

The Periodic Table of Elements

CYOPT- Create Your Own Periodic Table...

...as well as labeling and taking notes on each group of elements

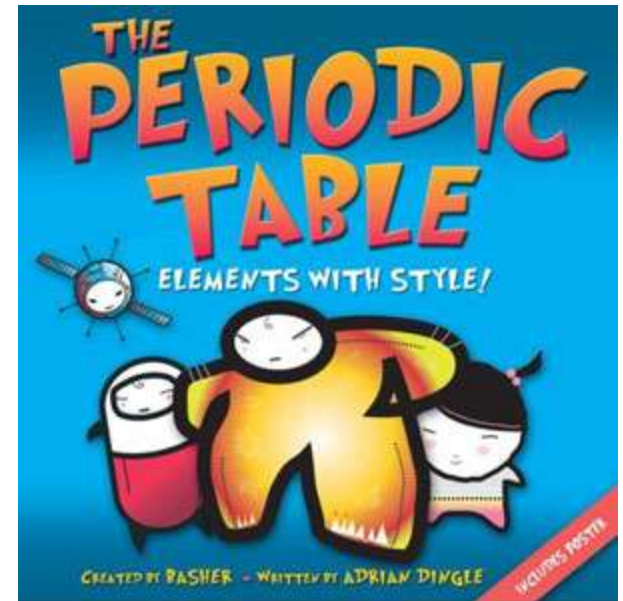
Periodic Table of the Elements

1 H 1.00794																	2 He 4.0026
3 Li 6.941	4 Be 9.01218											5 B 10.811	6 C 12.011	7 N 14.0067	8 O 16.00	9 F 18.9984	10 Ne 20.1797
11 Na 22.989769	12 Mg 24.305	13 Al 27.98	14 Si 28.086	15 P 30.974	16 S 32.066	17 Cl 35.453	18 Ar 39.948										
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	106 106	107 107	108 108	109 109	110 110								

* 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



Create-Your-Own Periodic Table (CYOPT)

- Fill in the Key at the top for Carbon

Artificially Made →  6  ← Atomic number
← Radioactive

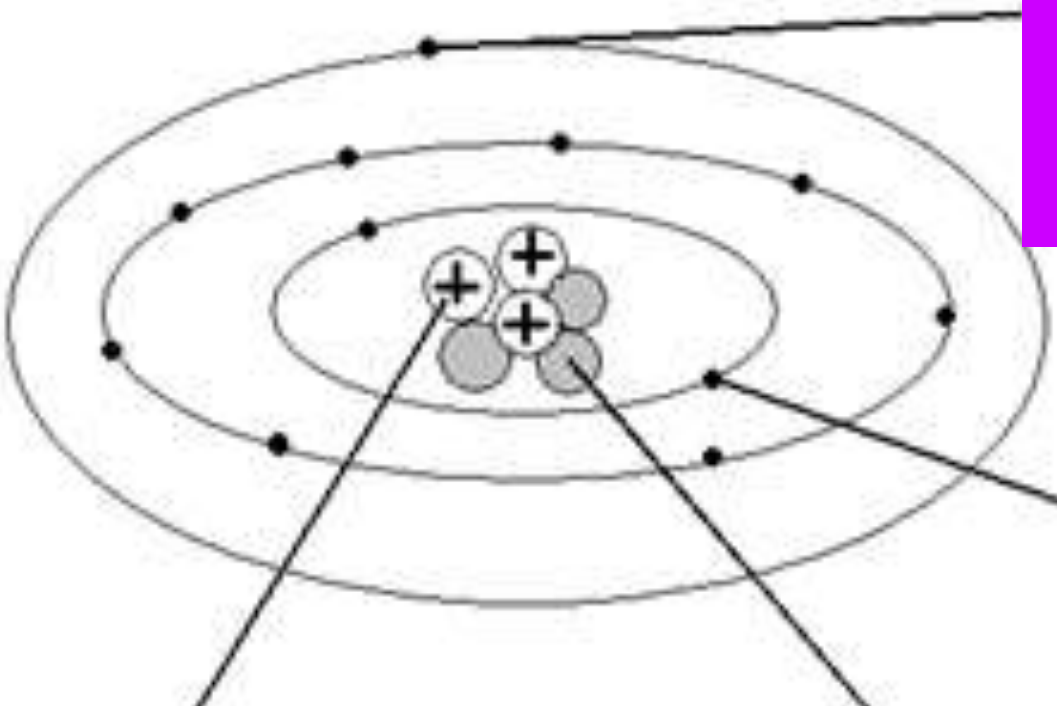
 ← Chemical symbol

12.01 ← Atomic mass

Carbon ← Element Name

- Begin filling in the atomic symbol, atomic mass, and atomic number for the elements in group 1 & 2—be sure to use the same order as the key!

CYOPT- Structure of the Atom



Valence Electron
Negatively Charged
Outside the Nucleus;
in the outside shell

Electron
Negatively Charged
Outside the Nucleus

Proton
Positively Charged
Inside the Nucleus

Neutron
Neutrally Charged
Inside the Nucleus

Charge of atom:
Neutral

Charge of nucleus:
Positive

Majority of the atom
is empty space.

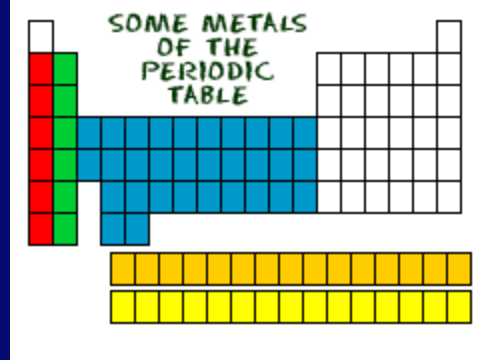
CYOPT-

Reading the Periodic Table

Group	# Valence Electrons
1	1
2	2
13	3
14	4
15	5
16	6
17	7
18	8

- **Atomic Mass = # of protons + # of neutrons**
- **Atomic Number = # of protons**
- **Organized by increasing atomic number**
- **Valence Electrons**
 - *[Sketch Table]*
- **An element's properties can be predicted from its location in the periodic table**
- **Group/Family = column (up/down)**
 - # of valence electrons
- **Period = row (left to right)**
 - # of orbitals/shells

Metals



- 75% of elements are metals
- Physical properties of metals:
 1. **hardness**
 2. **luster** (shininess)
 3. **malleability** (can be pounded or rolled into shapes or flat sheets)
 4. **ductility** (can be pulled out or drawn into wires)

5. **Conductors** (transmit heat and electricity easily)

6. **Magnetic** (attracted to magnets)

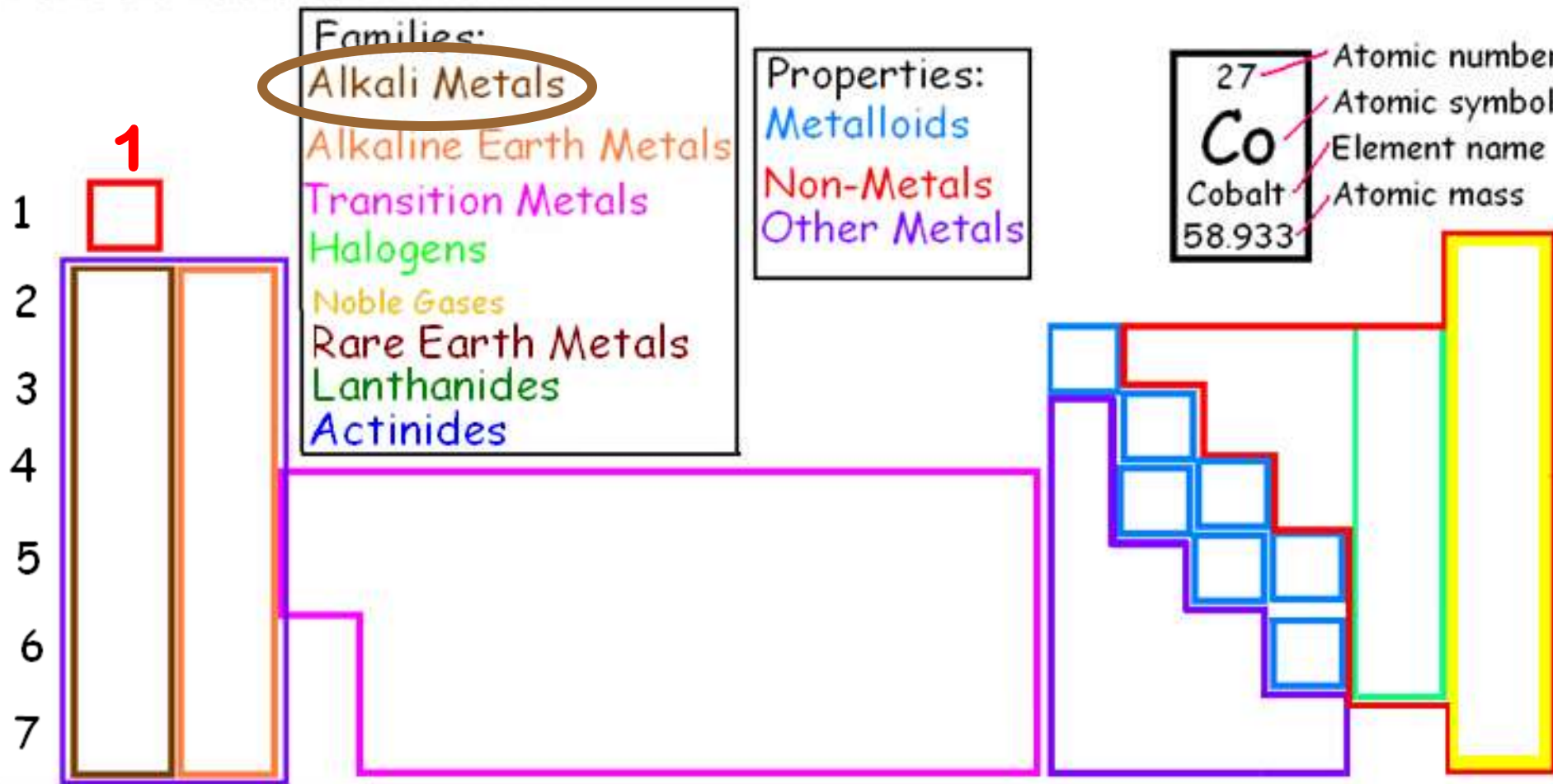
- ex. iron (Fe), cobalt (Co), and nickel (Ni)

7. **State of Matter**- Most metals are solids at room temperature

8. **Melting point**- high temperature; except Mercury (Hg)--liquid at room temperature

Group 1: Alkali Metals

Periodic Table of Elements



Chemical Symbols

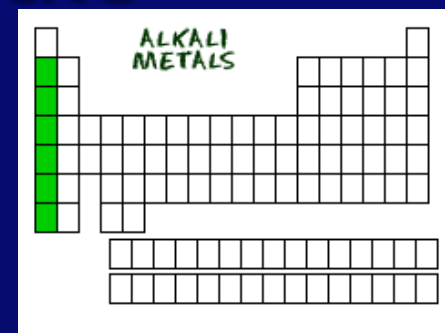
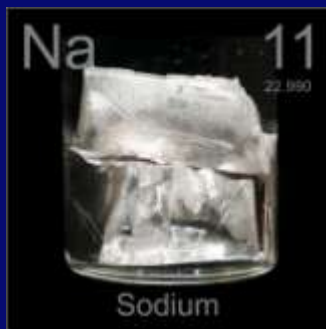
Red- Gases

Blue- Liquids

Black- Solids



Group 1: Alkali Metals



- Group 1
- 1 valence electron
 - which it readily loses to become a cation
- Extremely reactive – NEVER found alone in nature
- Only found in compounds, combined with other elements
- Reacts violently with water to produce explosions
- Causes skin burns if you come into contact with it
- Physical Properties:
 - Soft- can be cut with a plastic knife
 - Shiny
 - Lightweight
 - Good conductors of electricity and heat
 - Low melting points
 - Tarnishes rapidly
- [Alkali Metals Video](#) (1.30)

Group 2: Alkaline Earth Metals

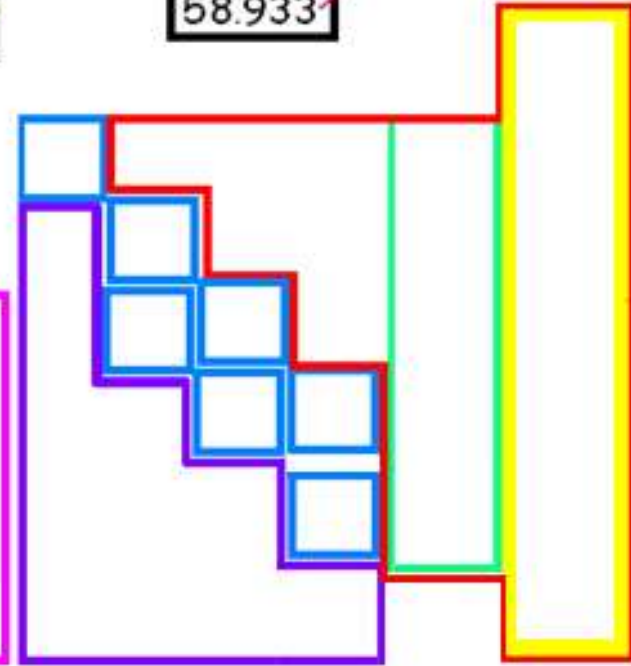
Periodic Table of Elements

Families:
Alkali Metals
Alkaline Earth Metals
Transition Metals
Halogens
Noble Gases
Rare Earth Metals
Lanthanides
Actinides

Properties:
Metalloids
Non-Metals
Other Metals

27	Atomic number
Co	Atomic symbol
Cobalt	Element name
58.933	Atomic mass

1 **2**
2
3
4
5
6
7



Chemical Symbols

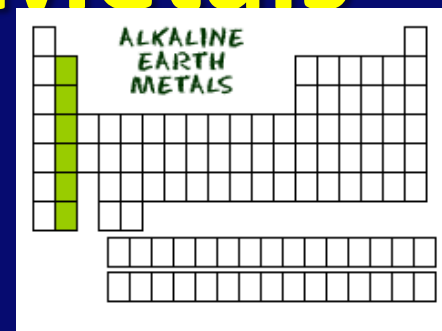
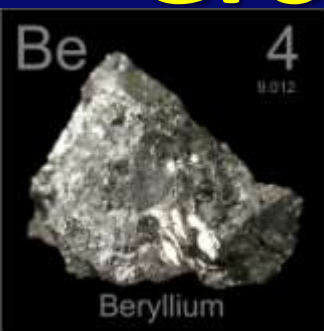
Red- Gases

Blue- Liquids

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Group 2: Alkaline Earth Metals



- Group 2
- 2 valence electrons
- 2nd most reactive group of elements in the periodic table
- Chemically bond very easily by giving away 2 electrons
- Physical Properties:
 - Fairly hard
 - bright white
 - good conductors of electricity
 - high melting points
 - high densities
- Called Alkaline? When mixed in solutions = pH greater than 7
 - Those pH levels are defined as 'basic' or 'alkaline' solutions
- [Alkali and Alkaline Metals Video](#)
- [Brainiac Alkaline Metals Video](#)

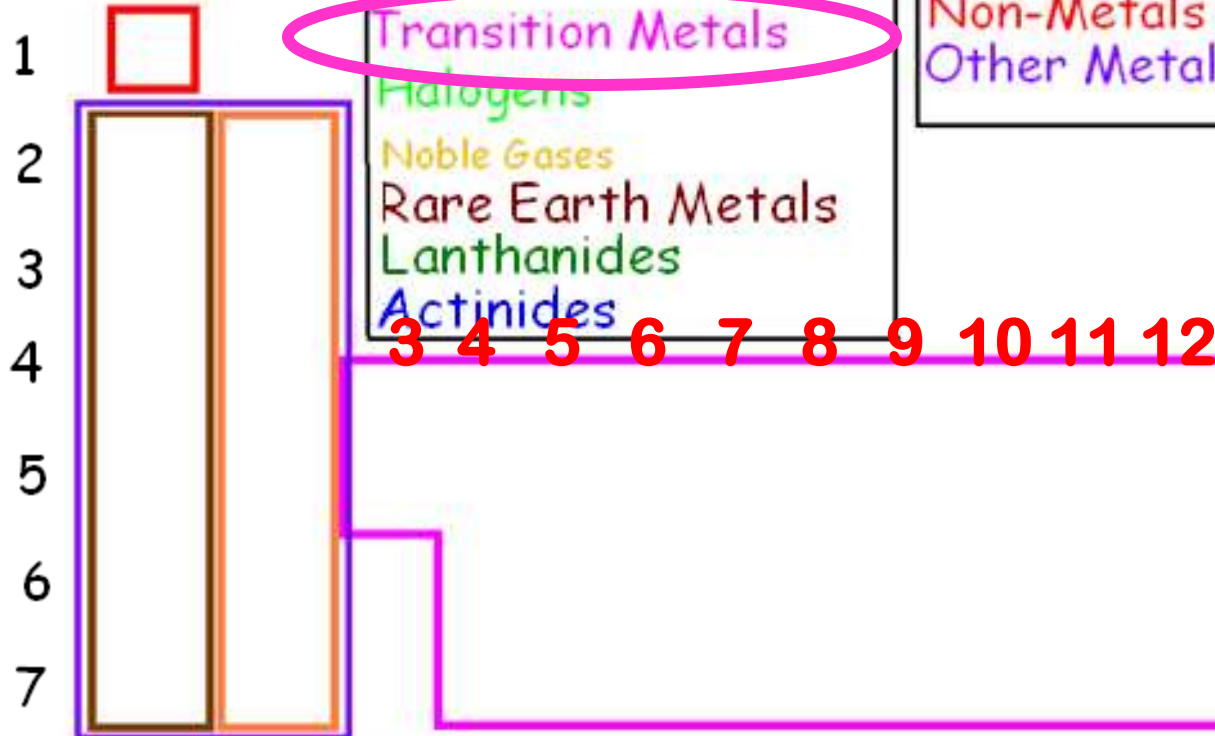
Groups 3-12: Transition Metals

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Chemical Symbols

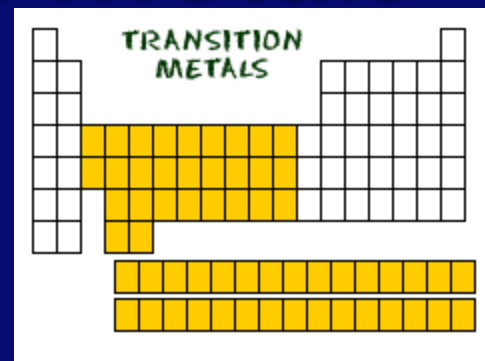
Red- Gases

Blue- Liquids

Black- Solids



Groups 3-12: Transition Metals



- Groups 3-12
- Largest group of elements
- Most commonly found
- Follows NO rules when finding valence electrons
- Use the two outermost shells/orbitals to bond with other elements
 - Most elements only use the valence shell

- Physical Properties:
 - Hard and shiny
 - Good conductors of heat & electricity
 - Are fairly stable, reacting slowly or not at all with air and water
 - Most have very high melting and boiling points
 - Most dissolve in acids
- [Gold Malleability Video](#)
- [Copper + Zinc = Brass Video](#)
- [Iron in a Dollar Video](#)

Rare Earth Metals

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Chemical Symbols

Red- Gases

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Lanthanides

Rare Earth Metals: Lanthanides

- Top row (Rare Earth Metals)
- Fits in period 6
- Named after the first element in the row (Lanthanum)
- Physical Properties:
 - Soft
 - Malleable
 - Shiny/high luster
 - High conductivity
- Found naturally on Earth
- Only 1 element in the series is radioactive

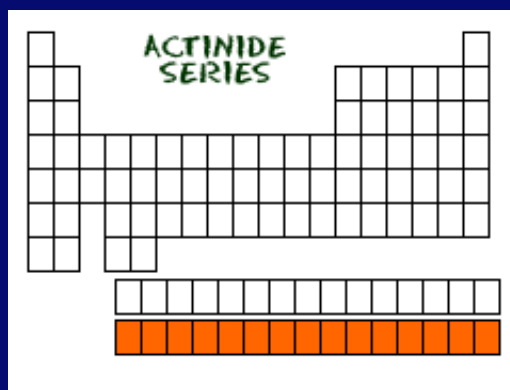


A periodic table with the lanthanide series (La to Lu) and actinide series (Ac to Lr) highlighted in pink. The lanthanide series is shown as a separate row below the main table, starting from La and ending at Lu. The actinide series is shown as a separate row below the lanthanide series, starting from Ac and ending at Lr. The main table has a color gradient from green on the left to red on the right.

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

Rare Earth Metals: Actinides

- Bottom row (Rare Earth Metals)
- Fits in period 7
- Named after the first element in the row (Actinium)



- All are radioactive
 - Nucleus is very unstable
 - last for only a fraction of a second after they are made
- Some not found in nature
 - Only thorium and uranium exist on Earth in significant amounts
 - All the elements after uranium were created artificially in the lab

Other Metals (Metals in Mixed Groups)

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Other Metals (Metals in Mixed Groups)

- Located in groups 13, 14, 15
- Includes 7 Elements – Al, Ga, In, Sn, Tl, Pb, Bi
- Follow “rules” when finding valence electrons
- Possess many of the same Physical Properties as the Transition Metals:
 - Solid & Opaque
 - Ductile & Malleable
 - High densities



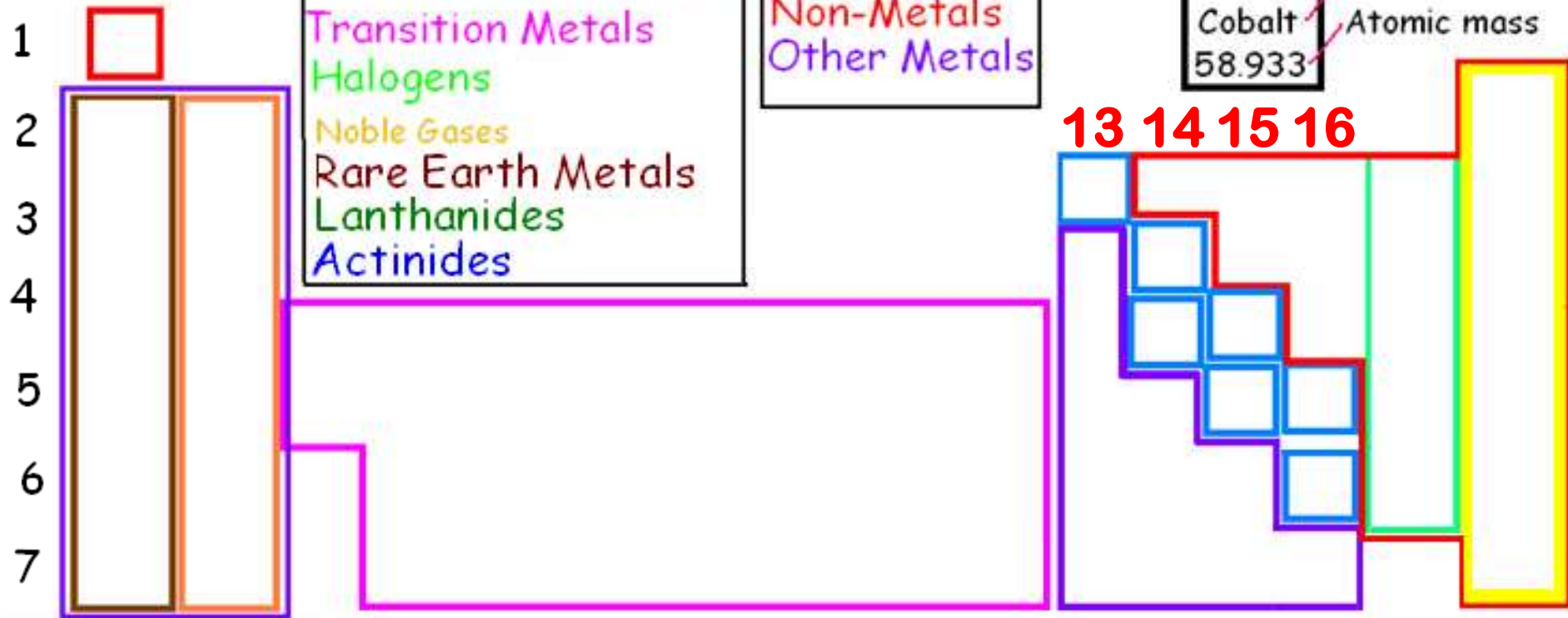
Metalloids

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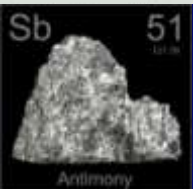
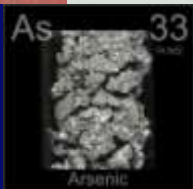
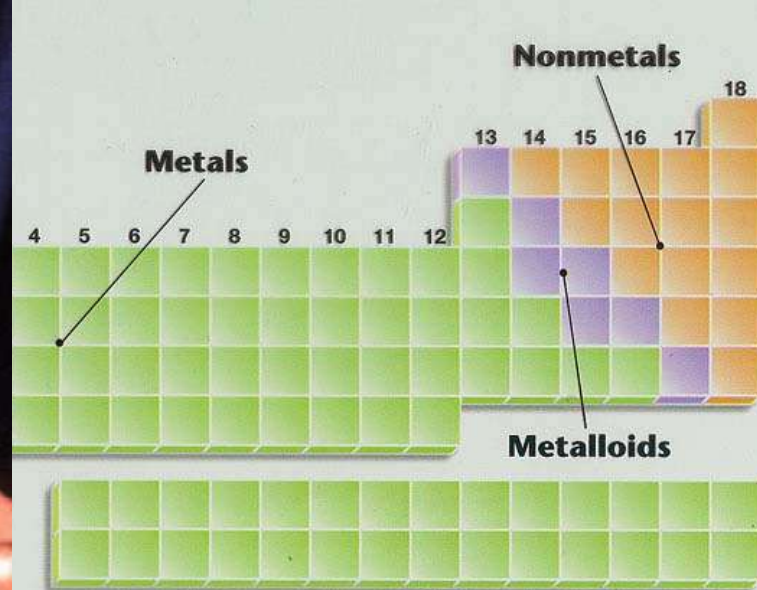
Metalloids

• Possess properties of both metals and non-metals

- Semi-conductors

- Found along the “stair-step” or “ladder” (between metals/non-metals)

- Physical Properties:
 - Solids
 - Shiny or dull
 - Will conduct heat and electricity (but not as well as metals)



Metalloids:

- Boron
- Silicon
- Germanium
- Arsenic
- Antimony
- Tellurium
- Polonium

13	14	15	16	17
B Boron	C Carbon	N Nitrogen	O Oxygen	F Fluorine
Al Aluminium	Si Silicon	P Phosphorus	S Sulfur	Cl Chlorine
Ga Gallium	Ge Germanium	As Arsenic	Se Selenium	Br Bromine
In Indium	Sn Tin	Sb Antimony	Te Tellurium	I Iodine
Tl Thallium	Pb Lead	Bi Bismuth	Po Polonium	At Astatine

Non-Metals

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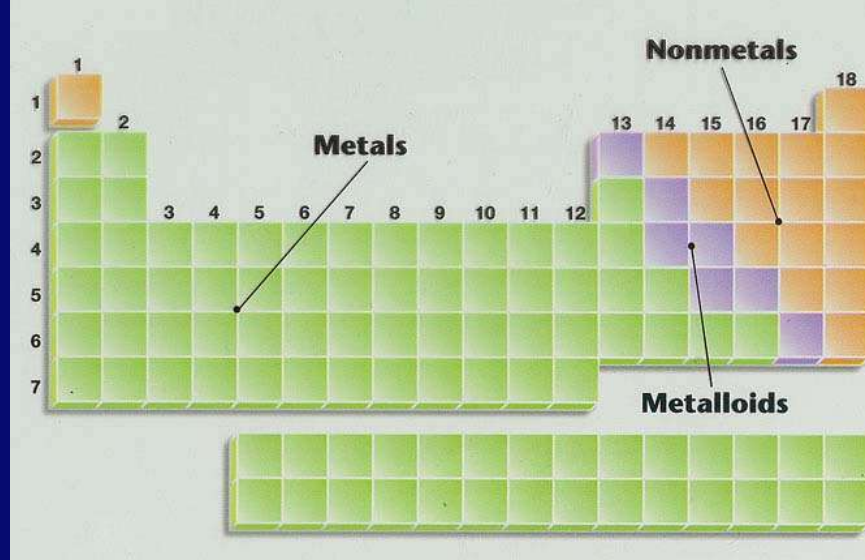
Black- Solids



Nonmetals

□ 17 nonmetals

□ Found to the **right** of the “stair step” on the periodic table & Hydrogen



• Lack most of the properties of metals

• Physical Properties: (most)

– Solid nonmetals are brittle (not malleable/ductile)

– Poor conductors of heat & electricity

– Dull

• Chemical Properties: (most)

– Form compounds easily

• EXCEPT Group 18 (Noble Gases)



Group 17: Halogens

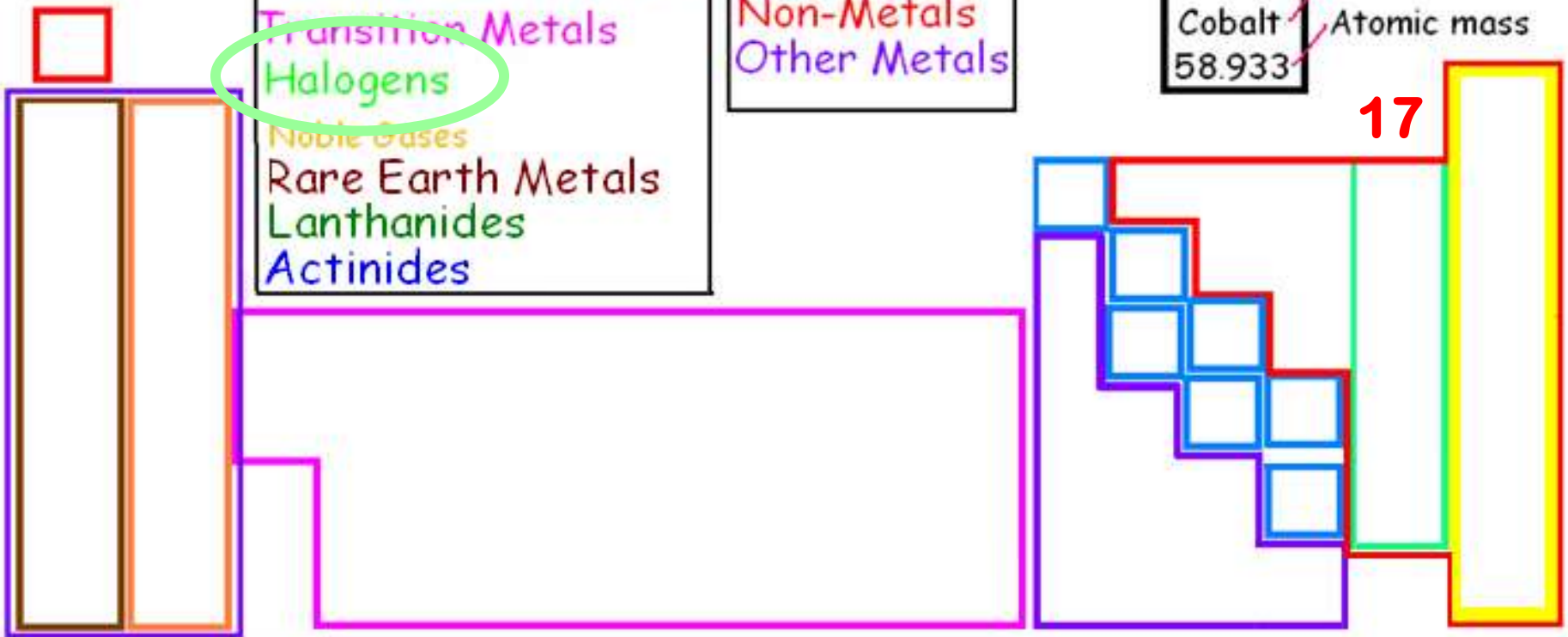
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17

Chemical Symbols

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Group 18: Noble Gases

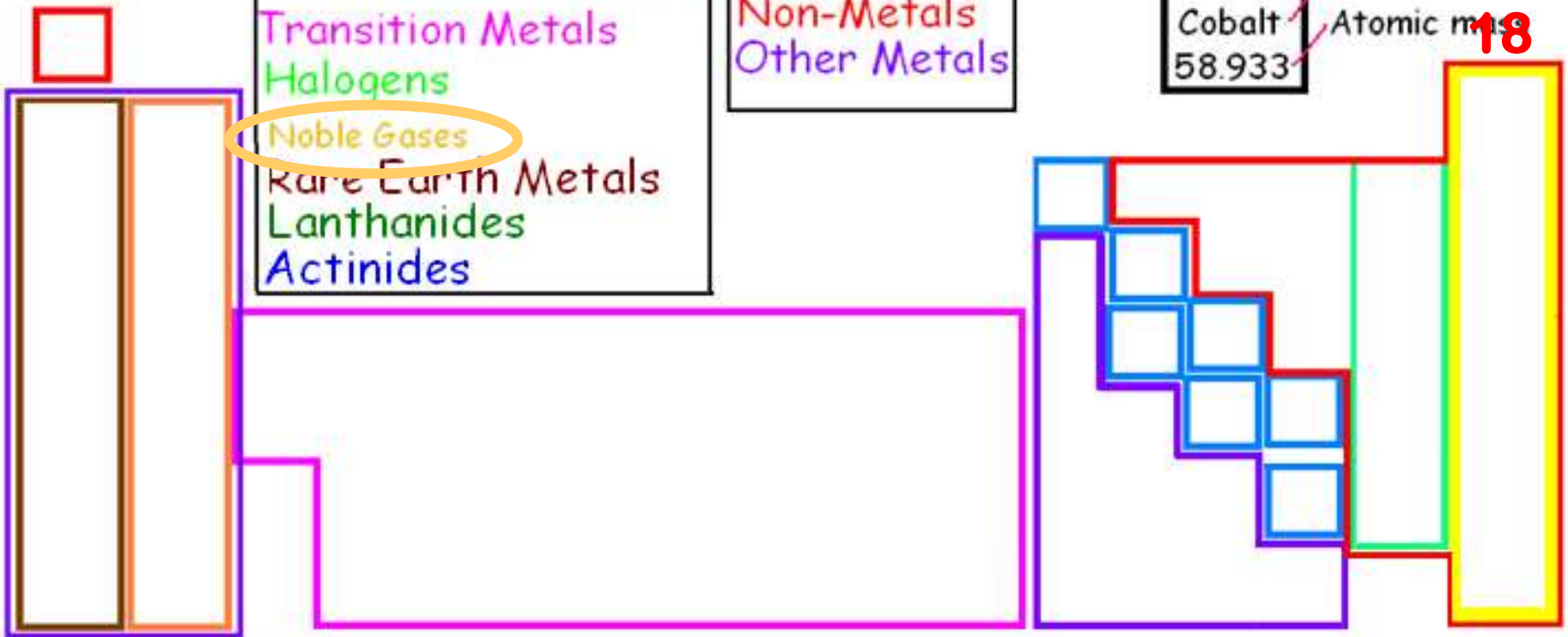
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The "Noble" Gases

