ALKALINE EARTH METALS

A blank periodic table grid with the text "ALKALINE EARTH METALS" in green, bold, capital letters in the top left corner. The grid is composed of white squares with black outlines, arranged in a standard periodic table layout. The first two columns (Groups 1 and 2) are highlighted in light blue. The text is positioned above the first two columns, spanning the first three rows.

Group 2

- 2 electrons in the outer shell
- Reactive, but less than Alkali metals
- Conduct electricity

Periodic Table
of the Elements



- Good conductors of heat and electricity.
- Some are used for jewelry.
- The transition metals are able to put up to 32 electrons in their second to last shell.

BORON FAMILY

Group 13

Periodic Table of the Elements

- 3 electrons in the outer shell
- Most are metals
- Boron is a **metalloid**
- Aluminum metal was once rare and expensive, not a “disposable metal.”

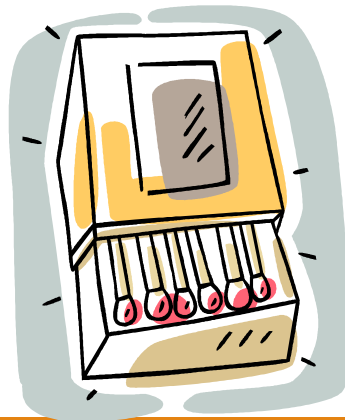
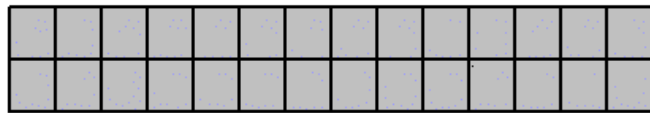
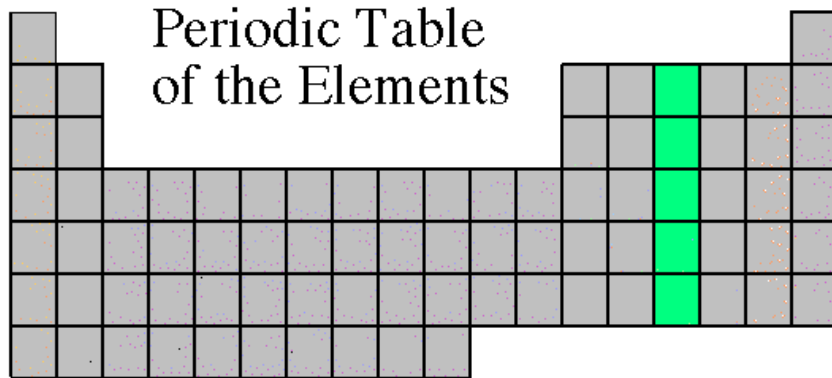


Group 14

- 4 electrons in the outer shell
- Contains elements important to life and computers.
- Carbon is the basis for an **entire branch** of chemistry.
- Silicon and Germanium are important semiconductors.

NITROGEN FAMILY

Periodic Table of the Elements



Group 15

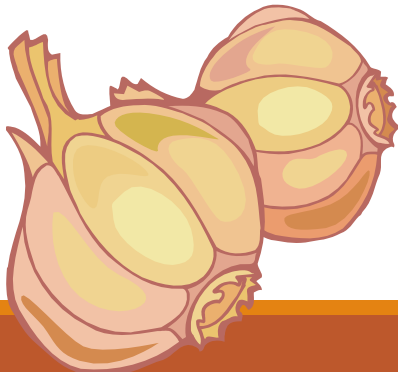
- 5 electrons in the outer shell
- Nitrogen makes up over $\frac{3}{4}$ of the atmosphere.
- Nitrogen and phosphorus are both important in living things.
- The red stuff on the tip of matches is phosphorus.

OXYGEN FAMILY

Periodic Table
of the Elements

Group 16

- 6 electrons in the outer shell
- Reactive
- Oxygen is necessary for respiration.
- Many things that stink, contain sulfur (rotten eggs, garlic, skunks, etc.)

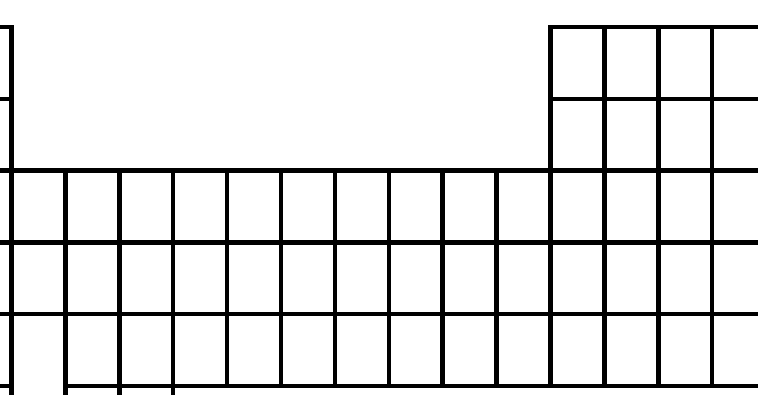


Halogens



THE HALOGEN GROUP

THE HALOGEN GROUP

[illegible]

Group 17

- 7 electrons in the outer shell
- All are **non-metals**
- **Very reactive**, are often bonded with elements from Group 1
- Used as disinfectants and to strengthen teeth.

Noble Gases

THE INERT GASES (NOBLE GASES)

Group 18

- Exist as gases
- Non-metals
- Not reactive with other elements because outer shell is full
- Used in lighted “neon” signs.

Rare Earth Metals

Periodic Table of the Elements

The diagram shows a simplified periodic table. The main table consists of 7 rows and 18 columns. The first two columns are on the left, and the last two are on the right. The middle 14 columns are filled with gray cells. Below the main table, there is a separate row of 14 blue cells, representing the f-block (lanthanides and actinides).

- The rare earths are silver, silvery-white, or gray metals.
- Conduct electricity
- Found in the earth
- Some are radioactive