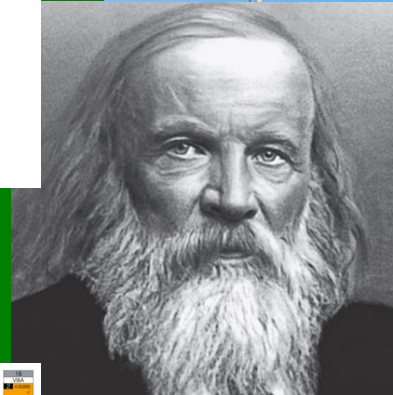
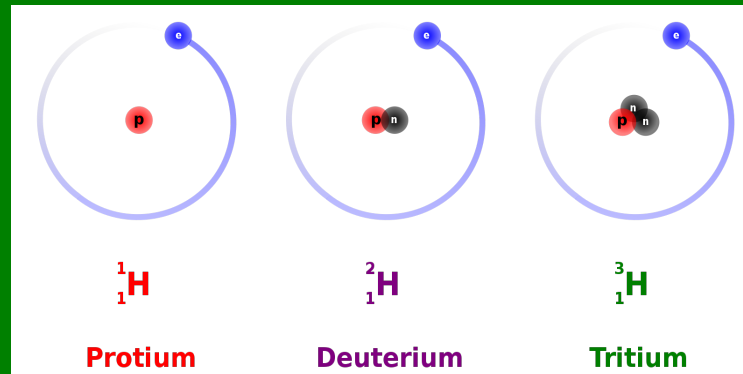


The Periodic Table and Bohr Rutherford Diagrams

- Periodic Table History
- Elements
- Current Periodic Table
- Atomic Number
- Atomic Mass
- Isotopes
- Valence Electrons
- Periodic Table Properties
- Atomic Radius
- Electronegativity
- Bohr-Rutherford Diagrams



PERIODIC TABLE OF THE ELEMENTS

The table displays elements from Hydrogen (H) to Oganesson (Og). It includes atomic numbers, element symbols, and names. The table is color-coded by groups: s-block (pink), p-block (various colors), d-block (blue), and f-block (yellow/green).

Preview File

Please enjoy this preview of your Student Version of the presentation. Please note within this sample file:

- Some slides appear blank because they have been removed
- Student versions have portions of the text removed which is given in the teacher version and appear as _____ which the students are to fill in
- Other slides may have on them, this represents writing that has been removed on this sample

The paid full version of your resource includes both Google Slides and PowerPoint and is Google Classroom Ready





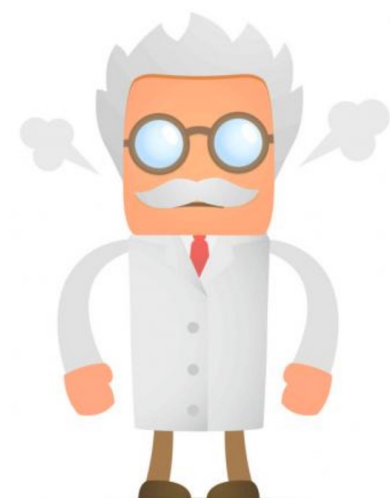
1 - Meet the Elements

Why is the Periodic Table Important?



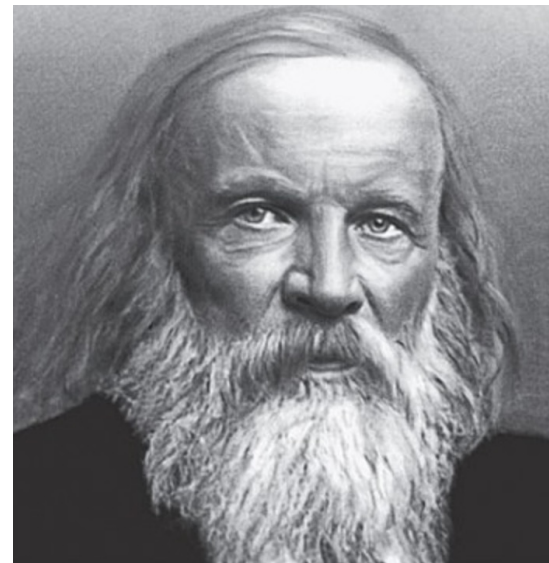
Before the periodic table, chemistry ...

- was a mess!
- The elements weren't organized in any kind of logical way
- It was difficult to find information
- Chemistry didn't make sense



Mendeléeev

- The first accepted version of the periodic table was created in 1869 by Dmitri Ivanovitch Mendeléeev
- He grouped elements according to their atomic mass, and as he did, he found that the families had similar chemical properties
- His understanding was so advanced that _____



The Current Periodic Table

- Mendeleev was very close
- _____
- The horizontal rows are called periods and are labeled from 1 to 7
- The vertical columns are called groups and are labeled from 1 to 18



2 – Periodic Table Song

The Elements

- There are 118 elements, 98 of which occur naturally
- The remainder have been created in the lab
- The universe as we know it is created out of these elements and nothing else however, there may be others we aren't yet aware of



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PERIODIC TABLE OF THE ELEMENTS

The periodic table is organized into groups and periods. The groups are labeled at the top: IA, IIA, IIIA, IVA, VA, VIA, VIIA, VIIIA, and the f-block elements (labeled f-elements). The periods are labeled on the left: 1, 2, 3, 4, 5, 6, 7.

Callouts and Legends:

- Atomic number:** The number in the top left corner of each element's box.
- Symbol:** The chemical symbol in the center of the box.
- Name:** The element's name at the bottom of the box.
- Atomic weight:** The number in the top right corner of the box.
- Electronic configuration:** The configuration of electrons, shown in the top right corner of the box.
- Oxidation states:** The numbers in the bottom right corner of the box.
- Chemical symbol of the element:** The symbol in the center of the box.
- Element type:** The color of the box indicates the element's type: s-block (blue), d-block (green), p-block (red), and f-block (purple).
- Legend:** A key for the oxidation states and element types.

Legend:

- oxidation states:** The numbers in the bottom right corner of the box.
- element type:** The color of the box indicates the element's type: s-block (blue), d-block (green), p-block (red), and f-block (purple).

Groups and Periods:

- Groups:** IA, IIA, IIIA, IVA, VA, VIA, VIIA, VIIIA, and the f-block elements (labeled f-elements).
- Periods:** 1, 2, 3, 4, 5, 6, 7.

Elements:

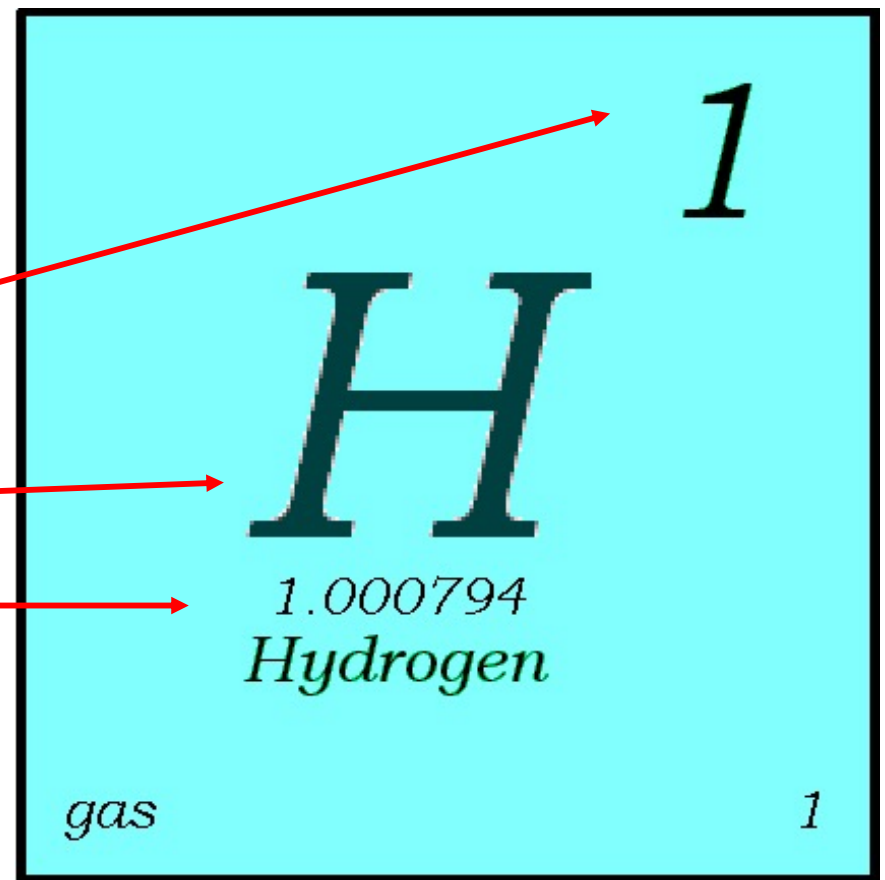
- s-block elements:** H, He, Li, Be, Na, Mg, K, Ca, Rb, Sr, Cs, Ba, Fr, Ra.
- d-block elements:** Sc, Ti, V, Cr, Mn, Fe, Co, Ni, Cu, Zn, Ga, Ge, As, Se, Br, Kr, Y, Zr, Nb, Mo, Tc, Ru, Rh, Pd, Ag, Cd, In, Sn, Sb, Te, I, Xe, La, Ce, Pr, Nd, Pm, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu, Th, Pa, U, Np, Pu, Am, Cm, Bk, Cf, Es, Fm, Md, No, Lr.
- p-block elements:** B, C, N, O, F, Ne, Al, Si, P, S, Cl, Ar, Ga, Ge, As, Se, Br, Kr, In, Sn, Sb, Te, I, Xe, La, 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.
- f-block elements:** La, 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.

f - elements

What Does Each Square on a Periodic Table Tell Us?

Different periodic tables can include various bits of information, but usually include the

- atomic number
- symbol
- atomic mass
- state of matter at room temperature



Atomic Number

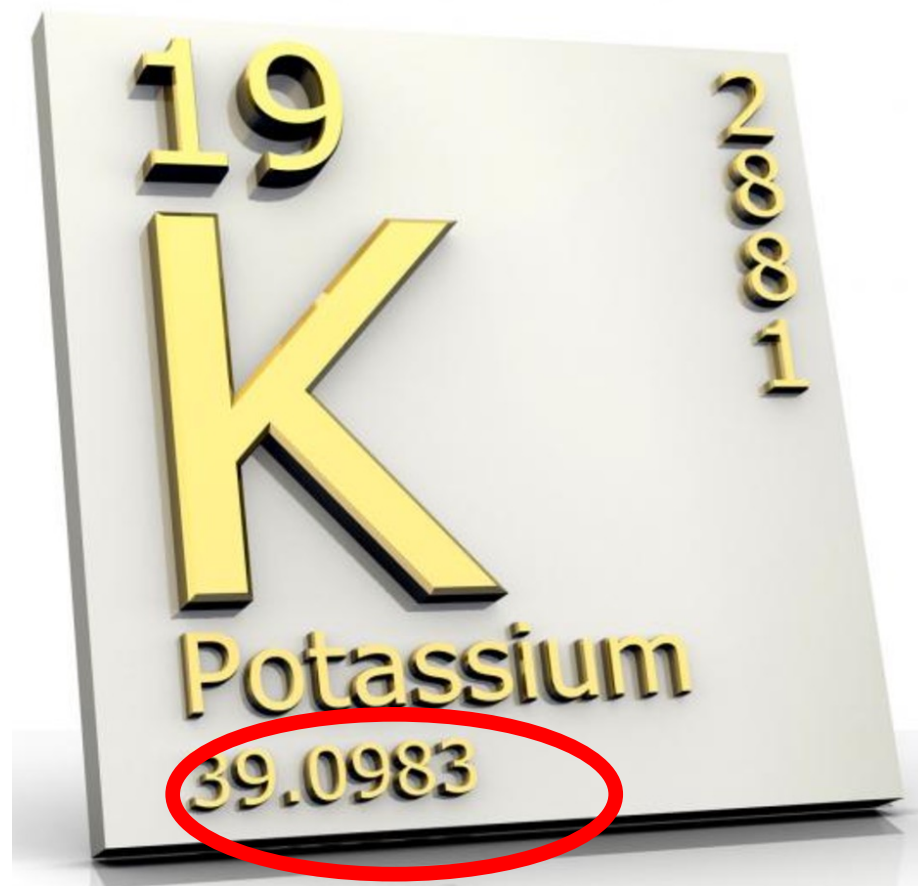


- _____
- No two elements have the same number of protons

Atomic Mass

- Atomic Mass refers to the “weight” of the atom

- _____

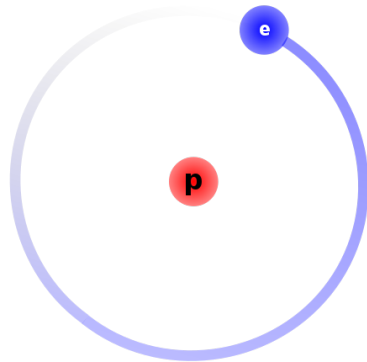


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Isotopes

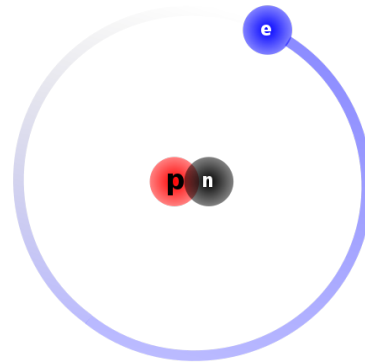
- While most atoms of an element have the same number of neutrons, some don't
 - E.g., Some Lithium atoms can have 3 neutrons while other can have 4

•



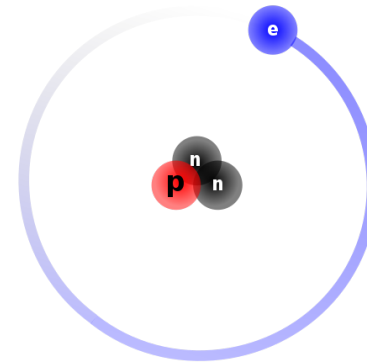
${}^1_1\text{H}$

Protium



${}^2_1\text{H}$

Deuterium



${}^3_1\text{H}$

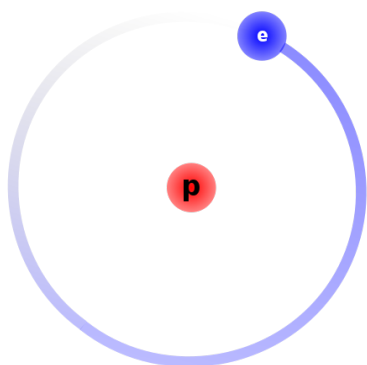
Tritium

3

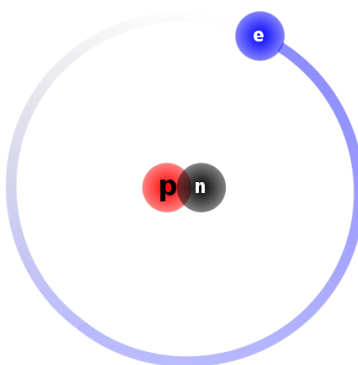


Isotope Formulas

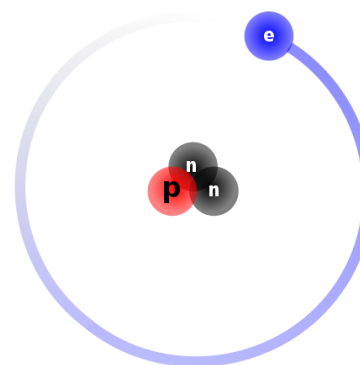
- We write the symbol – mass (protons + neutrons)
- Hydrogen → _____
- Helium → _____
- Lithium → _____



Protium



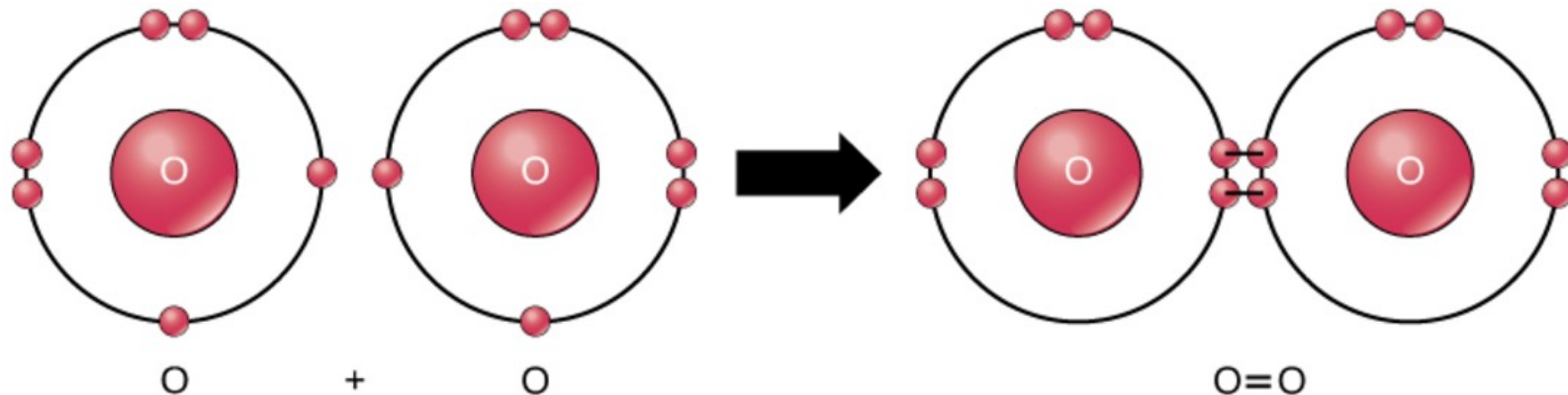
Deuterium



Tritium

Valence Electrons

- The
- Valence electrons are the electrons in the outer energy level of an atom
- _____



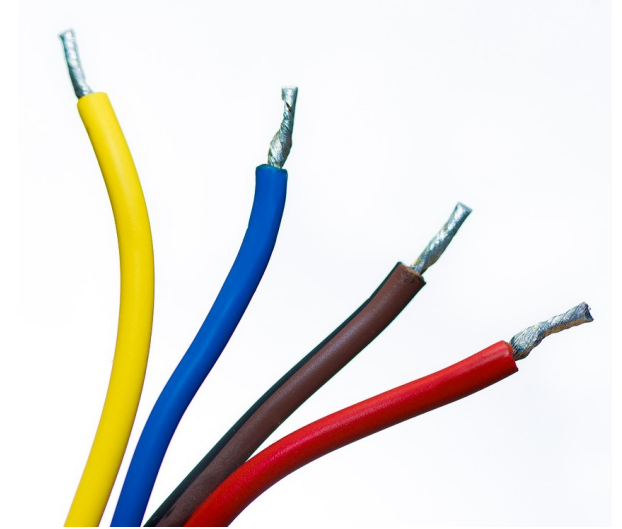
Metals, Non-Metals, and Metalloids

1 H Hydrogen 1.008																	2 He Helium 4.003				
3 Li Lithium 6.94	4 Be Beryllium 9.012															5 B Boron 10.81	6 C Carbon 12.011	7 N Nitrogen 14.007	8 O Oxygen 15.999	9 F Fluorine 18.998	10 Ne Neon 20.180
11 Na Sodium 22.990	12 Mg Magnesium 24.305															13 Al Aluminum 26.982	14 Si Silicon 28.085	15 P Phosphorus 30.974	16 S Sulfur 32.06	17 Cl Chlorine 35.45	18 Ar Argon 39.948
19 K Potassium 39.098	20 Ca Calcium 40.078	21 Sc Scandium 44.956	22 Ti Titanium 47.867	23 V Vanadium 50.942	24 Cr Chromium 51.996	25 Mn Manganese 54.938	26 Fe Iron 55.845	27 Co Cobalt 58.933	28 Ni Nickel 58.693	29 Cu Copper 63.546	30 Zn Zinc 65.38	31 Ga Gallium 69.723	32 Ge Germanium 72.630	33 As Arsenic 74.922	34 Se Selenium 78.97	35 Br Bromine 79.904	36 Kr Krypton 83.798				
37 Rb Rubidium 85.468	38 Sr Strontium 87.62	39 Y Yttrium 88.906	40 Zr Zirconium 91.224	41 Nb Niobium 92.906	42 Mo Molybdenum 95.95	43 Tc Technetium [97]	44 Ru Ruthenium 101.07	45 Rh Rhodium 102.905	46 Pd Palladium 106.42	47 Ag Silver 107.868	48 Cd Cadmium 112.414	49 In Indium 114.818	50 Sn Tin 118.710	51 Sb Antimony 121.760	52 Te Tellurium 127.60	53 I Iodine 126.904	54 Xe Xenon 131.29				
55 Cs Cesium 132.905	56 Ba Barium 137.327	* 57 - 70	71 Lu Lutetium 174.967	72 Hf Hafnium 178.49	73 Ta Tantalum 180.948	74 W Tungsten 183.84	75 Re Rhenium 186.207	76 Os Osmium 190.23	78 Ir Iridium 192.217	79 Pt Platinum 195.084	80 Au Gold 196.967	81 Hg Mercury 200.592	82 Tl Thallium 204.38	83 Pb Lead 207.2	84 Bi Bismuth 208.980	85 At Astatine [210]	86 Rn Radon [222]				
87 Fr Francium [223]	88 Ra Radium [226]	** 89 - 102	103 Lr Lawrencium [262]	104 Rf Rutherfordium [267]	105 Db Dubnium [270]	106 Sg Seaborgium [269]	107 Bh Bohrium [270]	108 Hs Hassium [270]	109 Mt Meitnerium [278]	110 Ds Darmstadtium [281]	111 Rg Roentgenium [281]	112 Cn Copernicium [285]	113 Nh Nihonium [286]	114 Fl Flerovium [289]	115 Mc Moscovium [289]	116 Lv Livermorium [293]	117 Ts Tennessee [293]	118 Og Oganesson [294]			
* Lanthanide series			57 La Lanthanum 138.905	58 Ce Cerium 140.116	59 Pr Praseodymium 140.908	60 Nd Neodymium 144.242	61 Pm Promethium [145]	62 Sm Samarium 150.36	63 Eu Europium 151.964	64 Gd Gadolinium 157.25	65 Tb Terbium 158.925	66 Dy Dysprosium 162.500	67 Ho Holmium 164.930	68 Er Erbium 167.259	69 Tm Thulium 168.934	70 Yb Ytterbium 173.045					
** Actinide series			89 Ac Actinium [227]	90 Th Thorium 232.038	91 Pa Protactinium 231.036	92 U Uranium 238.029	93 Np Neptunium [237]	94 Pu Plutonium [244]	95 Am Americium [243]	96 Cm Curium [247]	97 Bk Berkelium [247]	98 Cf Californium [251]	99 Es Einsteinium [252]	100 Fm Fermium [257]	101 Md Mendelevium [258]	102 No Nobelium [259]					

Use the handout to colour your top periodic table like this.
Make sure you include a legend

Properties of Metals

- _____
- Metals are shiny
- Metals are ductile (can be stretched into thin wires)
- Metals are malleable (can be pounded into thin sheets)
- A chemical



Properties of Non-Metals

- Non-metals are poor conductors of heat and electricity
- Non-metals are not ductile or malleable
- Solid non-metals break easily.
- They are dull
- _____



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Columns and Families

- Elements in the periodic table are grouped into 18 columns
- Each element within a column or group contains the same number of valence electrons



PERIODIC TABLE OF THE ELEMENTS

Columns and Families

- _____
- Elements in each family have similar but not identical properties.
- For example, lithium (Li), sodium (Na), potassium (K), and other members of family 1A are all soft, white, shiny metals.



PERIODIC TABLE OF THE ELEMENTS

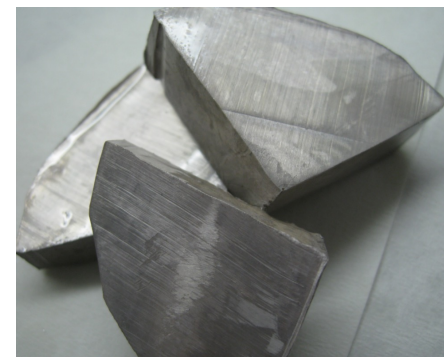
Hydrogen

- The hydrogen square sits atop Group 1, but it is not a member of that family. Hydrogen is in a class of its own
 - It's a gas at room temperature.
 - It has
-
- Hydrogen only needs 2 electrons to fill up its valence shell

The image shows a simplified periodic table grid. The first row contains one square, which is highlighted with a thick black border, representing Hydrogen. The second row contains two squares. The third row contains 16 squares. The fourth row contains 18 squares. The fifth row contains 18 squares. The sixth row contains 18 squares. Below the main grid is a separate row of 10 squares, representing the lanthanide and actinide series.

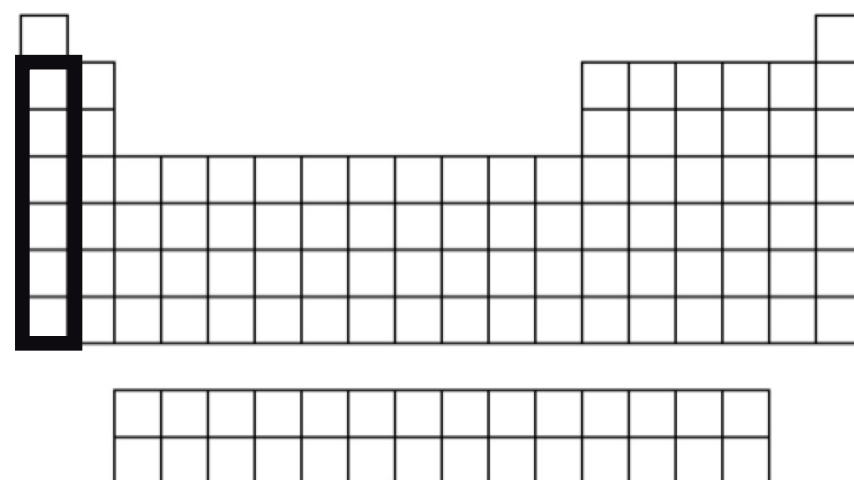
Assign Hydrogen a colour and use the second periodic table to colour it in.
Include it on your legend

Alkali Metals



Sodium metal

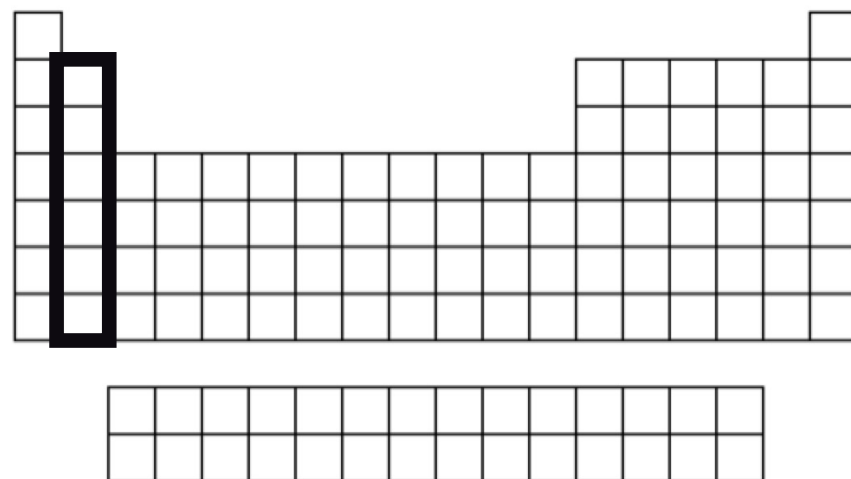
- The alkali family is found in the first column of the periodic table
- Atoms of the alkali metals have a single electron in their outermost level
- _____
- They react violently with water and so are never found free in nature



Assign alkali metals a colour and use the second periodic table to colour it in. ****Include it on your legend****

Alkaline Earth Metals

- They are very reactive but not as reactive as
- _____
- Alkaline earth metals include magnesium and calcium, among others



Assign alkali metals a colour and use the second periodic table to colour it in. **Include it on your legend**

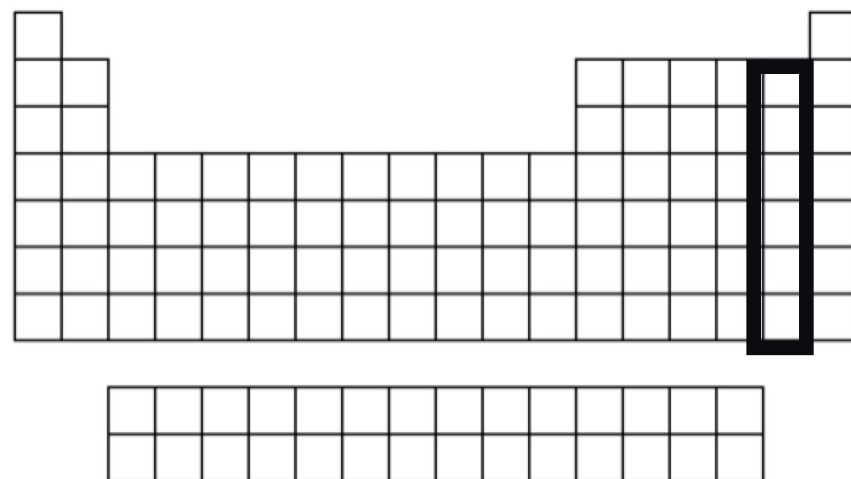
Magnesium metal strip



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Halogen Family

- The elements in this family
 - Halogens have 7 valence electrons, and are very reactive, therefore,
-



Assign halogens a colour and use the second periodic table to colour it in.
Include it on your legend

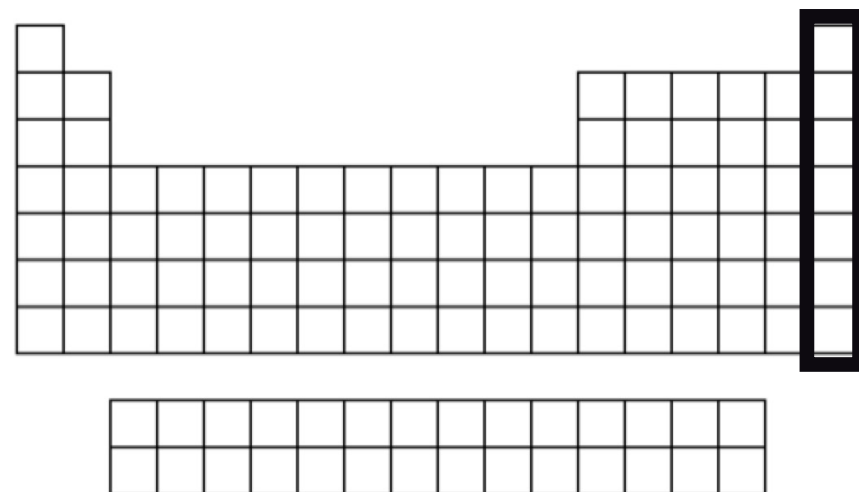


Chlorine gas (Cl_2) contains two chlorine atoms bonded together and is poisonous

Noble Gases

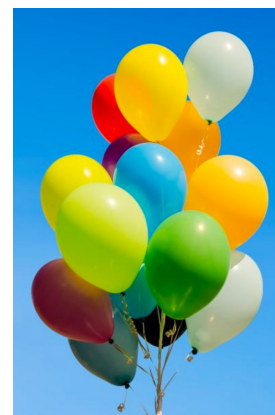
- Noble Gases are colorless gases that are extremely unreactive
- They are inactive because their outermost energy level is full
- The family of noble gases includes helium, neon, argon, krypton, xenon, and radon

- _____



A simplified periodic table grid. The noble gas column (Group 18) is highlighted with a thick black border. The grid consists of 7 rows and 18 columns. The noble gas column is the 18th column.

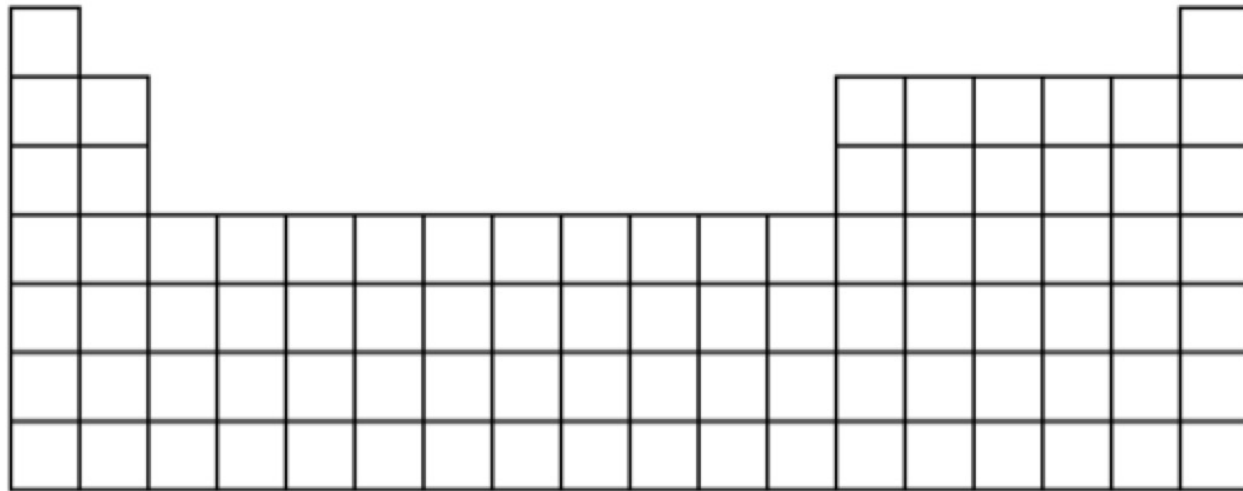
Assign noble gases a colour and use the second periodic table to colour it in. ****Include it on your legend****



Helium is lighter than air. This allows balloons filled with it to float.

Rare Earth Elements

- The thirty rare earth elements are composed of the lanthanide and actinide series
- _____
- _____



Assign rare earth elements a colour and use the second periodic table to colour it in. **Include it on your legend**

Rows and Periods

- Elements in the periodic table are also grouped into rows or periods



- The periods are numbered 1-7

- This is because they each have a different number of valence electrons

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Atomic Radius

The size of atoms (atomic radius) generally

Group (column)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Period (row)																		
1	H 25																	He
2	Li 145	Be 105											B 85	C 70	N 65	O 60	F 50	Ne
3	Na 180	Mg 150											Al 125	Si 110	P 100	S 100	Cl 100	Ar
4	K 220	Ca 180	Sc 160	Ti 140	V 135	Cr 140	Mn 140	Fe 140	Co 135	Ni 135	Cu 135	Zn 135	Ga 130	Ge 125	As 115	Se 115	Br 115	Kr
5	Rb 235	Sr 200	Y 180	Zr 155	Nb 145	Mo 145	Tc 135	Ru 130	Rh 135	Pd 140	Ag 160	Cd 155	In 155	Sn 145	Sb 145	Te 140	I 140	Xe
6	Cs 260	Ba 215	*	Hf 155	Ta 145	W 135	Re 135	Os 130	Ir 135	Pt 135	Au 135	Hg 150	Tl 190	Pb 180	Bi 160	Po 190	At	Rn
7	Fr 215	Ra 215	**	Rf	Db	Sg	Bh	Hs	Mt	Ds	Rg	Cn	Nh	Fl	Mc	Lv	Ts	Og
Lanthanides	*	La 195	Ce 185	Pr 185	Nd 185	Pm 185	Sm 185	Eu 185	Gd 180	Tb 175	Dy 175	Ho 175	Er 175	Tm 175	Yb 175	Lu 175		
Actinides	**	Ac 195	Th 180	Pa 180	U 175	Np 175	Pu 175	Am 175	Cm	Bk	Cf	Es	Fm	Md	No	Lr		

Electronegativity

- _____
 - This can lead to polar molecules (molecules where electron pairs are closer to one atom than another)
- An atom that is more electronegative can pull an electron away from an atom that is less electronegative



Electronegativity

- As you move from left to right across a period, the ability of the atom to attract another electron increases

- _____

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Group →																		
↓ Period																		
1	H 2.20																	He
2	Li 0.98	Be 1.57											B 2.04	C 2.55	N 3.04	O 3.44	F 3.98	Ne
3	Na 0.93	Mg 1.31											Al 1.61	Si 1.90	P 2.19	S 2.58	Cl 3.16	Ar
4	K 0.82	Ca 1.00	Sc 1.36	Ti 1.54	V 1.63	Cr 1.66	Mn 1.55	Fe 1.83	Co 1.88	Ni 1.91	Cu 1.90	Zn 1.65	Ga 1.81	Ge 2.01	As 2.18	Se 2.55	Br 2.96	Kr 3.00
5	Rb 0.82	Sr 0.95	Y 1.22	Zr 1.33	Nb 1.6	Mo 2.16	Tc 1.9	Ru 2.2	Rh 2.28	Pd 2.20	Ag 1.93	Cd 1.69	In 1.78	Sn 1.96	Sb 2.05	Te 2.1	I 2.66	Xe 2.60
6	Cs 0.79	Ba 0.89	La 1.1	* Hf 1.3	* Ta 1.5	* W 2.36	* Re 1.9	* Os 2.2	* Ir 2.20	* Pt 2.28	* Au 2.54	* Hg 2.00	* Tl 1.62	* Pb 1.87	* Bi 2.02	* Po 2.0	* At 2.2	* Rn 2.2
7	Fr >0.79 ^[en]	Ra 0.9	Ac 1.1	** Rf	** Db	** Sg	** Bh	** Hs	** Mt	** Ds	** Rg	** Cn	** Nh	** Fl	** Mc	** Lv	** Ts	** Og
				* Ce 1.12	* Pr 1.13	* Nd 1.14	* Pm 1.13	* Sm 1.17	* Eu 1.2	* Gd 1.2	* Tb 1.1	* Dy 1.22	* Ho 1.23	* Er 1.24	* Tm 1.25	* Yb 1.1	* Lu 1.27	
				** Th 1.3	** Pa 1.5	** U 1.38	** Np 1.36	** Pu 1.28	** Am 1.13	** Cm 1.28	** Bk 1.3	** Cf 1.3	** Es 1.3	** Fm 1.3	** Md 1.3	** No 1.3	** Lr 1.3 ^[en 2]	

Check Your Understanding

Which elements have a higher electronegativity value? Look up the values before answering.

1. Hydrogen or Krypton
2. Aluminum or Lithium
3. Manganese or Chromium

The Bohr Model of the Atom

- An effective way to represent the first _____
- Each electron orbit is shown as a ring around the nucleus
 - The 1st orbit will hold a maximum of _____
 - The 2nd orbit will hold a maximum of _____
 - The 3rd orbit will hold a maximum of _____

Bohr-Rutherford (BR) Diagrams

1. Determine the number of electrons

2. Determine the number of neutrons
3. Draw a circle and write the number of protons and neutrons inside → i.e. 11p 12n
4. Write the element symbol underneath → i.e. Na
5. Place

Bohr-Rutherford (BR) Diagrams

Draw the following BR Diagrams

He = 2 electrons

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Bohr-Rutherford (BR) Diagrams

Draw the following BR Diagrams

K = 19 electrons

What Does it Mean to be Reactive?

- We will be describing elements according to their reactivity
- Elements that are reactive bond easily with other elements to make compounds
- What makes an element reactive?
 - _____
 - All atoms (except hydrogen and helium) want to have 8 electrons in their very outermost energy level (this is called the rule of octet.)
 - Atoms