Regions of the Periodic Table

Unit: Periodicity

MA Curriculum Frameworks (2016): HS-PS1-1

Mastery Objective(s): (Students will be able to…)

- Identify regions of the periodic table by name.
- Describe the properties of different groups (families) of elements.

Success Criteria:

- Regions of the periodic table are identified correctly.
- Descriptions of properties are correct.

Tier 2 Vocabulary: period, group, family

Language Objectives:

- Name each of the regions of the periodic table.

Notes:

period: a row of the periodic table. Properties of the elements are *periodic*, meaning that they repeat after a specific interval. Elements in the same period have their highest energy electrons in the same principal energy level.

group (family): a column of the periodic table. Elements in the same group have the same number of valence electrons, and therefore have similar chemical and physical properties.

diatomic elements: elements whose natural state is a molecule that has two atoms of the element. There are seven diatomic elements:
H_2, N_2, O_2, F_2, Cl_2, Br_2, and I_2.

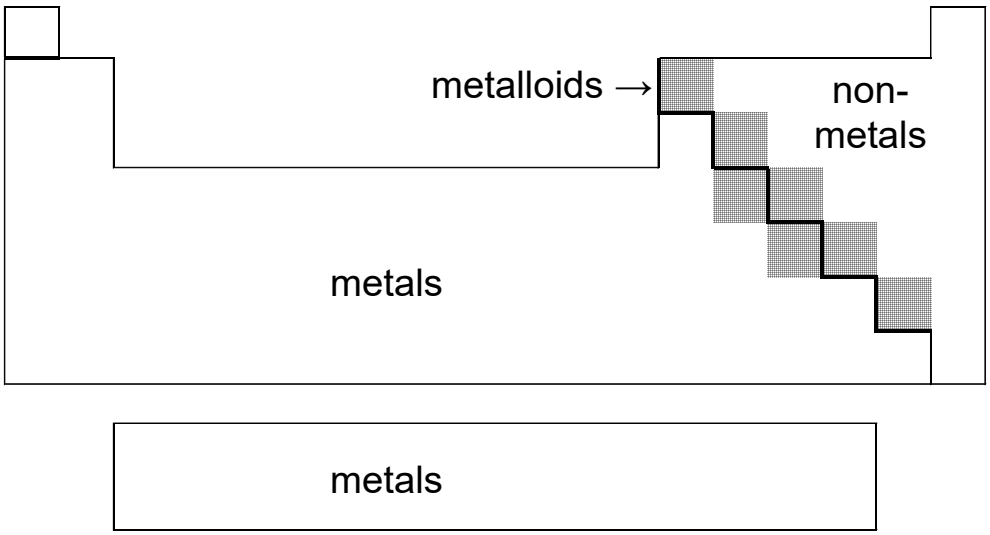
Use this space for summary and/or additional notes:

Metals, Non-Metals & Metalloids

metals: elements to the left of and below the "stairstep line."

non-metals: elements to the right of and above the "stairstep line."

metalloids: elements that exhibit both metallic and non-metallic character. These are most of the elements that touch the "stairstep line". (All except for Al and Po).



Use this space for summary and/or additional notes:

properties of metals:

- shiny
- high density
- good conductors of heat & electricity
- malleable & ductile (can be reshaped by hammering, bending and stretching)
- high melting & boiling points
- most have 3 or fewer valence electrons
- tend to form positive ions

properties of non-metals:

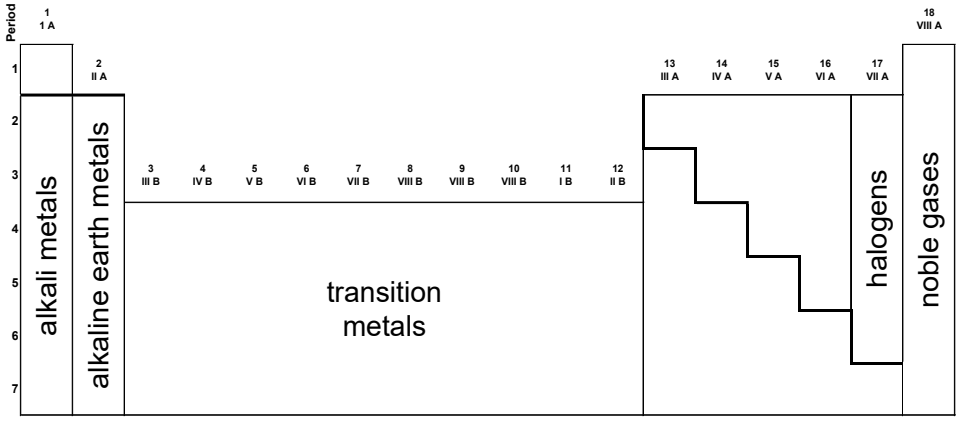
- dull
- low density
- poor conductors of heat & electricity
- brittle
- low melting & boiling points
- most have 4 or more valence electrons
- tend to form negative ions

properties of metalloids:

Metalloids can have properties “in between,” or can have some properties like metals and others like non-metals.

Use this space for summary and/or additional notes:

Groups ("Families") of Elements



lanthanides (rare earth metals)
actinides

<u>alkali metals</u>: elements in group 1 (IA) of the periodic table.

- 1 valence electron (form +1 ions)
- very reactive
- soft
- very high melting & boiling points
- ions are soluble in water

<u>alkaline earth metals</u>: elements in group 2 (IIA) of the periodic table.

- 2 valence electrons (form +2 ions)
- reactive, though not as much as group I metals
- very high melting & boiling points
- ions are not soluble in water

Use this space for summary and/or additional notes:

transition metals: elements in the center section (groups 3–12) of the periodic table.

- have a partially-filled *d* sub-level
- form colored ions when dissolved in water
- "officially" have 2 valence electrons, but can shift electrons into and out of *s* and *d* sub-levels. Often form more than one kind of ion.
- transition metals with several unpaired electrons in their *d* or *f* sub-levels are paramagnetic (are attracted to a magnet).
- most are shiny, hard metals with high melting & boiling points

inner transition metals: elements in the "f block" of the periodic table. (The "extra" section below the rest of the table.)

- are part of the transition metals
- have a partially-filled *f* sub-level
- officially have 2 valence electrons, but can shift electrons between *s*, *d,* and *f* sub-levels. Usually form ions with +3 charges.
- are rare

noble gases: elements in group 18 (VIIIA) of the periodic table.

- 8 valence electrons (except for He which has 2)—full valence shells
- do not form ions
- do not react with other compounds
- gases
- extremely low melting & boiling points. (In fact, helium cannot be made into a solid even at absolute zero, except at extremely high pressures.)

halogens: elements in group 17 (VIIA) of the periodic table.

- 7 valence electrons (form −1 ions)
- reactive
- diatomic (atoms in pairs) in their natural state: F_2, Cl_2, Br_2, I_2
- low melting & boiling points. (F & Cl are gases at room temp; Br is a liquid, and I is a solid, but will melt in your hand.)
- form salts that are soluble in water (except for fluorine—fluoride salts are not soluble in water.)

Homework

Color and label the regions of the periodic table on an actual periodic table (with elements and data).

Use this space for summary and/or additional notes: