

Name: _____ Date: _____ Period: _____

An Organized Table – Worksheet Due

The Periodic Table of Elements

In 1871, the first periodic table was developed by **Dmitrii Mendeleev**. Mendeleev is known as the father of the current day periodic table. He arranged the known elements at the time in order of increasing atomic mass. There was a predictive power in his table - based on the periodic law, Mendeleev believed that more elements would be discovered someday. He left spaces in his table where the elements would be placed once they had been discovered. Unlike Mendeleev's table, the currently accepted periodic table is arranged in order of increasing atomic number.

Mendeleev's Periodic Table:

Group I	II	III	IV	V	VI	VII	VIII
1 H=1							
2 Li=7	Be=9.4	B=11	C=12	N=14	O=16	F=19	
3 Na=23	Mg=24	Al=27.3	Si=28	P=31	S=32	Cl=35.5	
4 K=39	Ca=40	?=44	Ti=48	V=51	Cr=52	Mn=55	Fe=56, Co=59 Ni=59
5 Cu=63	Zn=65	?=68	?=72	As=75	Se=78	Br=80	
6 Rb=85	Sr=87	?Yt=88	Zr=90	Nb=94	Mo=96	?=100	Ru=104, Rh=104 Pd=106
7 Ag=108	Cd=112	In=113	Sn=118	Sb=122	Te=125	J=127	
8 Cs=133	Ba=137	?Di=138	?Ce=140				
9							
10		?Er=178	?La=180	Ta=182	W=184		Os=195, Ir=197 Pt=198
11 Au=199	Hg=200	Tl=204	Pb=207	Bi=208			
12			Th=231		U=240		

Current Periodic Table:

Periodic Table of the Elements

The image shows a standard modern periodic table with elements color-coded by groups. It includes atomic numbers and element symbols for all known elements. The lanthanide and actinide series are shown as separate rows below the main table.

The Periodic Law

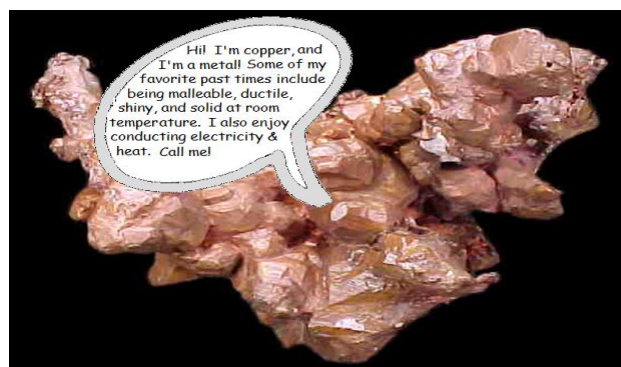
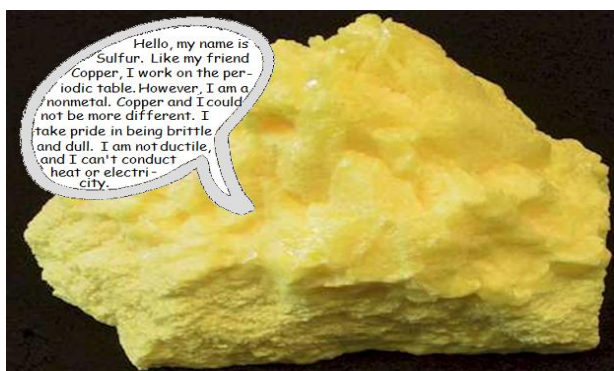
The Periodic Law states that when elements are arranged in order of increasing atomic number, there is a periodic repetition of their physical and chemical properties.

Periods and Groups

Elements in the periodic table are arranged in periods (rows) and groups (columns). Atomic number increases as you move across a period.

Metals

Metals are located on the left side of the periodic staircase on the periodic table. They are malleable, ductile, good conductors of heat and electricity, solid at room temperature (except for Mercury), and they have a high luster (they are shiny). Metals make up most of the elements in the periodic table.



Nonmetals

Non-metals are located on the right side of the periodic staircase on the periodic table (except for Hydrogen). They are brittle, not ductile, poor conductors of heat and electricity, and they have a low luster. Most are gases at room temperature, but some are solids and Bromine is a liquid.

Metalloids

Metalloids have properties of both metals and nonmetals. A metalloid may behave as a metal under some conditions, but the same metalloid may behave as a nonmetal under other conditions.



Color the periodic table below: (Need help look at page 164 in your Chemistry book)

Metals: Green

Non-metals: Blue

Metalloids: Pink

Periodic Table of the Elements

1																	18					
1																	2					
1	H Hydrogen 1.0																	He Helium 4.0				
2	Li Lithium 6.9	Be Beryllium 9.0															B Boron 10.8	C Carbon 12.0	N Nitrogen 14.0	O Oxygen 16.0	F Fluorine 19.0	Ne Neon 20.2
3	Na Sodium 23.0	Mg Magnesium 24.3															Al Aluminum 27.0	Si Silicon 28.1	P Phosphorus 31.0	S Sulphur 32.1	Cl Chlorine 35.5	Ar Argon 39.9
4	K Potassium 39.1	Ca Calcium 40.1	Sc Scandium 45.0	Ti Titanium 47.9	V Vanadium 50.9	Cr Chromium 52.0	Mn Manganese 54.9	Fe Iron 55.8	Co Cobalt 58.9	Ni Nickel 58.7	Cu Copper 63.5	Zn Zinc 65.4	Ga Gallium 69.7	Ge Germanium 72.6	As Arsenic 74.9	Se Selenium 79.0	Br Bromine 79.9	Kr Krypton 83.8				
5	Rb Rubidium 85.5	Sr Strontium 87.6	Y Yttrium 88.9	Zr Zirconium 91.2	Nb Niobium 92.9	Mo Molybdenum 95.9	Tc Technetium (98)	Ru Ruthenium 101.1	Rh Rhodium 102.9	Pd Palladium 106.4	Ag Silver 107.9	Cd Cadmium 112.4	In Indium 114.8	Sn Tin 118.7	Sb Antimony 121.8	Te Tellurium 127.6	I Iodine 126.9	Xe Xenon 131.3				
6	Cs Cesium 132.9	Ba Barium 137.3	La Lanthanum 138.9	Hf Hafnium 178.5	Ta Tantalum 180.9	W Tungsten 183.8	Re Rhenium 186.2	Os Osmium 190.2	Ir Iridium 192.2	Pt Platinum 195.1	Au Gold 197.0	Hg Mercury 200.6	Tl Thallium 204.4	Pb Lead 207.2	Bi Bismuth 209.0	Po Polonium (209)	At Astatine (210)	Rn Radon (222)				
7	Fr Francium (223)	Ra Radium (226)	Ac Actinium (227)	Rf Rutherfordium (261)	Db Dubnium (262)	Sg Seaborgium (263)	Bh Bohrium (262)	Hs Hassium (265)	Mt Meitnerium (266)	Ds Darmstadtium (281)	Rg Roentgenium (272)	Uub* Ununbium (285)	Uut* Ununtrium (284)	Uuq* Ununquadium (289)	Uup* Ununpentium (288)	Uuh* Ununhexium (292)						

metalloid

Atomic Number	→	22	4+	←	Ion charge(s)
Symbol	→	Ti	3+		
Name	→	Titanium			
Atomic Mass	→	47.9			

* Temporary names

Based on mass of C-12 at 12.00.

Any value in parentheses is the mass of the most stable or best known isotope for elements that do not occur naturally.

Ce Cerium 140.1	Pr Praseodymium 140.9	Nd Neodymium 144.2	Pm Promethium (145)	Sm Samarium 150.4	Eu Europium 152.0	Gd Gadolinium 157.3	Tb Terbium 158.9	Dy Dysprosium 162.5	Ho Holmium 164.9	Er Erbium 167.3	Tm Thulium 168.9	Yb Ytterbium 173.0	Lu Lutetium 175.0
Th Thorium 232.0	Pa Protactinium 231.0	U Uranium 238.0	Np Neptunium (237)	Pu Plutonium (244)	Am Americium (243)	Cm Curium (247)	Bk Berkelium (247)	Cf Californium (251)	Es Einsteinium (252)	Fm Fermium (257)	Md Mendelevium (258)	No Nobelium (259)	Lr Lawrencium (262)

Label the following elements as a metal, non-metal, or metalloid

_____ C	_____ Pd	_____ Xe
_____ Mg	_____ H	_____ Si
_____ Bi	_____ Es	_____ O
_____ Na	_____ Ne	_____ B

Arrangement of the Periodic Table

The periodic table consists of Representative Elements and Transition Elements (Transition Metals and Inner Transition Metals). Representative Elements on many periodic tables are labeled Group A and the Transition Elements are labeled Group B.

Representative Elements

The representative elements are found in groups 1 through 2 and groups 13 through 18 on the periodic table. They display a wide variety of properties that represent the table as a whole. They represent each category of metals, nonmetals, and metalloids; as well as representing each state of matter solids, liquids and gasses. Representative Elements on many periodic tables have a second group number labeled A to represent the number of valence electrons found in the elements of that group. For example, elements in group 2 (2A) have 2 valence electrons, while elements in group 15 (5A) have 5 valence electrons, group 17 (7A) have 7 valence electrons and so on.

1 1A	2 2A	13 3A	14 4A	15 5A	16 6A	17 7A	18 8A
H	He	B	C	N	O	F	Ne
Li	Be	Al	Si	P	S	Cl	Ar
Na	Mg	Ga	Ge	As	Se	Br	Kr
K	Ca	In	Sn	Sb	Te	I	Xe
Rb	Sr	Tl	Pb	Bi	Po	At	Rn
Cs	Ba						
Fr	Ra						

Because we
Representative Elements
contain metals, nonmetals, &
metalloids, we represent the
periodic table as a whole!
:)

Transition metals

The transition metals are groups 3 through 12 in the middle of the periodic table. These metals are solid at room temperature (except for Mercury). Transition Metals show a second group number labeled B that corresponds to the number of valence electrons.

Inner transition metals

The inner transition metals are found underneath the periodic table. The Lanthanide series belongs in period 6 and the Actinide series belongs in period 7. These metals are also solid at room temperature.

1 **Color the periodic table below:**

1A Representative Elements: yellow
 2 Transition Metals: orange
 3 Inner Transition Metals: green

18
8A

1	hydrogen 1 H 1.0079																		helium 2 He 4.0026
2	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
3	sodium 11 Na 22.990	magnesium 12 Mg 24.305	3 3B	4 4B	5 5B	6 6B	7 7B	8 8B	9 8B	10 8B	11 1B	12 2B	aluminum 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	
4	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	
5	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	
6	caesium 55 Cs 132.91	barium 56 Ba 137.33	lanthanum 57 La 138.905	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]	
7	francium 87 Fr [223]	radium 88 Ra [226]	actinide series 89-102 * *	lutetium 71 Lu 174.97	rutherfordium 104 Rf [261]	dubnium 105 Db [262]	seaborgium 106 Sg [266]	bohrium 107 Bh [264]	hassium 108 Hs [269]	meitnerium 109 Mt [268]	ununnium 110 Uun [271]	ununium 111 Uuu [272]	unubium 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
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** Actinide series

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]
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Circle the following element that is a metalloid

- Argon Germanium Bismuth Zinc Hydrogen

Circle the following element that is not a transition metal

- Osmium Titanium Gold Radon Copper

Circle all of the following elements that are representative elements

- Sulfur Cerium Sodium Aluminum Iron

Circle the following element that is an inner transition metal

- Nitrogen Hassium Californium Mercury Lithium

There are _____ groups and _____ periods in the periodic table.

Chlorine has _____ valence electrons

Groups 3 – 12 are called the _____ metals.

Write the symbol of the element that is in the 3rd period and group 13 _____

Write the symbol of the element that is in the 5th period and group 11 _____

Important Groups

Elements in a group share similar chemical and physical properties. There are groups of elements in the periodic table that are given special names.

Alkali Metals (Li, Na, K, Rb, Cs, Fr)

Alkali metals, excluding Hydrogen, are found in Group 1 or also called group 1A. They only have one valence electron in their outermost energy. Only having one valence electron leads to alkali metals being very unstable and highly reactive, meaning it is likely to bond with other elements and lose its 1 valence electron. They are all metals, extremely soft metals, which can be cut with a butter knife. Alkali metals are very abundant in nature. They share many similar chemical and physical properties for example they have low densities and low melting and boiling points.

Alkaline Earth Metals (Be, Mg, Ca, Sr, Ba, Ra)

Alkaline earth metals are found in Group 2 (2A). They have two valence electrons and very reactive, likely to bond with other elements and lose 2 electrons. All the elements in the group bond similarly and there for have similar properties.

Halogens (F, Cl, Br, I, At)

Halogens are found in Group 17 (7A). They have seven valence electrons, so want to gain 1 more electron to make their outer energy level full. A halogen will easily bond with an alkali metal (whom wants to lose 1 e⁻), together they form a salt. Example NaCl (sodium chloride) is table salt.

Noble Gasses (He, Ne, Ar, Kr, Xe, Rn)

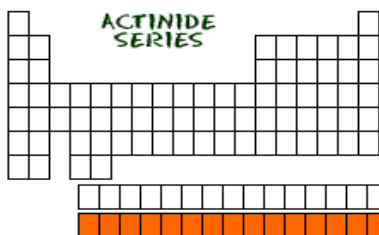
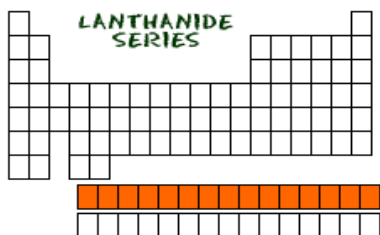
Noble gasses are found in Group 18 (8A). They have eight valence electrons and are the most stable of the elements (non-reactive). Their outermost energy level or shell is full, so they do not naturally bond with other elements. Noble gasses share properties like high densities, high melting points, colorless, odorless, and tasteless.

Lanthanide Series

The lanthanide series include the “rare-earth elements” and are found on the top row of the inner transition metals, these elements are part of period 6. The lanthanide series get it name from the element Lanthanum (La) atomic number 57 where the row would fall after. All the elements in the lanthanide series have common properties to the element Lanthanum.

Actinide Series

The actinide series includes all radioactive metals and can be found on the bottom row of the inner transition metals, these elements are part of period 7. The actinide series is named after the element Actinium (Ac) atomic number 89 where the row would fall after. All the elements in the lanthanide series have common properties to the element Actinium.



Use the following words to match up to the descriptions below.

Representative Elements, Transition Metals, Inner Transition Metals , Periods , Groups, Lanthanide Series, Actinide Series, Metals, Non-metals, Metalloids, Alkali Metals, Alkaline Earth Metals, Halogens, Noble Gases

_____ all elements in this series are radioactive

_____ poor conductors of heat& electricity; solids are dull & brittle

_____ made up of groups 1,2, & 13-18

_____ vertical columns on the periodic table; all elements have similar chemical & physical properties; all elements have the same number of valence electrons

_____ made up of the Lanthanide series and the Actinide series

_____ do not naturally combine with other elements

_____ are ductile, malleable and lustrous

_____ all elements of this group have 2 valence electrons

_____ made up of groups 3-12

_____ elements in this group will easily bond with an alkali metal to form a salt

_____ the "Rare Earths Elements"

_____ horizontal rows, atomic number increases as you move across a the row

_____ all elements in this group have 1 valence electron

_____ have the properties of both metals & non-metals