




The Periodic Table

Part I – Categories of Elements

A laboratory setting with various glassware containing colored liquids. In the foreground, there is a beaker with blue liquid, a flask with yellow liquid, and a graduated cylinder with orange liquid. The background is blurred, showing more laboratory equipment and a blue wall.

Matter & Elements

- **Matter** - anything that has mass and takes up space.
- **Elements** - a pure substance that cannot be broken down into a simpler substance by physical or chemical means.

Open Ended Question

What are similarities and differences between protons and neutrons?

Open Ended Question

What are some similarities between protons and electrons?

Open Ended Question

What are some similarities and differences between atomic number and atomic mass?

Quiz

Which is NOT a category of element on the periodic table?

- metals
- metalloids
- asteroids
- nonmetals

A photograph of various laboratory glassware including beakers, flasks, and test tubes containing liquids of different colors (blue, yellow, green, orange, red).

Three Categories of Elements

- Metals

- Non-Metals

- Metalloids

Make this table in your notebook
to fill in during the lesson

(you will have a quiz at the end and can use your notes)

Class	Physical property	Chemical Properties	Example
Metal			
Nonmetal			
Metalloid			

Three Categories of Elements

- Metals

- Luster (shiny)
- Malleable - can be flattened into sheets
- Good Conductors - heat and electricity can flow through
- Ductile - can be drawn into thin wires
- Most are solid at room temperature except Mercury



Physical Properties of Metals:

high melting points

solid at room temperature
(except mercury)

malleable & ductile

shiny

good conductors of heat and
electricity

Chemical Properties of Metals:

1-3 valence electrons

lose electrons easily

react with metals and some
nonmetals

A photograph of various laboratory glassware including beakers, flasks, and test tubes containing liquids of different colors (blue, yellow, green, orange, red).

Three Categories of Elements

- Metals

Some examples of metals and their atomic symbols:

- Copper (Cu)

- Mercury (Hg)


- Gold (Au)

- Potassium (K)

- Sodium (Na)

- Silver (Ag)

The Periodic Table



H																	He
Li	Be											B	C	N	O	F	Ne
Na	Mg											Al	Si	P	S	Cl	Ar
K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr
Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I	Xe
Cs	Ba	La	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At	Rn
Fr	Ra	Ac	Rf	Db	Sg	Bh	Hs	Mt	Ds	Rg							

The Metals are represented in the Periodic Table in blue.



Three Categories of Elements

- Non-Metals

- Dull
- Not Malleable/Ductile
- Poor Conductors
- At room temperature, most are solid or gaseous



Physical Properties of Nonmetals:

Low melting points

Most are gases at room
temperature

Low densities

brittle

do not conduct heat and
electricity

Chemical Properties of Nonmetals:

4-8 valence electrons

do not give up or lose electrons

react with metals and some
nonmetals

gain or share valence electrons
easily

A photograph of various laboratory glassware including beakers, flasks, and test tubes containing liquids of different colors (blue, yellow, green, red, orange).

Three Categories of Elements

- Non-Metals

Some Examples of Non-Metals

- Oxygen (O)

- Helium (He)


- Sulfur (S)

- Chlorine (Cl)

- Neon (Ne)

- Nitrogen (N)

The Periodic Table



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Na	Mg											Al	Si	P	S	Cl	Ar
K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr
Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I	Xe
Cs	Ba	La	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At	Rn
Fr	Ra	Ac	Rf	Db	Sg	Bh	Hs	Mt	Ds	Rg							

The Non-Metals are represented in the Periodic Table in yellow.

A photograph of various laboratory glassware including beakers, flasks, and test tubes containing liquids of different colors (blue, yellow, green, orange, red).

Three Categories of Elements

- Metalloids

- Have properties of both metals and non-metals.
- Some are shiny, others dull
- Some are malleable and ductile
- They conduct heat and electricity better than nonmetals, but less than metals.

Physical Properties of Metalloids:

Solid at room temperature

malleable or brittle

shiny or dull

conductors of heat and
electricity (not as good as
metals) *called semi-conductors

Chemical Properties of Metalloids:

3-7 valence electrons

able to give or take electrons

Forms alloys with metals

gains/shares/loses valence
electrons depending on who it
bonds with



Three Categories of Elements

- Metalloids

Here are the Metalloids

- Boron (B)

- Arsenic (As)

- Tellurium (Te)

- Silicon (Si)

- Antimony (Sb)

- Polonium (Po)


- Germanium (Ge)

The Periodic Table

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Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I	Xe	
Cs	Ba	La	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At	Rn	
Fr	Ra	Ac	Rf	Db	Sg	Bh	Hs	Mt	Ds	Rg								

The Metalloids are represented in the Periodic Table in green.

The Periodic Table



H																	He
Li	Be											B	C	N	O	F	Ne
Na	Mg											Al	Si	P	S	Cl	Ar
K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr
Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I	Xe
Cs	Ba	La	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At	Rn
Fr	Ra	Ac	Rf	Db	Sg	Bh	Hs	Mt	Ds	Rg							

What do you notice about the way the element groups are arranged in the Periodic Table?

Poll

Which classes of elements are shiny?

- metals
- nonmetals
- metalloids

Quiz

Which class of elements contains sodium?

- metal
- nonmetal
- metalloid

Which class of elements does not conduct electricity?

- metal
- nonmetal
- metalloid

Which classes of elements are shiny (or can be shiny)?

- metal
- nonmetal
- metalloid

Which class has the largest number of elements?

- metal
- nonmetal
- metalloid

Which class of elements is found in semiconductors?

- metal
- nonmetal
- metalloid

Which class of elements can be formed into sheets and wires?

- metal
- nonmetal
- metalloid

Which class of elements has 1-3 valence electrons?

- metal
- nonmetal
- metalloid

Which class of elements is dull in appearance?

- metal
- nonmetal
- metalloid

When you are finished . . .

- Pick a PHET simulation to work on:
- Work at least 10 minutes in the pHet simulation about atoms and isotopes to help better your understanding. Some of you are still confused.



Periodic Table

H						He	
Li	Be	B	C	N	O	F	Ne
Na	Mg	Al	Si	P	S	Cl	Ar

Percent Composition

Average Atomic Mass

Isotope Mixture:



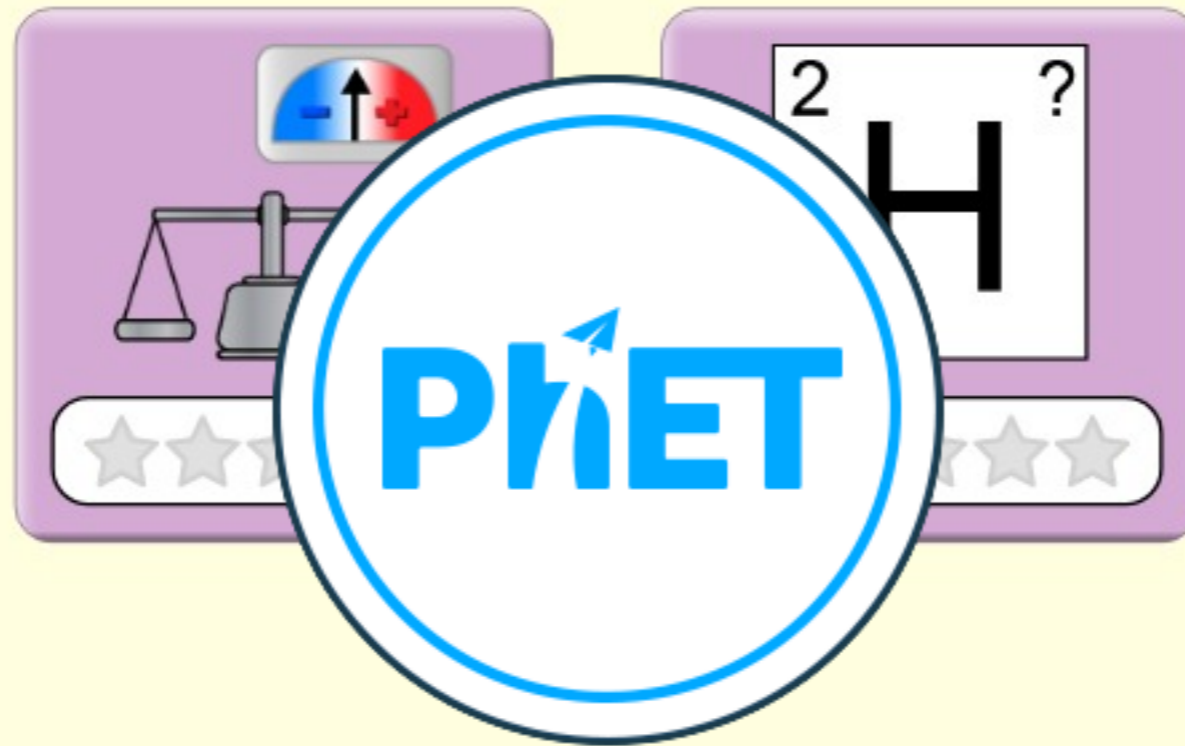
https://phet.colorado.edu/sims/html/isotopes-and-atomic-mass/latest/isotopes-and-atomic-mass_en.html?screens=2

Choose Your Game!



Na	Mg				
K	Ca	Sc	Ti	V	Cr
Rb	Sr	Y	Zr	Nb	Mo

★★★★★



PHET

★★★★★



★★★★★



https://phet.colorado.edu/sims/html/build-an-atom/latest/build-an-atom_en.html?screens=3

