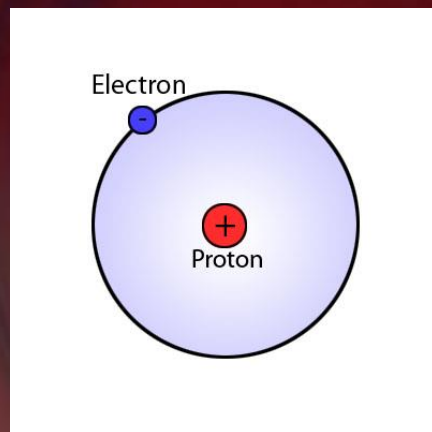


Atoms, Elements & Matter

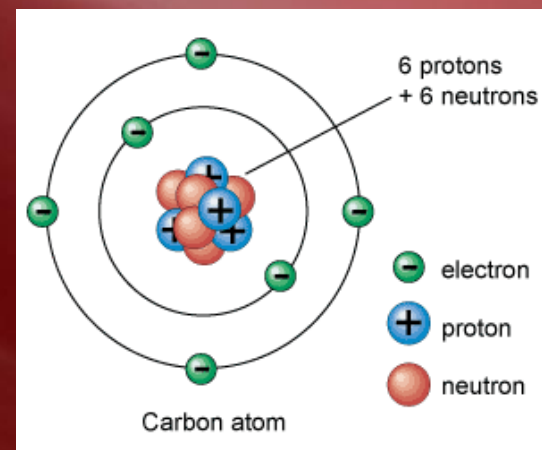


Atoms -

The basic unit of matter. All atoms are made up of protons (+), electrons (-) and neutral neutrons.



atom of hydrogen



atom of carbon

Elements -

A substance made up of only one kind of atom that cannot be broken down further.

Each element has a symbol that can be used to identify it.

There are 92 naturally occurring elements in the world.

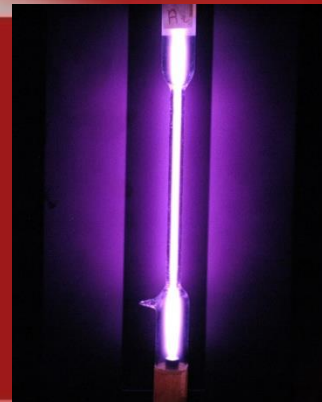
Examples of Elements



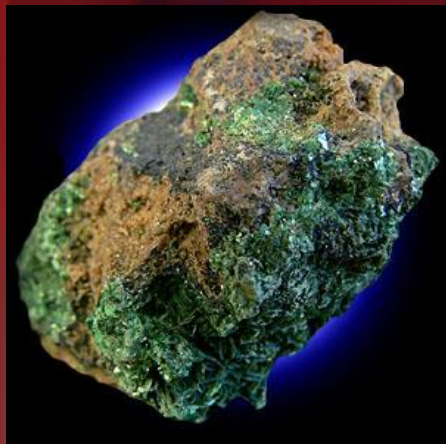
gold (Au)



mercury (Hg)



argon (Ar)



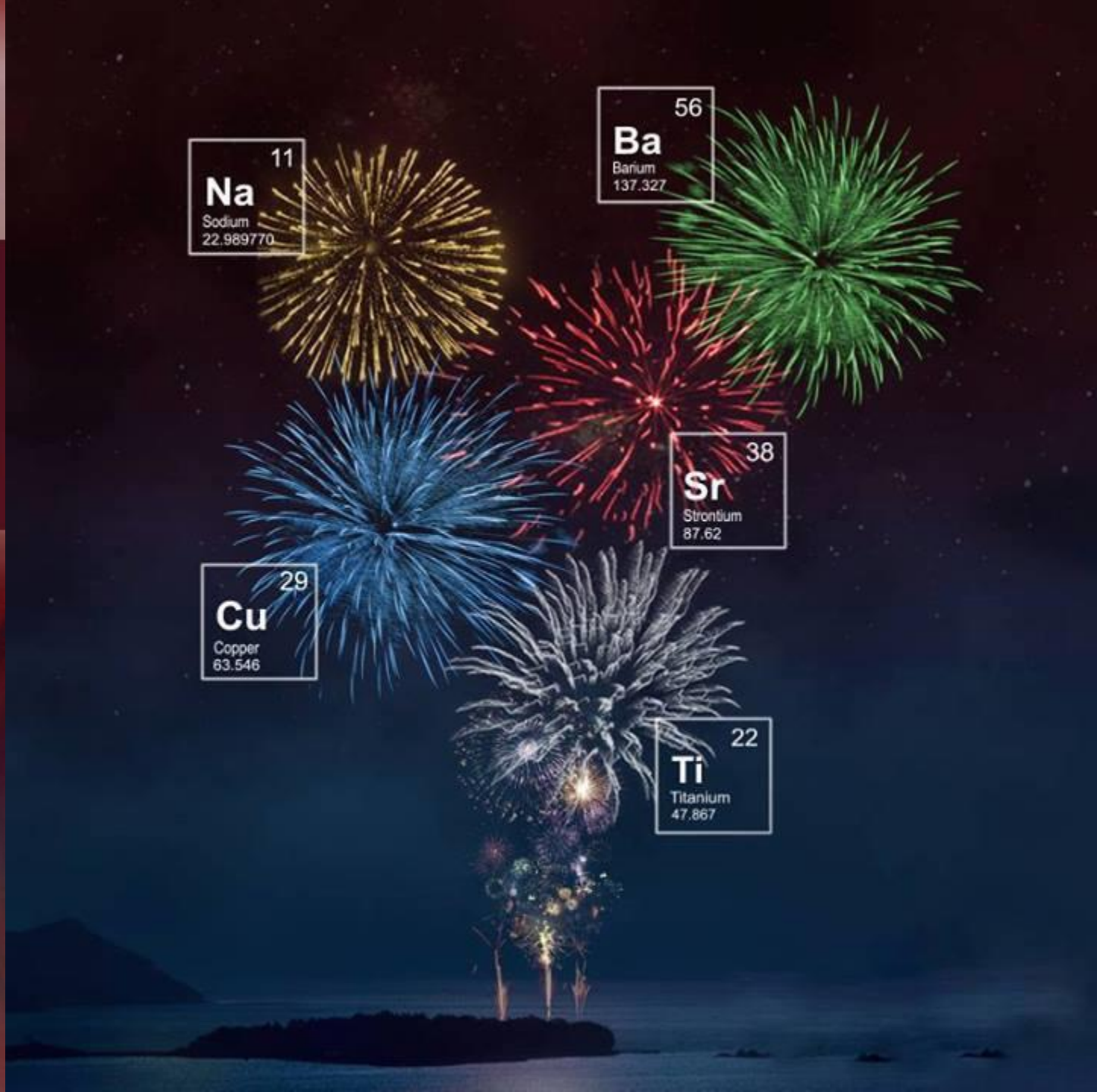
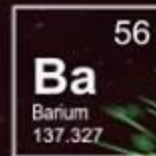
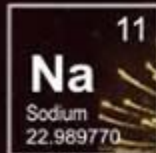
uranium (U)



platinum (Pt)



carbon (C)



Physical Change -

A change that affects only the physical properties of something.

Ex of physical change -

*Bending, melting, freezing,
dissolving, cutting, boiling.*

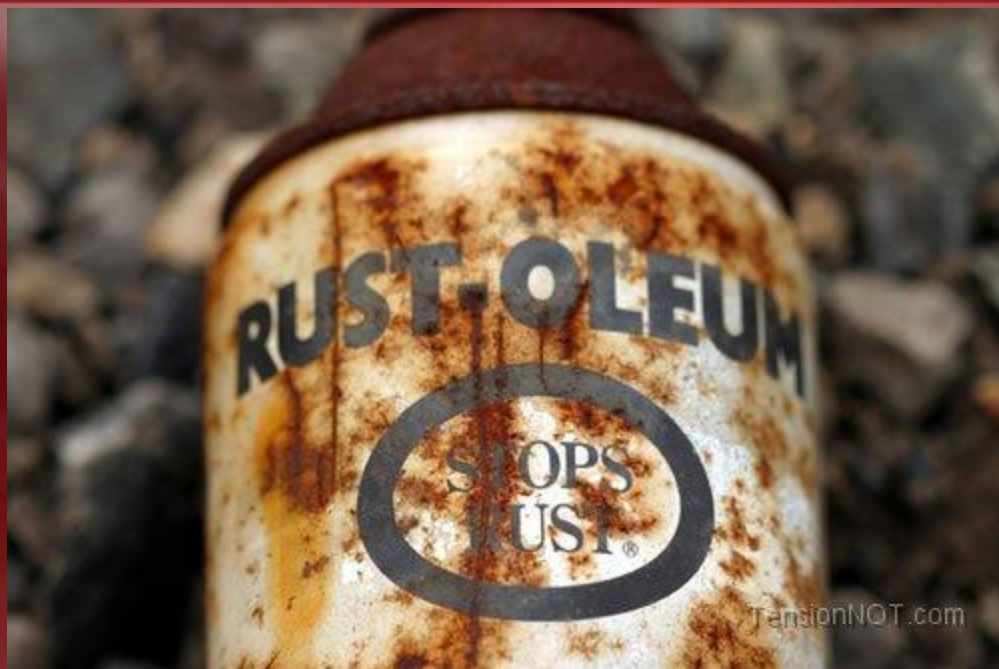


Chemical Change -

A change that creates a totally new substance.

Ex of chemical change -

Burning, baking, rusting, fizzing, foaming, etc.



Mixtures -

***When two or more
substances are combined
without a chemical reaction.***

***This means that mixtures
involve a physical change.***

Examples of mixtures -

Saltwater and Kool-aid.



Compounds -

A substance made up of two or more elements chemically combined.

A compound makes something new, meaning it is a chemical change.

For example, hydrogen is a gas at room temperature that will catch fire. Oxygen is also a gas at room temperature that will catch on fire. What compound do two hydrogen atoms and one oxygen atom make?

Water (H_2O)



Water is a liquid at room temperature that puts out fires.

Sodium is a silver metal that burns when it gets wet. Chlorine is a poisonous gas. When you add one atom of sodium to one atom of chlorine what do you get?



a510225 [RM] © www.visualphotos.com



Salt (NaCl)

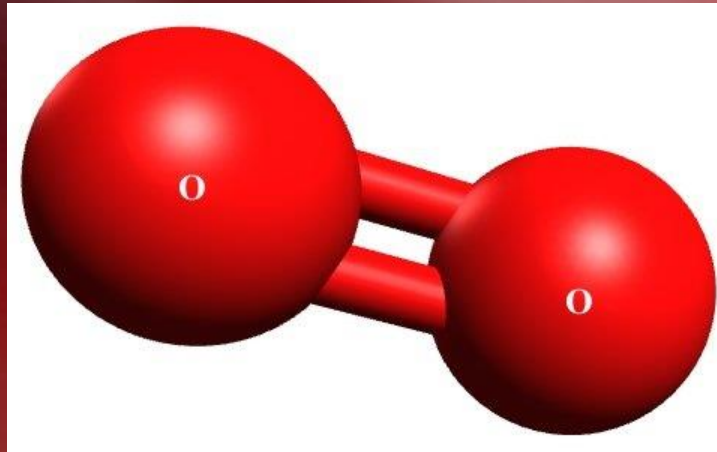


Molecule -

***Two or more atoms
chemically combined.***

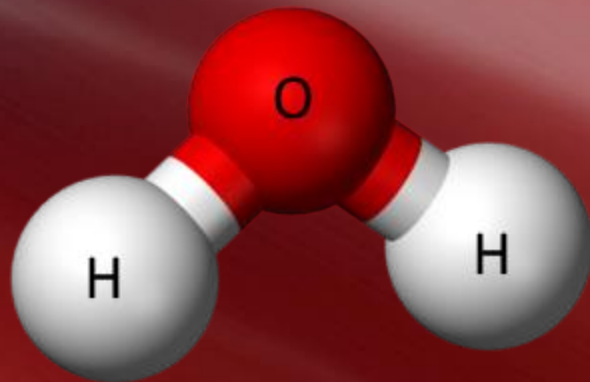
You can have a molecule of an element.

Ex. Oxygen gas (O_2)



You can have a molecule of a compound.

Ex. Water (H_2O)



One color = Element

Not connected = Mixture

***Two or more colors
connected = Compound***

***Put atoms in pan. Take
apart each time.***

Solubility -

How easily a substance can dissolve.

Soluble substances:

Dissolve easily.

Ex. Sugar and salt in water.



Insoluble substances:

Do not dissolve at all.

Ex. Sand and oil in water.



Solution -

A mixture where one or more substances is totally dissolved in another.

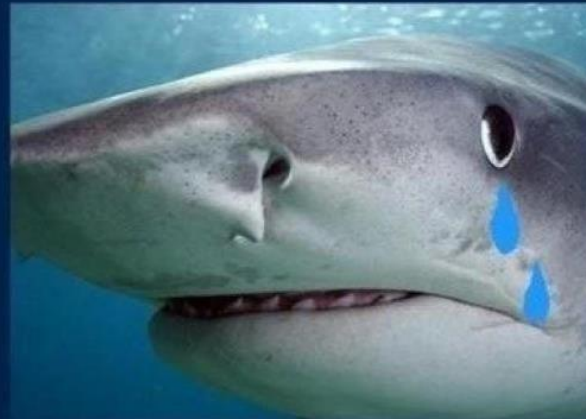
Solutions never settle out.

Ex of a solution -

Salt water and air.

Did you know?

THE OCEAN GETS ITS SALTINESS FROM
THE TEARS OF MISUNDERSTOOD SHARKS
WHO JUST WANT TO CUDDLE.



Solute -

***The substance or substances
being dissolved. (Always
less.)***

Solvent -

***The substance doing the
dissolving. (Always more.)***

Ex. Red food coloring goes into water. Name the solute and solvent.



The solute is food coloring.
The solvent is water.

Ex. Kool aid is made from sugar, flavoring and water. Name the solutes and solvent.



The solutes are sugar and flavoring. Water is the solvent.

Usually, as a liquid solvent gets warmer:

It holds more solute. It holds less as it gets colder.



*Rock
candy*

0100

DATE _____

PAY TO THE
ORDER OF

Ken Beuther

\$ 70000

Seventy Thousand Dollars

DOLLARS



Security
Check Service
Institution



SAVINGS BANK

MEMO

For being such a good teacher

⑆000000⑆123⑆

000000456⑆

0100

Suspension -

A mixture of a liquid and solid where the solid will settle out over time.

Ex of a suspension -

Snow globes.



Colloid -

A mixture where the substance is not dissolved but is too small to settle out.

Ex of a colloid -

Fog in air, bubbles in pop.



The bubbles stay as long as the pop isn't opened.

A beam of light will show in a colloid and suspension, but not in a solution.



Law of Conservation of Matter -

The total amount of matter cannot change, even with chemical or physical changes.

When mixtures or compounds are formed, the number of atoms does not change. So, the mass does not change.

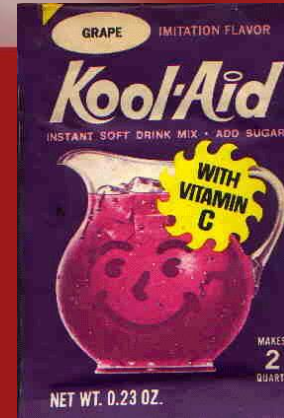
For example (physical change):



+



+



=

***100 g of
sugar***

***600 g of
water***

***10 g of
grape flavor***



710 grams of Kool-Aid

For example (chemical change):



***Cremating a 100
pound body will
make...***



***Exactly 100 pounds of ashes and
smoke.***

The Periodic Table

The Periodic Table -

A table where all of the elements in the world are grouped according to their properties.

* * Actinide series

How are the elements arranged on the Periodic Table? -

By the number of protons, from small to large.

How many protons does oxygen
(O) have? If protons the element
has.

hydrogen 1 H 1.0079																		helium 2 He 4.0026	
lithium 3 Li 6.941	beryllium 4 Be 9.0122											boron 5 B 10.811	carbon 6 C 12.011	nitrogen 7 N 14.007	oxygen 8 O 15.999	fluorine 9 F 18.998	neon 10 Ne 20.180		
sodium 11 Na 22.990	magnesium 12 Mg 24.305											aluminium 13 Al 26.982	silicon 14 Si 28.086	phosphorus 15 P 30.974	sulfur 16 S 32.065	chlorine 17 Cl 35.453	argon 18 Ar 39.948		
potassium 19 K 39.098	calcium 20 Ca 40.078	scandium 21 Sc 44.956	titanium 22 Ti 47.867	vanadium 23 V 50.942	chromium 24 Cr 51.996	manganese 25 Mn 54.938	iron 26 Fe 55.845	cobalt 27 Co 58.933	nickel 28 Ni 58.693	copper 29 Cu 63.546	zinc 30 Zn 65.39	gallium 31 Ga 69.723	germanium 32 Ge 72.61	arsenic 33 As 74.922	selenium 34 Se 78.96	bromine 35 Br 79.904	krypton 36 Kr 83.80		
rubidium 37 Rb 85.468	strontium 38 Sr 87.62	yttrium 39 Y 88.906	zirconium 40 Zr 91.224	niobium 41 Nb 92.906	molybdenum 42 Mo 95.94	technetium 43 Tc [98]	ruthenium 44 Ru 101.07	rhodium 45 Rh 102.91	palladium 46 Pd 106.42	silver 47 Ag 107.87	cadmium 48 Cd 112.41	indium 49 In 114.82	tin 50 Sn 118.71	antimony 51 Sb 121.76	tellurium 52 Te 127.60	iodine 53 I 126.90	xenon 54 Xe 131.29		
caesium 55 Cs 132.91	barium 56 Ba 137.33	57-70 ✱	lutetium 71 Lu 174.97	hafnium 72 Hf 178.49	tantalum 73 Ta 180.95	tungsten 74 W 183.84	rhenium 75 Re 186.21	osmium 76 Os 190.23	iridium 77 Ir 192.22	platinum 78 Pt 195.08	gold 79 Au 196.97	mercury 80 Hg 200.59	thallium 81 Tl 204.38	lead 82 Pb 207.2	bismuth 83 Bi 208.98	polonium 84 Po [209]	astatine 85 At [210]	radon 86 Rn [222]	
francium 87 Fr [223]	radium 88 Ra [226]	89-102 ✱ ✱	lawrencium 103 Lr [262]	rutherfordium 104 Rf [261]	dubnium 105 Db [262]	seaborgium 106 Sg [266]	bohrium 107 Bh [264]	hassium 108 Hs [269]	meitnerium 109 Mt [268]	ununnilium 110 Uun [271]	unununium 111 Uuu [272]	ununbium 112 Uub [277]	ununquadium 114 Uuq [289]						

* Lanthanide series

lanthanum 57 La 138.91	cerium 58 Ce 140.12	praseodymium 59 Pr 140.91	neodymium 60 Nd 144.24	promethium 61 Pm [145]	samarium 62 Sm 150.36	europium 63 Eu 151.96	gadolinium 64 Gd 157.25	terbium 65 Tb 158.93	dysprosium 66 Dy 162.50	holmium 67 Ho 164.93	erbium 68 Er 167.26	thulium 69 Tm 168.93	ytterbium 70 Yb 173.04
actinium 89 Ac [227]	thorium 90 Th 232.04	protactinium 91 Pa 231.04	uranium 92 U 238.03	neptunium 93 Np [237]	plutonium 94 Pu [244]	americium 95 Am [243]	curium 96 Cm [247]	berkelium 97 Bk [247]	californium 98 Cf [251]	einsteinium 99 Es [252]	fermium 100 Fm [257]	mendelevium 101 Md [258]	nobelium 102 No [259]

** Actinide series

The elements were not all discovered at the same time. So, just like with the activity you did, scientists had an incomplete periodic table for many years. They used it to predict what the undiscovered elements had to be like.

Only 38 elements were discovered before 1800.

1 H 1.0079																	13 B 10.811	14 C 12.011	15 N 14.007	16 O 15.999	17 F 18.998
4 Be 9.0122																			7 N 14.007	8 O 15.999	9 F 18.998
12 Mg 24.305	3															13 Al 26.982		15 P 30.974	16 S 32.065	17 Cl 35.453	
20 Ca 40.078		4 Ti 47.867	5	6 Cr 51.996	7 Mn 54.938	8 Fe 55.845	9 Co 58.933	10 Ni 58.693	11 Cu 63.546	12 Zn 65.38											
38 Sr 87.62	39 Y 88.906	40 Zr 91.224							47 Ag 107.87												
56 Ba 137.33	57-71								78 Pt 195.08	79 Au 196.97	80 Hg 200.59										
											82 Pb 207.2					83 Bi 208.98					
89-103																					
92 U 238.03																					

From 1800 to 1849 22 more elements were discovered.

1 H 1.0079																	13 B 10.811	14 C 12.011	15 N 14.007	16 O 15.999	17 F 18.998		
3 Li 6.941	4 Be 9.0122											11 Na 22.990	12 Mg 24.305						13 Al 26.982	14 Si 28.086	15 P 30.974	16 S 32.065	17 Cl 35.453
19 K 39.098	20 Ca 40.078			22 Ti 47.867	23 V 50.942	24 Cr 51.996	25 Mn 54.938	26 Fe 55.845	27 Co 58.933	28 Ni 58.693	29 Cu 63.546	30 Zn 65.38						33 As 74.922	34 Se 78.96	35 Br 79.904			
		38 Sr 87.62	39 Y 88.906	40 Zr 91.224	41 Nb 92.906	42 Mo 95.96				44 Ru 101.07	45 Rh 102.91	46 Pd 106.42	47 Ag 107.87	48 Cd 112.41			50 Sn 118.71	51 Sb 121.76	52 Te 127.60	53 I 126.90			
		56 Ba 137.33	57-71		73 Ta 180.95	74 W 183.84				76 Os 190.23	77 Ir 192.22	78 Pt 195.08	79 Au 196.97	80 Hg 200.59			82 Pb 207.2	83 Bi 208.98					
				57 La 138.91	58 Ce 140.12				60 Nd 144.24						65 Tb 158.93						68 Er 167.26		
				90 Th 232.04					92 U 238.03														

From 1850 to 1949 36 more elements were discovered.

1																	18	
1 H 1.0079	2											13	14	15	16	17	2 He 4.0026	
3 Li 6.941	4 Be 9.0122											5 B 10.811	6 C 12.011	7 N 14.007	8 O 15.999	9 F 18.998	10 Ne 20.180	
11 Na 22.990	12 Mg 24.305	3											13 Al 26.982	14 Si 28.086	15 P 30.974	16 S 32.065	17 Cl 35.453	18 Ar 39.948
19 K 39.098	20 Ca 40.078	21 Sc 44.956	22 Ti 47.867	23 V 50.942	24 Cr 51.996	25 Mn 54.938	26 Fe 55.845	27 Co 58.933	28 Ni 58.693	29 Cu 63.546	30 Zn 65.38	31 Ga 69.723	32 Ge 72.64	33 As 74.922	34 Se 78.96	35 Br 79.904	36 Kr 83.798	
37 Rb 85.468	38 Sr 87.62	39 Y 88.906	40 Zr 91.224	41 Nb 92.906	42 Mo 95.96	43 Tc -	44 Ru 101.07	45 Rh 102.91	46 Pd 106.42	47 Ag 107.87	48 Cd 112.41	49 In 114.82	50 Sn 118.71	51 Sb 121.76	52 Te 127.60	53 I 126.90	54 Xe 131.29	
55 Cs 132.91	56 Ba 137.33	57-71	72 Hf 178.49	73 Ta 180.95	74 W 183.84	75 Re 186.21	76 Os 190.23	77 Ir 192.22	78 Pt 195.08	79 Au 196.97	80 Hg 200.59	81 Tl 204.38	82 Pb 207.2	83 Bi 208.98	84 Po -	85 At -	86 Rn -	
87 Fr -	88 Ra -	89-103																
			57 La 138.91	58 Ce 140.12	59 Pr 140.91	60 Nd 144.24	61 Pm -	62 Sm 150.36	63 Eu 151.96	64 Gd 157.25	65 Tb 158.93	66 Dy 162.50	67 Ho 164.93	68 Er 167.26	69 Tm 168.93	70 Yb 173.05	71 Lu 174.97	
			89 Ac -	90 Th 232.04	91 Pa 231.04	92 U 238.03	93 Np -	94 Pu -	95 Am -	96 Cm -								

From 1950 to 1999 15 more elements were discovered.

1																	18	
1 H 1.0079	2											13	14	15	16	17	2 He 4.0026	
3 Li 6.941	4 Be 9.0122											5 B 10.811	6 C 12.011	7 N 14.007	8 O 15.999	9 F 18.998	10 Ne 20.180	
11 Na 22.990	12 Mg 24.305	3											13 Al 26.982	14 Si 28.086	15 P 30.974	16 S 32.065	17 Cl 35.453	18 Ar 39.948
19 K 39.098	20 Ca 40.078	21 Sc 44.956	22 Ti 47.867	23 V 50.942	24 Cr 51.996	25 Mn 54.938	26 Fe 55.845	27 Co 58.933	28 Ni 58.693	29 Cu 63.546	30 Zn 65.38	31 Ga 69.723	32 Ge 72.64	33 As 74.922	34 Se 78.96	35 Br 79.904	36 Kr 83.798	
37 Rb 85.468	38 Sr 87.62	39 Y 88.906	40 Zr 91.224	41 Nb 92.906	42 Mo 95.96	43 Tc -	44 Ru 101.07	45 Rh 102.91	46 Pd 106.42	47 Ag 107.87	48 Cd 112.41	49 In 114.82	50 Sn 118.71	51 Sb 121.76	52 Te 127.60	53 I 126.90	54 Xe 131.29	
55 Cs 132.91	56 Ba 137.33	57-71	72 Hf 178.49	73 Ta 180.95	74 W 183.84	75 Re 186.21	76 Os 190.23	77 Ir 192.22	78 Pt 195.08	79 Au 196.97	80 Hg 200.59	81 Tl 204.38	82 Pb 207.2	83 Bi 208.98	84 Po -	85 At -	86 Rn -	
87 Fr -	88 Ra -	89-103	104 Rf -	105 Db -	106 Sg -	107 Bh -	108 Hs -	109 Mt -	110 Ds -	111 Rg -								
			57 La 138.91	58 Ce 140.12	59 Pr 140.91	60 Nd 144.24	61 Pm -	62 Sm 150.36	63 Eu 151.96	64 Gd 157.25	65 Tb 158.93	66 Dy 162.50	67 Ho 164.93	68 Er 167.26	69 Tm 168.93	70 Yb 173.05	71 Lu 174.97	
			89 Ac -	90 Th 232.04	91 Pa 231.04	92 U 238.03	93 Np -	94 Pu -	95 Am -	96 Cm -	97 Bk -	98 Cf -	99 Es -	100 Fm -	101 Md -	102 No -	103 Lr -	

If a new element gets discovered, how many protons is it likely to have?.

1																	18	
1 H 1.0079	2											13	14	15	16	17	2 He 4.0026	
3 Li 6.941	4 Be 9.0122											5 B 10.811	6 C 12.011	7 N 14.007	8 O 15.999	9 F 18.998	10 Ne 20.180	
11 Na 22.990	12 Mg 24.305	3											13 Al 26.982	14 Si 28.086	15 P 30.974	16 S 32.065	17 Cl 35.453	18 Ar 39.948
19 K 39.098	20 Ca 40.078	21 Sc 44.956	22 Ti 47.867	23 V 50.942	24 Cr 51.996	25 Mn 54.938	26 Fe 55.845	27 Co 58.933	28 Ni 58.693	29 Cu 63.546	30 Zn 65.38	31 Ga 69.723	32 Ge 72.64	33 As 74.922	34 Se 78.96	35 Br 79.904	36 Kr 83.798	
37 Rb 85.468	38 Sr 87.62	39 Y 88.906	40 Zr 91.224	41 Nb 92.906	42 Mo 95.96	43 Tc -	44 Ru 101.07	45 Rh 102.91	46 Pd 106.42	47 Ag 107.87	48 Cd 112.41	49 In 114.82	50 Sn 118.71	51 Sb 121.76	52 Te 127.60	53 I 126.90	54 Xe 131.29	
55 Cs 132.91	56 Ba 137.33	57-71	72 Hf 178.49	73 Ta 180.95	74 W 183.84	75 Re 186.21	76 Os 190.23	77 Ir 192.22	78 Pt 195.08	79 Au 196.97	80 Hg 200.59	81 Tl 204.38	82 Pb 207.2	83 Bi 208.98	84 Po -	85 At -	86 Rn -	
87 Fr -	88 Ra -	89-103	104 Rf -	105 Db -	106 Sg -	107 Bh -	108 Hs -	109 Mt -	110 Ds -	111 Rg -								

[illegible]

Metals

Nonmetals

Zigzag line

Key

11	Atomic number
Na	Element symbol
Sodium	Element name
22.99	Average atomic mass*

1	1A	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	1	2											3A	4A	5A	6A	7A	8A
	H	He											B	C	N	O	F	Ne
	Hydrogen												Boron	Carbon	Nitrogen	Oxygen	Fluorine	Neon
	1.01												10.81	12.01	14.01	16.00	19.00	20.18
2	Li	Be											Al	Si	P	S	Cl	Ar
	Lithium	Beryllium											Aluminum	Silicon	Phosphorus	Sulfur	Chlorine	Argon
	6.94	9.01											26.98	28.09	30.97	32.07	35.45	39.95
3	Na	Mg	3	4	5	6	7	8	9	10	11	12	Ga	Ge	As	Se	Br	Kr
	Sodium	Magnesium	3B	4B	5B	6B	7B	8B	9B	10B	11B	12B	Gallium	Germanium	Arsenic	Selenium	Bromine	Krypton
	22.99	24.31											69.72	72.61	74.92	78.96	79.90	83.80
4	K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr
	Potassium	Calcium	Scandium	Titanium	Vanadium	Chromium	Manganese	Iron	Cobalt	Nickel	Copper	Zinc	Gallium	Germanium	Arsenic	Selenium	Bromine	Krypton
	39.10	40.08	44.96	47.87	50.94	52.00	54.94	55.85	58.93	58.69	63.55	65.39	69.72	72.61	74.92	78.96	79.90	83.80
5	Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I	Xe
	Rubidium	Strontium	Yttrium	Zirconium	Niobium	Molybdenum	Technetium (98)	Ruthenium	Rhodium	Palladium	Silver	Cadmium	Indium	Tin	Antimony	Tellurium	Iodine	Xenon
	85.47	87.62	88.91	91.22	92.91	95.94		101.07	102.91	106.42	107.87	112.41	114.82	118.71	121.76	127.60	126.90	131.29
6	Cs	Ba	La	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At	Rn
	Cesium	Barium	Lanthanum	Hafnium	Tantalum	Tungsten	Rhenium	Osmium	Iridium	Platinum	Gold	Mercury	Thallium	Lead	Bismuth	Polonium (209)	Astatine (210)	Radon (222)
	132.91	137.33	138.91	178.49	180.95	183.84	186.21	190.23	192.22	195.08	196.97	200.59	204.38	207.2	208.98			
7	Fr	Ra	Ac	Rf	Db	Sg	Bh	Hs	Mt									
	Francium (223)	Radium (226)	Actinium (227)	Rutherfordium (261)	Dubnium (262)	Seaborgium (266)	Bohrium (264)	Hassium (269)	Meitnerium (268)									

* If this number is in parentheses, then it refers to the atomic mass of the most stable isotope.

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
Cerium	Praseodymium	Neodymium	Promethium (145)	Samarium	Europium	Gadolinium	Terbium	Dysprosium	Holmium	Erbium	Thulium	Ytterbium	Lutetium
140.12	140.91	144.24		150.36	151.96	157.25	158.93	162.50	164.93	167.26	168.93	173.04	174.97
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
Thorium	Protactinium	Uranium	Neptunium (237)	Plutonium (244)	Americium (243)	Curium (247)	Berkelium (247)	Californium (251)	Einsteinium (252)	Fermium (257)	Mendelevium (258)	Nobelium (259)	Lawrencium (262)
232.04	231.04	238.03											

Properties of metals -

1. Most are solid at room temperature.

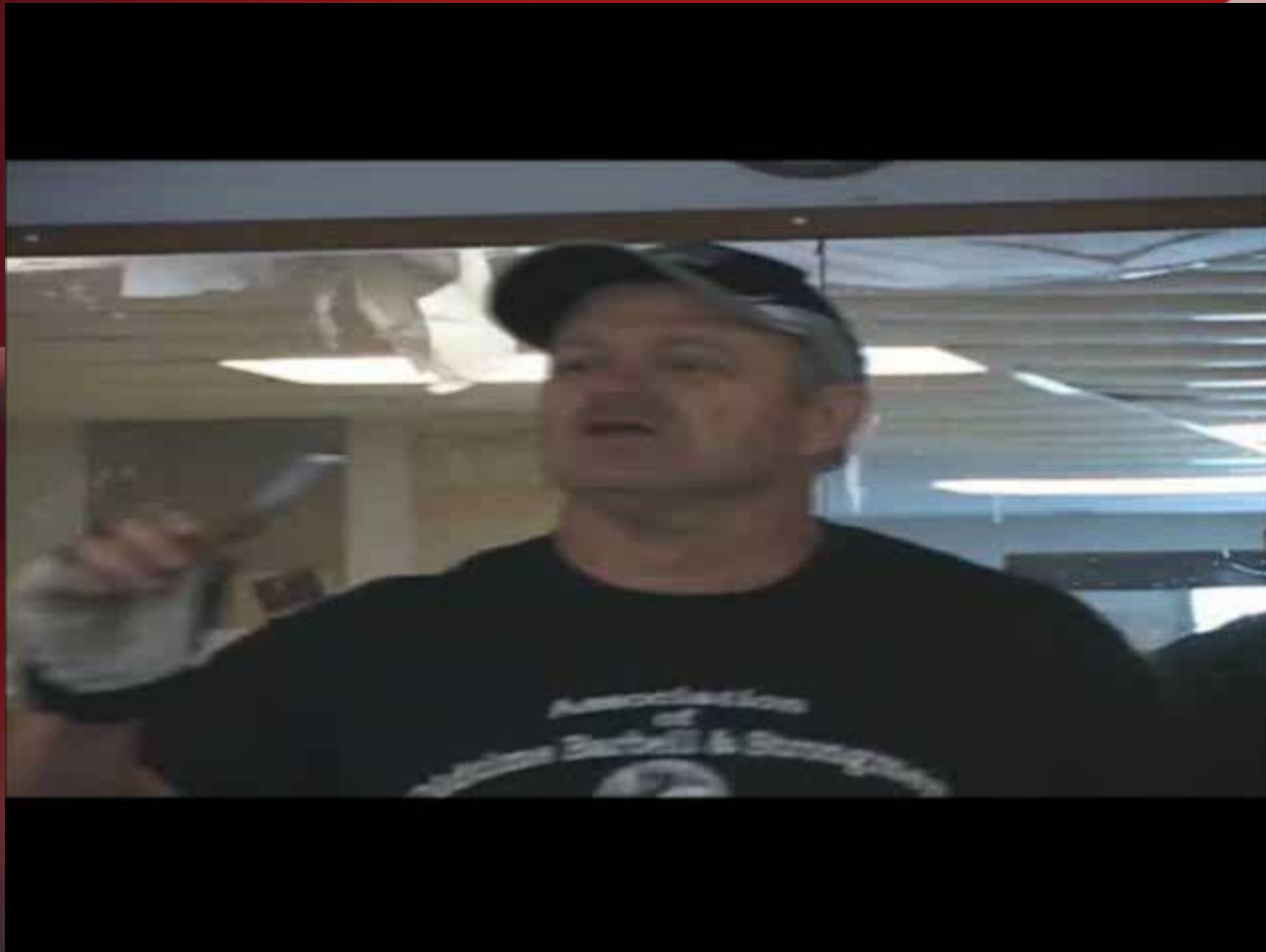


Properties of metals -

2. Malleable (bendable).



Bending iron.



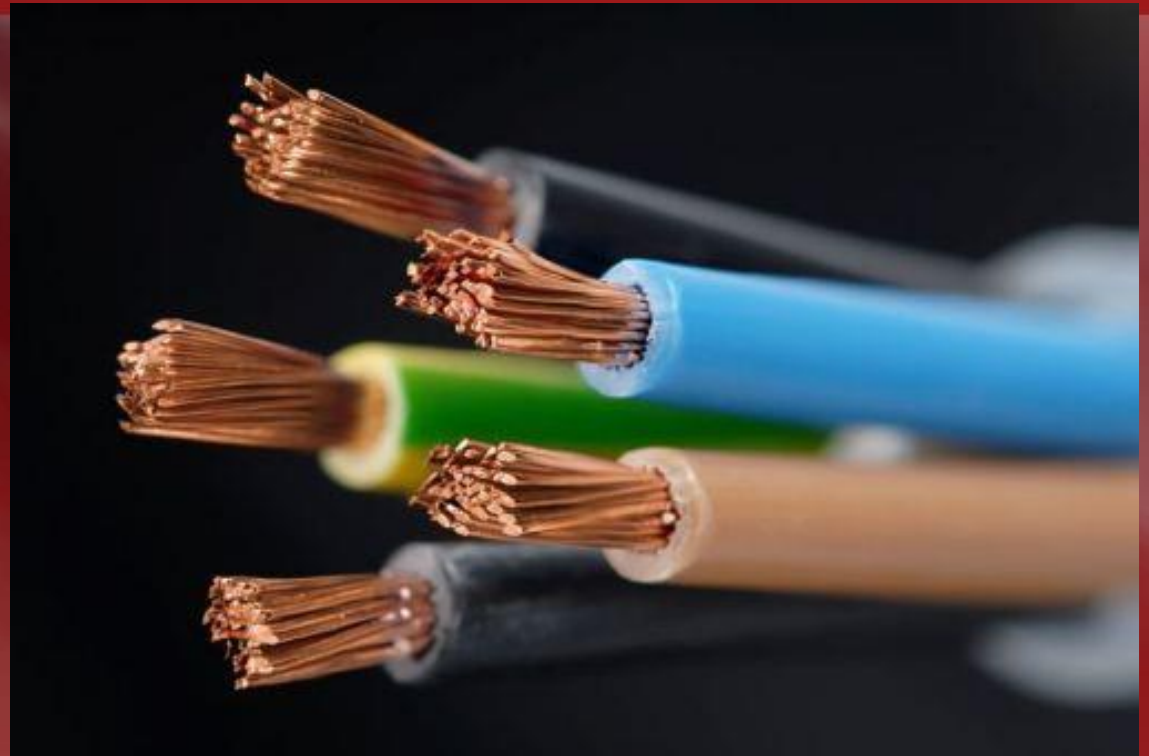
Properties of metals -

3. High melting points.



Properties of metals -

4. Good conductors of heat and electricity.

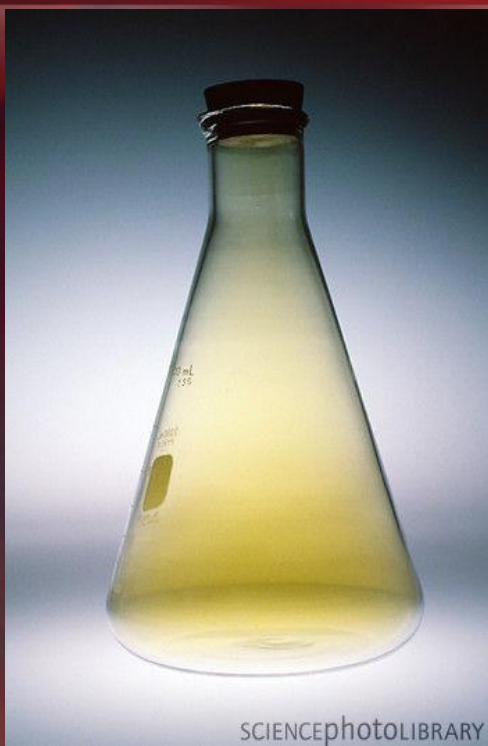


Electric fence fail.



Properties of nonmetals -

1. Most are gasses at room temperature.



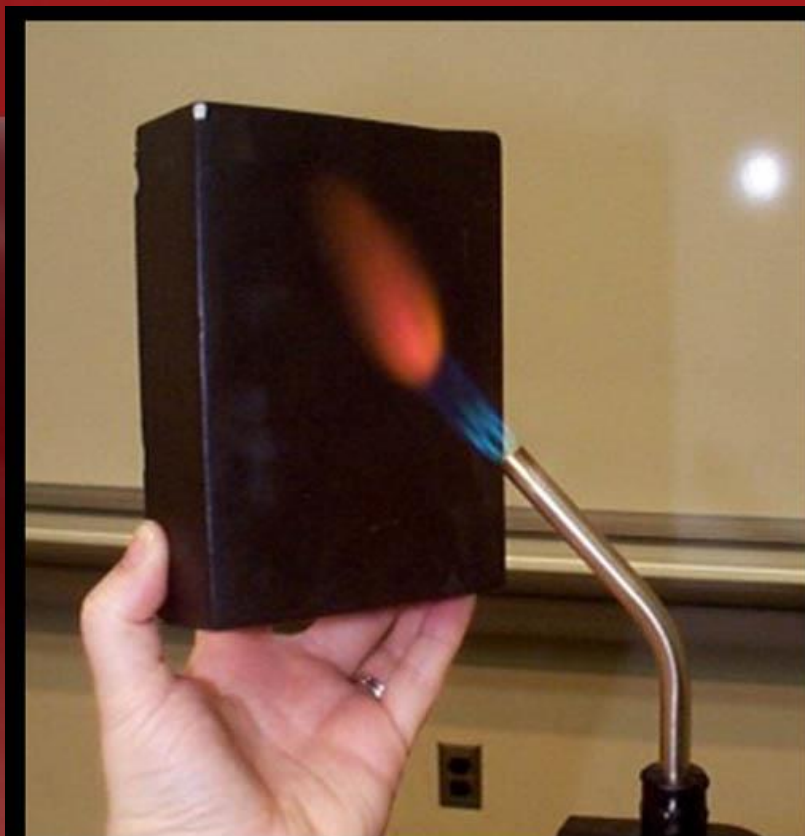
Properties of nonmetals -

2. Solids are dull and brittle.



Properties of nonmetals -

3. Poor conductors of heat and electricity.



Nonmetals are used to make the heat shield of the space shuttles because even though the atmosphere rubbing against the shuttle makes tremendous heat, the shuttle is protected because of the poor conductivity of the nonmetal.



Metalloids -

Elements with some of the properties of metals and nonmetals.

hydrogen 1 H 1.0079																	helium 2 He 4.0026
lithium 3 Li 6.941	beryllium 4 Be 9.0122																
sodium 11 Na 22.990	magnesium 12 Mg 24.305																
potassium 19 K 39.098	calcium 20 Ca 40.078	scandium 21 Sc 44.956	titanium 22 Ti 47.867	vanadium 23 V 50.942	chromium 24 Cr 51.996	manganese 25 Mn 54.938	iron 26 Fe 55.845	cobalt 27 Co 58.933	nickel 28 Ni 58.693	copper 29 Cu 63.546	zinc 30 Zn 65.39	gallium 31 Ga 69.723	germanium 32 Ge 72.61	arsenic 33 As 74.922	selenium 34 Se 78.96	bromine 35 Br 79.904	krypton 36 Kr 83.80
rubidium 37 Rb 85.468	strontium 38 Sr 87.62	yttrium 39 Y 88.906	zirconium 40 Zr 91.224	niobium 41 Nb 92.906	molybdenum 42 Mo 95.94	technetium 43 Tc [98]	ruthenium 44 Ru 101.07	rhodium 45 Rh 102.91	palladium 46 Pd 106.42	silver 47 Ag 107.87	cadmium 48 Cd 112.41	indium 49 In 114.82	tin 50 Sn 118.71	antimony 51 Sb 121.76	tellurium 52 Te 127.60	iodine 53 I 126.90	xenon 54 Xe 131.29
caesium 55 Cs 132.91	barium 56 Ba 137.33	* 57-70 Lu 174.97	hafnium 72 Hf 178.49	tantalum 73 Ta 180.95	tungsten 74 W 183.84	rhenium 75 Re 186.21	osmium 76 Os 190.23	iridium 77 Ir 192.22	platinum 78 Pt 195.08	gold 79 Au 196.97	mercury 80 Hg 200.59	thallium 81 Tl 204.38	lead 82 Pb 207.2	bismuth 83 Bi 208.98	polonium 84 Po [209]	astatine 85 At [210]	radon 86 Rn [222]
francium 87 Fr [223]	radium 88 Ra [226]	* * 89-102 Lr [262]	rutherfordium 104 Rf [261]	dubnium 105 Db [262]	seaborgium 106 Sg [266]	bohrium 107 Bh [264]	hassium 108 Hs [269]	meitnerium 109 Mt [268]	unnilium 110 Uun [271]	ununium 111 Uuu [272]	unubium 112 Uub [277]						
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* Lanthanide series

* * Actinide series

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*Let's look at some
of the families or
groups of elements
on the Periodic
Table.*

What determines the family or group of elements on the Periodic Table? -

By their properties.

Where are families or groups found on the Periodic Table? -

In rows or columns (up and down).

Highly Reactive Metals Family or Group -

- 1. Also called “alkali metals”.***
- 2. These silvery metals react quickly, so they are dangerous.***
- 3. Examples are sodium (Na) and potassium (K).***

Sodium reacting to water.



Highly reactive metals (metals, dangerous)

<div>Highly reactive metals (metals, dangerous)</div>																		
hydrogen 1 H 1.0079											helium 2 He 4.0026							
lithium 3 Li 6.941	beryllium 4 Be 9.0122											boron 5 B 10.811	carbon 6 C 12.011	nitrogen 7 N 14.007	oxygen 8 O 15.999	fluorine 9 F 18.998	neon 10 Ne 20.180	
sodium 11 Na 22.990	magnesium 12 Mg 24.305											aluminium 13 Al 26.982	silicon 14 Si 28.086	phosphorus 15 P 30.974	sulfur 16 S 32.065	chlorine 17 Cl 35.453	argon 18 Ar 39.948	
potassium 19 K 39.098	calcium 20 Ca 40.078	scandium 21 Sc 44.956	titanium 22 Ti 47.867	vanadium 23 V 50.942	chromium 24 Cr 51.996	manganese 25 Mn 54.938	iron 26 Fe 55.845	cobalt 27 Co 58.933	nickel 28 Ni 58.693	copper 29 Cu 63.546	zinc 30 Zn 65.39	gallium 31 Ga 69.723	germanium 32 Ge 72.61	arsenic 33 As 74.922	selenium 34 Se 78.96	bromine 35 Br 79.904	krypton 36 Kr 83.80	
rubidium 37 Rb 85.468	strontium 38 Sr 87.62	yttrium 39 Y 88.906	zirconium 40 Zr 91.224	niobium 41 Nb 92.906	molybdenum 42 Mo 95.94	technetium 43 Tc [98]	ruthenium 44 Ru 101.07	rhodium 45 Rh 102.91	palladium 46 Pd 106.42	silver 47 Ag 107.87	cadmium 48 Cd 112.41	indium 49 In 114.82	tin 50 Sn 118.71	antimony 51 Sb 121.76	tellurium 52 Te 127.60	iodine 53 I 126.90	xenon 54 Xe 131.29	
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actinium 89 Ac [227]	thorium 90 Th 232.04	protactinium 91 Pa 231.04	uranium 92 U 238.03	neptunium 93 Np [237]	plutonium 94 Pu [244]	americium 95 Am [243]	curium 96 Cm [247]	berkelium 97 Bk [247]	californium 98 Cf [251]	einsteinium 99 Es [252]	fermium 100 Fm [257]	mendelevium 101 Md [258]	nobelium 102 No [259]

Less Reactive Metals Family or Group -

- 1. Also called “transition metals”.***
- 2. Tend to be very hard and do not react, so they are safe.***
- 3. Examples are iron (Fe) and copper (Cu).***

The strength of steel, which is made from iron.



Less reactive metals (metals, safe)

<div>hydrogen 1 H 1.0079</div>		<div>Less reactive metals (metals, safe)</div>										<div>helium 2 He 4.0026</div>						
<div>lithium 3 Li 6.941</div>	<div>beryllium 4 Be 9.0122</div>											<div>boron 5 B 10.811</div>	<div>carbon 6 C 12.011</div>	<div>nitrogen 7 N 14.007</div>	<div>oxygen 8 O 15.999</div>	<div>fluorine 9 F 18.998</div>	<div>neon 10 Ne 20.180</div>	
<div>sodium 11 Na 22.990</div>	<div>magnesium 12 Mg 24.305</div>											<div>aluminium 13 Al 26.982</div>	<div>silicon 14 Si 28.086</div>	<div>phosphorus 15 P 30.974</div>	<div>sulfur 16 S 32.065</div>	<div>chlorine 17 Cl 35.453</div>	<div>argon 18 Ar 39.948</div>	
<div>potassium 19 K 39.098</div>	<div>calcium 20 Ca 40.078</div>	<div>scandium 21 Sc 44.956</div>	<div>titanium 22 Ti 47.867</div>	<div>vanadium 23 V 50.942</div>	<div>chromium 24 Cr 51.996</div>	<div>manganese 25 Mn 54.938</div>	<div>iron 26 Fe 55.845</div>	<div>cobalt 27 Co 58.933</div>	<div>nickel 28 Ni 58.693</div>	<div>copper 29 Cu 63.546</div>	<div>zinc 30 Zn 65.39</div>	<div>gallium 31 Ga 69.723</div>	<div>germanium 32 Ge 72.61</div>	<div>arsenic 33 As 74.922</div>	<div>selenium 34 Se 78.96</div>	<div>bromine 35 Br 79.904</div>	<div>krypton 36 Kr 83.80</div>	
<div>rubidium 37 Rb 85.468</div>	<div>strontium 38 Sr 87.62</div>	<div>yttrium 39 Y 88.906</div>	<div>zirconium 40 Zr 91.224</div>	<div>niobium 41 Nb 92.906</div>	<div>molybdenum 42 Mo 95.94</div>	<div>technetium 43 Tc [98]</div>	<div>ruthenium 44 Ru 101.07</div>	<div>rhodium 45 Rh 102.91</div>	<div>palladium 46 Pd 106.42</div>	<div>silver 47 Ag 107.87</div>	<div>cadmium 48 Cd 112.41</div>	<div>indium 49 In 114.82</div>	<div>tin 50 Sn 118.71</div>	<div>antimony 51 Sb 121.76</div>	<div>tellurium 52 Te 127.60</div>	<div>iodine 53 I 126.90</div>	<div>xenon 54 Xe 131.29</div>	
<div>caesium 55 Cs 132.91</div>	<div>barium 56 Ba 137.33</div>	<div>57-70 ★</div>	<div>lutetium 71 Lu 174.97</div>	<div>hafnium 72 Hf 178.49</div>	<div>tantalum 73 Ta 180.95</div>	<div>tungsten 74 W 183.84</div>	<div>rhenium 75 Re 186.21</div>	<div>osmium 76 Os 190.23</div>	<div>iridium 77 Ir 192.22</div>	<div>platinum 78 Pt 195.08</div>	<div>gold 79 Au 196.97</div>	<div>mercury 80 Hg 200.59</div>	<div>thallium 81 Tl 204.38</div>	<div>lead 82 Pb 207.2</div>	<div>bismuth 83 Bi 208.98</div>	<div>polonium 84 Po [209]</div>	<div>astatine 85 At [210]</div>	<div>radon 86 Rn [222]</div>
<div>francium 87 Fr [223]</div>	<div>radium 88 Ra [226]</div>	<div>89-102 ★ ★</div>	<div>lawrencium 103 Lr [262]</div>	<div>rutherfordium 104 Rf [261]</div>	<div>dubnium 105 Db [262]</div>	<div>seaborgium 106 Sg [266]</div>	<div>bohrium 107 Bh [264]</div>	<div>hassium 108 Hs [269]</div>	<div>meitnerium 109 Mt [268]</div>	<div>ununilium 110 Uun [271]</div>	<div>unununium 111 Uuu [272]</div>	<div>ununbium 112 Uub [277]</div>	<div>ununquadium 114 Uuq [289]</div>					

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Nonreactive Gasses

Family or Group -

- 1. Also called “noble”.***
- 2. Tend not to react so are safe***
- 3. These are a gas at room temperature.***
- 4. Examples are helium (He) and neon (Ne).***

Noble gasses (gasses, safe)

<div><h1>Noble gasses</h1><h2>(gasses, safe)</h2></div>										<table><tr><td>boron 5 B 10.811</td><td>carbon 6 C 12.011</td><td>nitrogen 7 N 14.007</td><td>oxygen 8 O 15.999</td><td>fluorine 9 F 18.998</td><td>helium 2 He 4.0026</td></tr><tr><td>aluminium 13 Al 26.982</td><td>silicon 14 Si 28.086</td><td>phosphorus 15 P 30.974</td><td>sulfur 16 S 32.065</td><td>chlorine 17 Cl 35.453</td><td>neon 10 Ne 20.180</td></tr><tr><td>gallium 31 Ga 69.723</td><td>germanium 32 Ge 72.61</td><td>arsenic 33 As 74.922</td><td>selenium 34 Se 78.96</td><td>bromine 35 Br 79.904</td><td>argon 18 Ar 39.948</td></tr><tr><td>indium 49 In 114.82</td><td>tin 50 Sn 118.71</td><td>antimony 51 Sb 121.76</td><td>tellurium 52 Te 127.60</td><td>iodine 53 I 126.90</td><td>krypton 36 Kr 83.80</td></tr><tr><td>thallium 81 Tl 204.38</td><td>lead 82 Pb 207.2</td><td>bismuth 83 Bi 208.98</td><td>polonium 84 Po [209]</td><td>astatine 85 At [210]</td><td>xenon 54 Xe 131.29</td></tr><tr><td></td><td>ununquadium 114 Uuq [289]</td><td colspan="3"></td><td>radon 86 Rn [222]</td></tr></table>					boron 5 B 10.811	carbon 6 C 12.011	nitrogen 7 N 14.007	oxygen 8 O 15.999	fluorine 9 F 18.998	helium 2 He 4.0026	aluminium 13 Al 26.982	silicon 14 Si 28.086	phosphorus 15 P 30.974	sulfur 16 S 32.065	chlorine 17 Cl 35.453	neon 10 Ne 20.180	gallium 31 Ga 69.723	germanium 32 Ge 72.61	arsenic 33 As 74.922	selenium 34 Se 78.96	bromine 35 Br 79.904	argon 18 Ar 39.948	indium 49 In 114.82	tin 50 Sn 118.71	antimony 51 Sb 121.76	tellurium 52 Te 127.60	iodine 53 I 126.90	krypton 36 Kr 83.80	thallium 81 Tl 204.38	lead 82 Pb 207.2	bismuth 83 Bi 208.98	polonium 84 Po [209]	astatine 85 At [210]	xenon 54 Xe 131.29		ununquadium 114 Uuq [289]				radon 86 Rn [222]
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The Hindenburg caught fire because instead of using a nonreactive gas like helium, they used hydrogen.






BRITISH
PATHÉ



Periodic Table of the Elements



PERIODIC TABLE OF THE ELEMENTS																				18 VIIA				
1 IA																	13 IIIA	14 IVA	15 VA	16 VIA	17 VIIA	2 IIA		
1	1																	5	6	7	8	9	10	1
2	3	4											13	14	15	16	17	18	2					
3	11	12	3 IIIV	4 IVB	5 VB	6 VIB	7 VIIB	8	9 VII	10	11 IB	12 IIB	13	14	15	16	17	18	3					
4	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	4					
5	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	5					
6	55	56	57-71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	6					
7	87	88	89-103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	7					
6	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71				6					
7	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103				7					

Acids and Bases

pH scale -

A measure of how acidic or basic something is. The scale ranges from 0 to 14.

Acidic -

***Something with a pH below 7.
The lower the number, the
stronger the acid.***

Ex. of an acid -

Vinegar, lemon juice, pop.

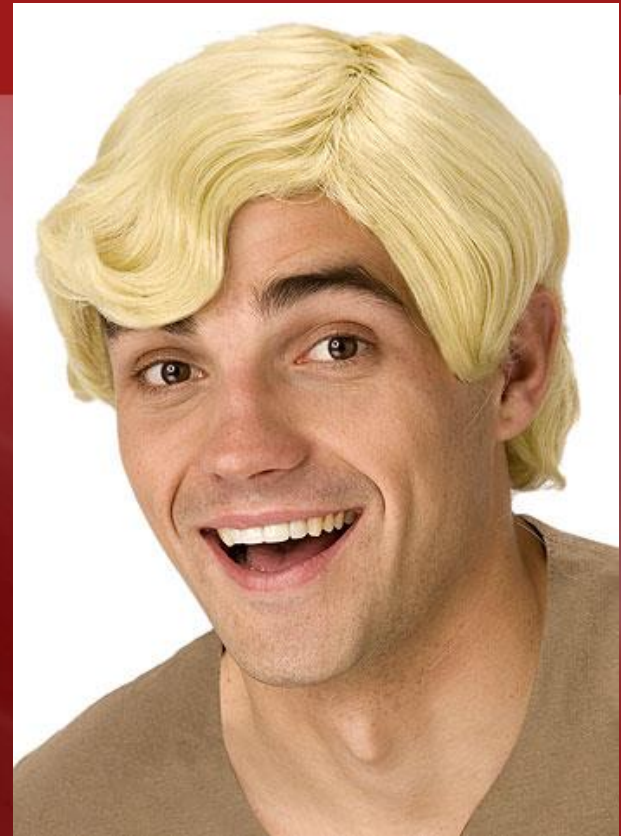


Basic -

***Something with a pH above 7.
The higher the number, the
stronger the base.***

Ex. of a base -

***Ammonia, bleach, tums,
Alka Seltzer***



Neutral -

***Anything with a pH of exactly
7.***

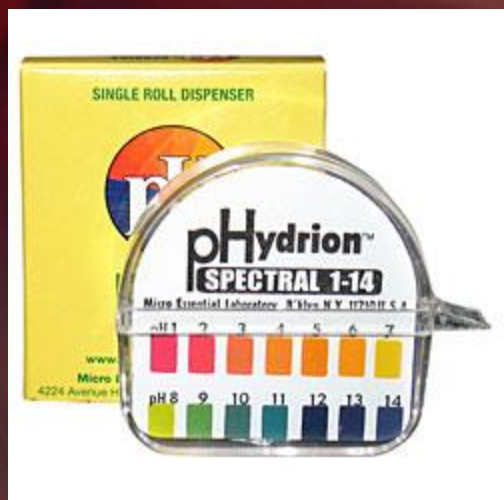
Ex. of a neutral substance -

Pure water.



Indicator -

A compound that changes color in either an acid or base.



Basic Humor

***What happens when an acid
and base mix?***

They neutralize each other.



0 (battery acid)

1 (sulfuric acid)

2 (vinegar)

3 (pop)

4 (acid rain)

5 (black coffee)

6 (urine, milk)

7 (pure water)

8 (seawater)

9 (baking soda)

10 (milk of magnesia)

11 (ammonia)

12 (bleach)

13 (oven cleaner)

14 (Drano)

