

## ELEMENTS AND THE PERIODIC TABLE

SNC1D

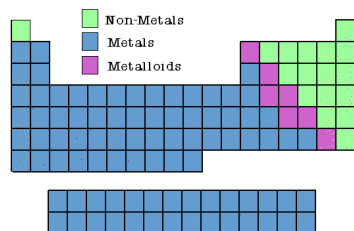
## WHY IS THE PERIODIC TABLE IMPORTANT TO ME?



- 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.

## CLASSIFICATION OF ELEMENTS

The elements of the periodic table can be divided into three main categories: Metals, Non-Metals, and Metalloids.



## PROPERTIES OF NON-METALS



Sulfur

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

## PROPERTIES OF METALS

- Solids
- Shiny
- Ductile and malleable
- Conduct heat and electricity



## PROPERTIES OF METALLOIDS



Silicon

- Metalloids (metal-like) have properties of both metals and non-metals.
- They are solids that can be shiny or dull.
- They conduct heat and electricity better than non-metals but not as well as metals.
- They can be ductile and malleable or brittle.

## Elements and Periodic Table Home Work

- Read 6.1 p 211-214 Q 1-10 p 215

## WHO DESIGNED THE PERIODIC TABLE?

DMITRI MENDELEEV

A Russian Chemistry working at the university of St. Petersburg

Designed the table in 1869

His periodic table only had 63 elements on it but he predicted there would be more.



## HOW DID HE DESIGN THE P.T.?

- 1. Organize the elements in terms of increasing mass
- 2. Organize the elements in columns by chemical characteristics
- 3. Assign Atomic Numbers including the blank spaces

### Analysis

- What are the characteristics of each group?
- What trend exists on the periodic table?
- Graph.....
- Can you predict the characteristics of the unknown compounds?

## THE CURRENT PERIODIC TABLE

- Now the elements are put in rows by increasing mass and

## ATOMIC NUMBER!!

- The horizontal rows are called **PERIODS** and are labeled from 1 to 7.
- The vertical columns are called **GROUPS** are labeled from 1 to 18.

## THE PERIODIC TABLE Numbering of Groups and Periods

1	2																18
IA	IIA																VIIIA
2nd Period																	
3	4	5	6	7	8	9	10	11	12								
IIIB	IVB	VB	VIB	VIIB													
6th Period																	
6																	
7																	

## FAMILIES ON THE PERIODIC TABLE

- Columns are also grouped into families.
- Families may be one column, or several columns put together.
- Families have names rather than numbers. (Just like your family has a common last name.)



## TABLE

Family: Are arranged vertically down the periodic table

A periodic table with the first column (Group 1) highlighted in yellow and labeled 'Alkali Family'. The 17th column (Group 17) is highlighted in light blue and labeled 'Halogen Family'. The columns are numbered 1 through 18 at the top. The rows are numbered 1 through 7 on the left side.

## INFAMOUS FAMILIES OF THE PERIODIC TABLE

Notable families of the Periodic Table and some important members:

A periodic table with several families highlighted: Group 1 (Alkali), Group 2 (Alkaline (earth)), the d-block (Transition Metals), a diagonal line of elements (Metalloids), Group 17 (Halogen), and Group 18 (Noble Gas). The columns are numbered 1 through 18 at the top. The rows are numbered 1 through 7 on the left side.

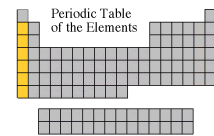
## HYDROGEN



- Hydrogen is in a class of its own.
- It is considered a nonmetal.
- It's a gas at room temperature.

## ALKALI METALS (1)

- First column of the periodic table.
- They are shiny, soft
- They are the most reactive metals.
- Francium is the most reactive metal
- They react violently with water.
- Alkali metals are never found as free elements in nature. They are always found in as compounds

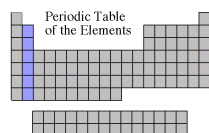


sodium(Na)

## ALKALINE EARTH METALS (2)

- They have are the second most reactive metals on the periodic table.
- They are only found in compounds in the earth such as Limestone:  $\text{CaCO}_3$
- Eg. magnesium and calcium

Periodic Table of the Elements



## TRANSITION METALS (3B-12B)

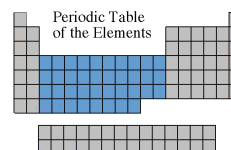
- These are the metals you are probably most familiar: copper, tin, zinc, iron, nickel, gold, and silver.

- Possess all the common characteristics of

- Many transition metals combine chemically with oxygen to form compounds called oxides.

- Eg. Iron reacts with oxygen to form rust

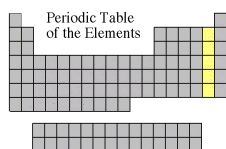
Periodic Table of the Elements



## HALOGEN FAMILY (7)

- The elements in this family are fluorine, chlorine, bromine, iodine, and astatine.
- Halogens have 7 valence electrons, which explains why they are the most active non-metals. They are never found free in nature.

Periodic Table of the Elements

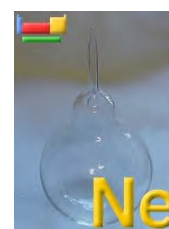
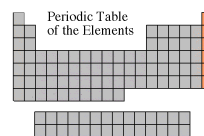


Halogen atoms only need to gain 1 electron to fill their outermost energy level. They react with alkali metals to form salts.

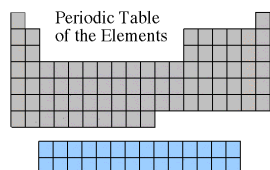
## NOBLE GASES (8)

- colorless gases
- un-reactive or inert
- The family of noble gases includes helium, neon, argon, krypton, xenon, and radon.
- All the noble gases are found in small amounts in the earth's atmosphere.

Periodic Table of the Elements



## RARE EARTH ELEMENTS



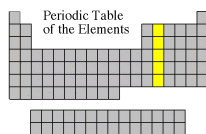
- The thirty rare earth elements are composed of the lanthanide and actinide series.
- Eg. Uranium, Plutonium Einsteinium
- Some are synthetic or man-made.

## Elements and Periodic Table Home Work

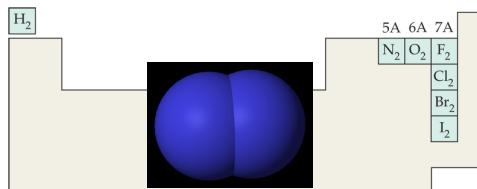
- Read 6.4 p 220-224 Q 1-11 p 225

## WHY ISN'T GROUP 4 A FAMILY

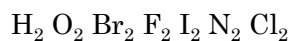
- This family includes a non-metal (carbon), metalloids, and metals.



## DIATOMIC MOLECULES

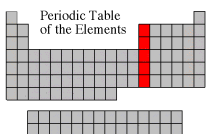


These seven elements occur naturally as molecules containing two atoms.



## Group 3

- The Boron Family is named after the first element in the family.
- This family includes a metalloid (boron), and the rest are metals.
- This family includes the most abundant metal in the earth's crust (aluminum).



## READING THE PERIODIC TABLE: CLASSIFICATION

- Nonmetals, Metals, Metalloids, Noble gases

■ Nonmetals  
■ Metals  
■ Metalloids  
■ Noble gases

**The metals, nonmetals, and metalloids**

IA 1 H																	VIIIA 2 He
3 Li	4 Be											5 B	6 C	7 N	8 O	9 F	10 Ne
11 Na	12 Mg	IIIB	IVB	VB	VIB	VIIIB	VIII			IB	IIB	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 Db	106 Sg	107 Bh	108 Hs	109 Mt	110 Uun	111 Uuu	112 Uub	114		116		118	
Rare earth elements																	
		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		

Lanthanides  
Actinides

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