

Build a Periodic Table Activity – Guided Inquiry

LEARNING GOALS

In this activity, you will:

1. make observations.
2. look for patterns.
3. make predictions.

In a group of 2 or 3, you will be creating a classification system for the periodic table of elements. This will be a simulation of how Dmitri Mendeleev organized information into a periodic table.

CONCEIVE – What do I wish to accomplish through this activity?

Through this activity you will have the opportunity to develop your observation skills as you interact with Periodic Table Cards showing properties of different elements from the periodic table. This activity will support your understanding of the concept of patterns and trends seen on the periodic table.

DESIGN – How will I accomplish this activity?

Each group of students will receive a set of Periodic Table Cards. Make observations to group the elements into columns and rows. Then arrange the cards in a two-dimensional grid according to the patterns or trends that you see. Not all the elements on the periodic table will be given. Only those that have been discovered at the time Mendeleev was working on building his table. If you leave a space for an “undiscovered element” brainstorm what characteristics that element may have.

IMPLEMENT – Carry out the activity.

Procedure

1. Separate the element cards using scissors
2. Arrange the cards based on the elements' properties.
 - a. How will the elements be grouped together?
 - i. What patterns or trends are visible?
3. Glue your periodic table down, you will be discussing how you came to this conclusion with the class.

MATERIALS NEEDED – What equipment and supplies do I need?

1. Periodic table cards
2. Large sheet of paper to glue down your groups periodic table

SOURCE

Periodic Table Cards are adapted and modified from *Living By Chemistry* (Angelica Stacy)

Hydrogen (H)

nonmetal atomic mass: 1.0
colourless,
odourless gas



very flammable compounds:
explodes in air HCl, H₂O

Helium (He)

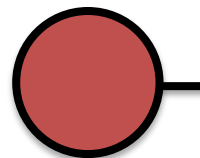
nonmetal atomic mass: 4.0
colourless,
odourless gas



very unreactive compounds:
none known

Lithium (Li)

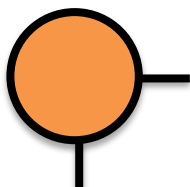
metal atomic mass: 6.9
soft, gray
solid



reacts with compounds:
water LiCl, Li₂O

Beryllium (Be)

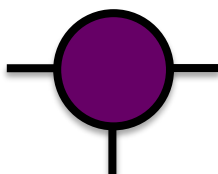
metal atomic mass: 9.0
hard, dull
gray solid



compounds:
BeO, BeCl₂

Boron (B)

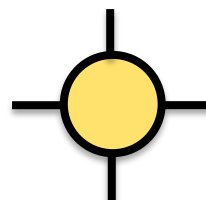
metalloid atomic mass: 10.8
hard black
solid
semiconductor



compounds:
B₂O₃, BCl₃

Carbon (C)

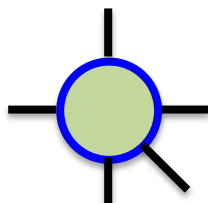
nonmetal atomic mass: 12.0
clear crystal
(diamond)
metalloid
black solid (graphite)



compounds:
CCl₄, CO₂, CH₄

Nitrogen (N)

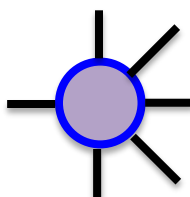
nonmetal atomic mass: 14.0
colourless,
odourless gas



not very compounds:
reactive NCl₃, NH₃

Oxygen (O)

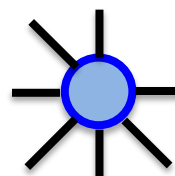
nonmetal atomic mass: 16.0
colourless,
odourless gas



very compounds:
reactive H₂O

Fluorine (F)

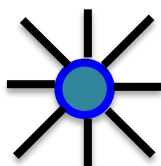
nonmetal atomic mass: 19.0
pale yellow
gas



extremely compounds:
reactive HF, NaF, CaF₂

Neon (Ne)

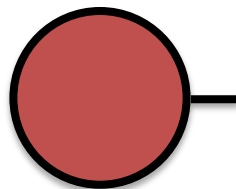
nonmetal atomic mass: 20.2
colourless,
odourless gas



very unreactive compounds:
 none known

Sodium (Na)

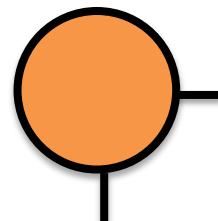
metal atomic mass: 23.0
soft, gray
solid



reacts vigorously compounds:
with water NaCl, Na₂O

Magnesium (Mg)

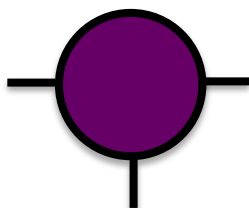
metal atomic mass: 24.3
moderately
hard silvery solid



flammable compounds:
 MgCl₂, MgO

Aluminium (Al)

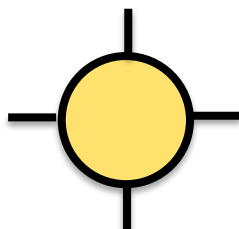
metal atomic mass: 27.0
soft silvery
solid



compounds:
Al₂O₃, AlCl₃

Silicon (Si)

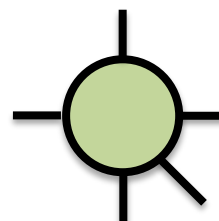
metalloid atomic mass: 28.1
moderately
hard gray solid
semiconductor



compounds:
SiH₄, SiO₂, SiCl₄

Phosphorus (P)

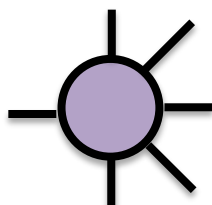
nonmetal atomic mass: 31.0
red, white,
black solid



spontaneously compounds:
flammable PH₃, PCl₃, PCl₅

Sulfur (S)

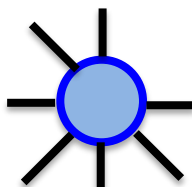
nonmetal atomic mass: 32.1
brittle, yellow
solid powder



compounds:
H₂S, SCl₂

Chlorine (Cl)

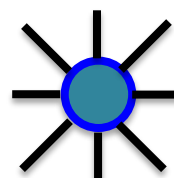
nonmetal atomic mass: 35.5
yellowish
green gas



extremely compounds:
reactive HCl, NaCl, CaCl₂

Argon (Ar)

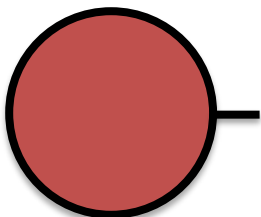
nonmetal atomic mass: 39.9
odourless
gas



very compounds:
unreactive none known

Potassium (K)

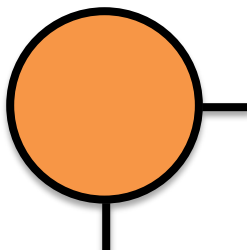
metal atomic mass: 39.1
very soft,
gray solid



reacts violently with water compounds:
KCl, K₂O

Calcium (Ca)

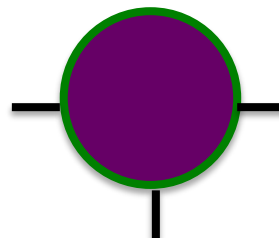
metal atomic mass: 40.1
moderately
hard silvery solid



reacts violently with water compounds:
CaCl₂, CaO

Gallium (Ga)

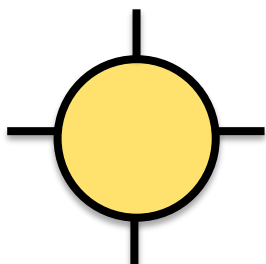
metal atomic mass: 69.7
silvery liquid



melts at just above room temp compounds:
Ga₂O₃

Germanium (Ge)

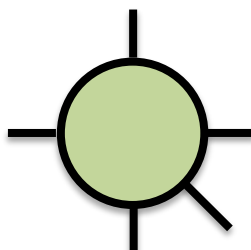
metalloid atomic mass: 72.6
gray solid
semiconductor



compounds:
GeCl₄, GeO₂

Arsenic (As)

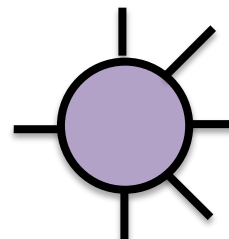
metalloid atomic mass: 74.9
gray solid



compounds:
AsH₃, AsCl₃, AsCl₅

Selenium (Se)

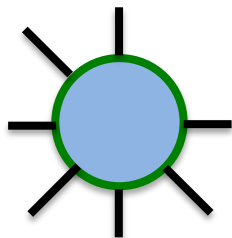
nonmetal atomic mass: 79.0
gray or red
solid



compounds:
H₂Se, SeCl₂

Bromine (Br)

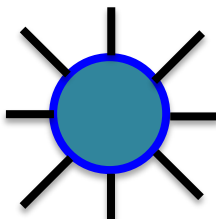
nonmetal atomic mass: 79.9
reddish,
orange liquid



very reactive compounds:
HBr, NaBr, CaBr₂

Krypton (Kr)

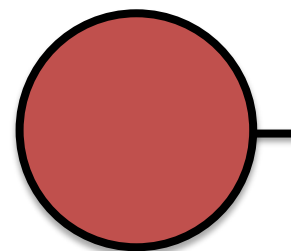
nonmetal atomic mass: 83.8
odourless
gas



very unreactive compounds:
none known

Rubidium (Rb)

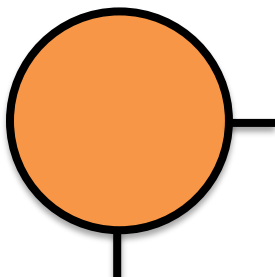
metal atomic mass: 85.5
extremely
soft grey solid



explodes in water compounds:
RbCl, Rb₂O

Strontium (Sr)

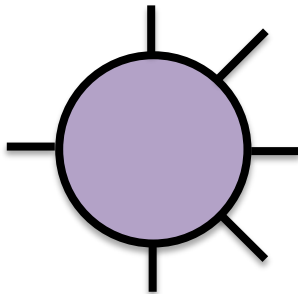
metal atomic mass: 87.6
moderately soft silvery solid



reacts vigorously with water compounds: SrCl_2 , SrO

Tellurium (Te)

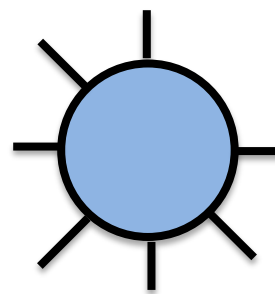
metalloid atomic mass: 127.6
silvery solid semiconductor



compounds: H_2Te , TeCl_2

Iodine (I)

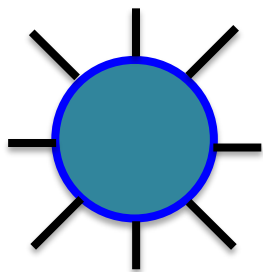
nonmetal atomic mass: 126.9
bluish, black solid



very reactive compounds: NaI , CaI_2 , HI

Xenon (Xe)

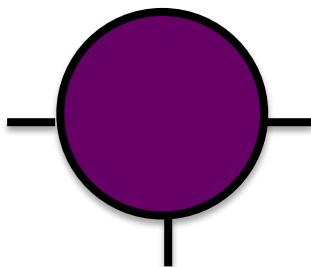
nonmetal atomic mass: 131.3
odourless gas



very unreactive compounds: XeF_6 , XeF_4

Indium (In)

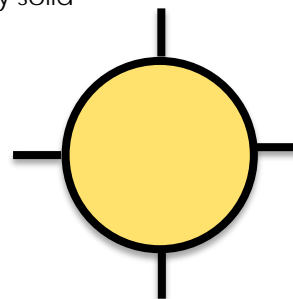
metal atomic mass: 114.8
very soft silvery solid



compounds: InCl_3

Tin (Sn)

metal atomic mass: 118.7
soft silvery gray solid



compounds: SnO_2 , SnCl_4

Hydrogen (H)

nonmetal atomic mass: 1.0
colourless,
odourless gas



very flammable compounds:
explodes in air HCl, H₂O

Helium (He)

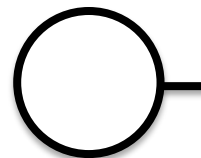
nonmetal atomic mass: 4.0
colourless,
odourless gas



very unreactive compounds:
none known

Lithium (Li)

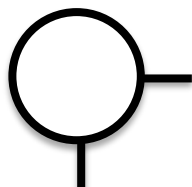
metal atomic mass: 6.9
soft, gray
solid



reacts with compounds:
water LiCl, Li₂O

Beryllium (Be)

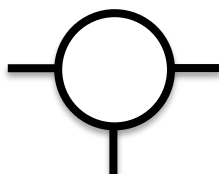
metal atomic mass: 9.0
hard, dull
gray solid



compounds:
BeO, BeCl₂

Boron (B)

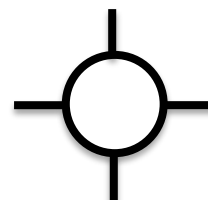
metalloid atomic mass: 10.8
hard black
solid
semiconductor



compounds:
B₂O₃, BCl₃

Carbon (C)

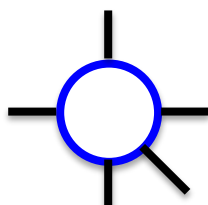
nonmetal atomic mass: 12.0
clear crystal
(diamond)
metalloid
black solid (graphite)



compounds:
CCl₄, CO₂, CH₄

Nitrogen (N)

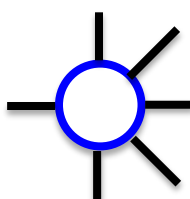
nonmetal atomic mass: 14.0
colourless,
odourless gas



not very compounds:
reactive NCl₃, NH₃

Oxygen (O)

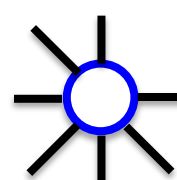
nonmetal atomic mass: 16.0
colourless,
odourless gas



very compounds:
reactive H₂O

Fluorine (F)

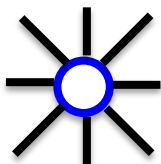
nonmetal atomic mass: 19.0
pale yellow
gas



extremely compounds:
reactive HF, NaF, CaF₂

Neon (Ne)

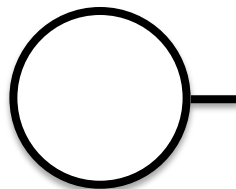
nonmetal atomic mass: 20.2
colourless,
odourless gas



very unreactive compounds:
none known

Sodium (Na)

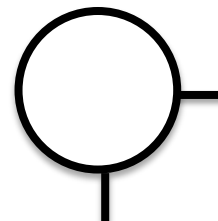
metal atomic mass: 23.0
soft, gray
solid



reacts vigorously with water compounds:
NaCl, Na₂O

Magnesium (Mg)

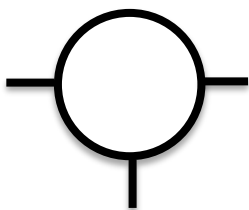
metal atomic mass: 24.3
moderately
hard silvery solid



flammable compounds:
MgCl₂, MgO

Aluminium (Al)

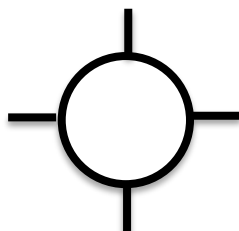
metal atomic mass: 27.0
soft silvery
solid



compounds:
Al₂O₃, AlCl₃

Silicon (Si)

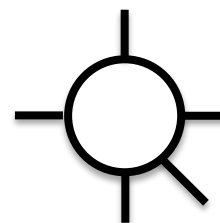
metalloid atomic mass: 28.1
moderately
hard gray solid
semiconductor



compounds:
SiH₄, SiO₂, SiCl₄

Phosphorus (P)

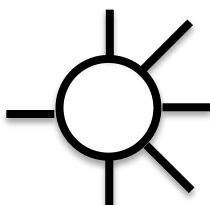
nonmetal atomic mass: 31.0
red, white,
black solid



spontaneously flammable compounds:
PH₃, PCl₃, PCl₅

Sulfur (S)

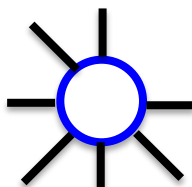
nonmetal atomic mass: 32.1
brittle, yellow
solid powder



compounds:
H₂S, SCl₂

Chlorine (Cl)

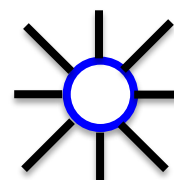
nonmetal atomic mass: 35.5
yellowish
green gas



extremely reactive compounds:
HCl, NaCl, CaCl₂

Argon (Ar)

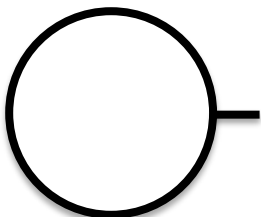
nonmetal atomic mass: 39.9
odourless
gas



very unreactive compounds:
none known

Potassium (K)

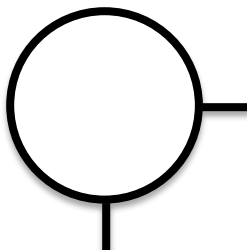
metal atomic mass: 39.1
very soft,
gray solid



reacts violently with water compounds: KCl, K₂O

Calcium (Ca)

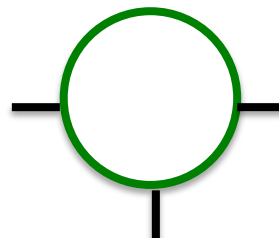
metal atomic mass: 40.1
moderately
hard silvery solid



reacts violently with water compounds: CaCl₂, CaO

Gallium (Ga)

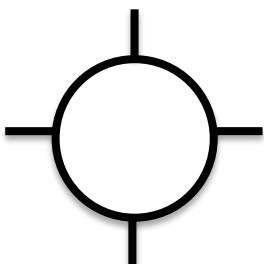
metal atomic mass: 69.7
silvery liquid



melts at just above room temp compounds: Ga₂O₃

Germanium (Ge)

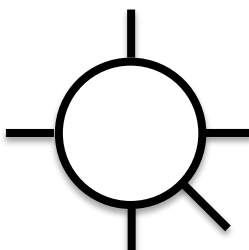
metalloid atomic mass: 72.6
gray solid
semiconductor



compounds: GeCl₄, GeO₂

Arsenic (As)

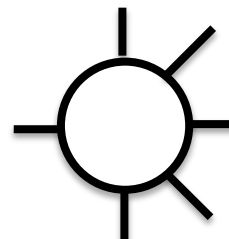
metalloid atomic mass: 74.9
gray solid



compounds: AsH₃, AsCl₃, AsCl₅

Selenium (Se)

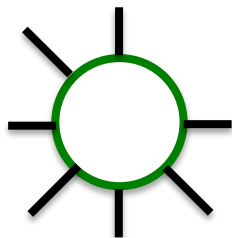
nonmetal atomic mass: 79.0
gray or red
solid



compounds: H₂Se, SeCl₂

Bromine (Br)

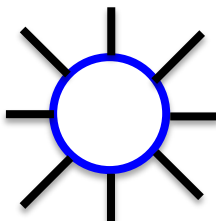
nonmetal atomic mass: 79.9
reddish,
orange liquid



very reactive compounds: HBr, NaBr, CaBr₂

Krypton (Kr)

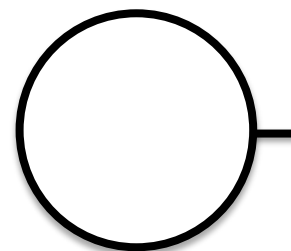
nonmetal atomic mass: 83.8
odourless
gas



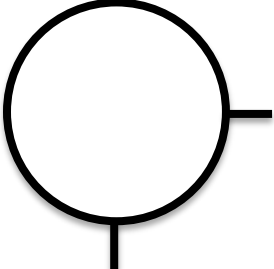
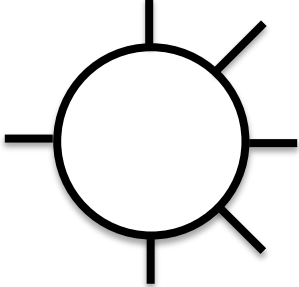
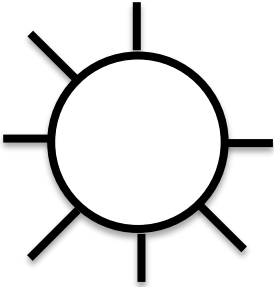
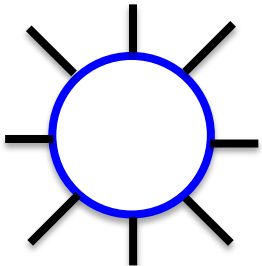
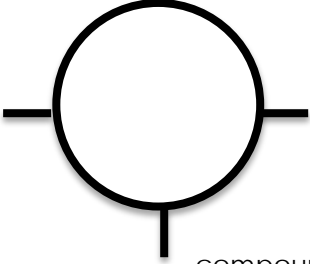
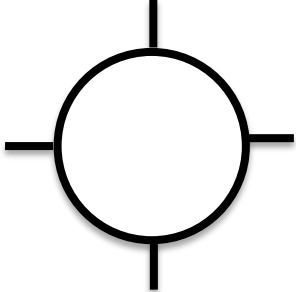
very unreactive compounds: none known

Rubidium (Rb)

metal atomic mass: 85.5
extremely
soft grey solid



explodes in water compounds: RbCl, Rb₂O

<p>Strontium (Sr)</p> <p>metal atomic mass: 87.6 moderately soft silvery solid</p>  <p>reacts vigorously compounds: with water SrCl₂, SrO</p>	<p>Tellurium (Te)</p> <p>metalloid atomic mass: 127.6 silvery solid semiconductor</p>  <p>compounds: H₂Te, TeCl₂</p>	<p>Iodine (I)</p> <p>nonmetal atomic mass: 126.9 bluish, black solid</p>  <p>very compounds: reactive NaI, CaI₂, HI</p>
<p>Xenon (Xe)</p> <p>nonmetal atomic mass: 131.3 odourless gas</p>  <p>very compounds: unreactive XeF₆, XeF₄</p>	<p>Indium (In)</p> <p>metal atomic mass: 114.8 very soft silvery solid</p>  <p>compounds: InCl₃</p>	<p>Tin (Sn)</p> <p>metal atomic mass: 118.7 soft silvery gray solid</p>  <p>compounds: SnO₂, SnCl₄</p>

Source: Periodic Table Cards are adapted from *Living By Chemistry* (Angelica Stacy)

<p style="text-align: center;">Hydrogen (H)</p> <p>atomic mass: 1.0</p> <p>nonmetal colorless, odorless gas</p> <p>very flammable explodes in air</p> <p>compounds: HCl, H₂O</p>	<p style="text-align: center;">Helium (He)</p> <p>atomic mass: 4.0</p> <p>nonmetal colorless, odorless gas</p> <p>very unreactive</p> <p>compounds: none known</p>	<p style="text-align: center;">Lithium (Li)</p> <p>atomic mass: 6.9</p> <p>metal soft, gray solid</p> <p>reacts with water</p> <p>compounds: LiCl, Li₂O</p>
<p style="text-align: center;">Beryllium (Be)</p> <p>atomic mass: 9.0</p> <p>metal hard, dull gray solid</p> <p>compounds: BeO, BeCl₂</p>	<p style="text-align: center;">Boron (B)</p> <p>atomic mass: 10.8</p> <p>metalloid hard black solid semiconductor</p> <p>compounds: B₂O₃, BCl₃</p>	<p style="text-align: center;">Carbon (C)</p> <p>atomic mass: 12.0</p> <p>nonmetal clear crystal (diamond)</p> <p>metalloid black solid (graphite)</p> <p>compounds: CCl₄, CO₂, CH₄</p>
<p style="text-align: center;">Nitrogen (N)</p> <p>atomic mass: 14.0</p> <p>nonmetal colorless, odorless gas</p> <p>not very reactive</p> <p>compounds: NCl₃, NH₃</p>	<p style="text-align: center;">Oxygen (O)</p> <p>atomic mass: 16.0</p> <p>nonmetal colorless, odorless gas</p> <p>very reactive</p> <p>compounds: H₂O</p>	<p style="text-align: center;">Fluorine (F)</p> <p>atomic mass: 19.0</p> <p>nonmetal pale yellow gas</p> <p>extremely reactive</p> <p>compounds: HF, NaF, CaF₂</p>

<p style="text-align: center;">Neon (Ne)</p> <p>atomic mass: 20.2</p> <p>nonmetal colorless, odorless gas</p> <p>very unreactive</p> <p>compounds: none known</p>	<p style="text-align: center;">Sodium (Na)</p> <p>atomic mass: 23.0</p> <p>metal soft, gray solid</p> <p>reacts vigorously with water</p> <p>compounds: NaCl, Na₂O</p>	<p style="text-align: center;">Magnesium (Mg)</p> <p>atomic mass: 24.3</p> <p>metal moderately hard silvery solid</p> <p>flammable</p> <p>compounds: MgCl₂, MgO</p>
<p style="text-align: center;">Aluminium (Al)</p> <p>atomic mass: 27.0</p> <p>metal soft silvery solid</p> <p>compounds: Al₂O₃, AlCl₃</p>	<p style="text-align: center;">Silicon (Si)</p> <p>atomic mass: 28.1</p> <p>metalloid moderately hard gray solid semiconductor</p> <p>compounds: SiH₄, SiO₂, SiCl₄</p>	<p style="text-align: center;">Phosphorus (P)</p> <p>atomic mass: 31.0</p> <p>nonmetal red, white, black solid</p> <p>spontaneously flammable</p> <p>compounds: PH₃, PCl₃, PCl₅</p>
<p style="text-align: center;">Sulfur (S)</p> <p>atomic mass: 32.1</p> <p>nonmetal brittle, yellow solid powder</p> <p>compounds: H₂S, SCl₂</p>	<p style="text-align: center;">Chlorine (Cl)</p> <p>atomic mass: 35.5</p> <p>nonmetal yellowish green gas</p> <p>extremely reactive</p> <p>compounds: HCl, NaCl, CaCl₂</p>	<p style="text-align: center;">Argon (Ar)</p> <p>atomic mass: 39.9</p> <p>nonmetal odorless gas</p> <p>very unreactive</p> <p>compounds: none known</p>

<p>Potassium (K)</p> <p>atomic mass: 39.1</p> <p>metal very soft, gray solid</p> <p>reacts violently with water</p> <p>compounds: KCl, K₂O</p>	<p>Calcium (Ca)</p> <p>atomic mass: 40.1</p> <p>metal moderately hard silvery solid</p> <p>reacts violently with water</p> <p>compounds: CaCl₂, CaO</p>	<p>Gallium (Ga)</p> <p>atomic mass: 69.7</p> <p>metal silvery liquid</p> <p>melts at just above room temperature</p> <p>compounds: Ga₂O₃</p>
<p>Germanium (Ge)</p> <p>atomic mass: 72.6</p> <p>metalloid gray solid semiconductor</p> <p>compounds: GeCl₄, GeO₂</p>	<p>Arsenic (As)</p> <p>atomic mass: 74.9</p> <p>metalloid gray solid</p> <p>compounds: AsH₃, AsCl₃, AsCl₅</p>	<p>Selenium (Se)</p> <p>atomic mass: 79.0</p> <p>nonmetal gray or red solid</p> <p>compounds: H₂Se, SeCl₂</p>
<p>Bromine (Br)</p> <p>atomic mass: 79.9</p> <p>nonmetal reddish, orange liquid</p> <p>very reactive</p> <p>compounds: HBr, NaBr, CaBr₂</p>	<p>Krypton (Kr)</p> <p>atomic mass: 83.8</p> <p>nonmetal odorless gas</p> <p>very unreactive</p> <p>compounds: none known</p>	<p>Rubidium (Rb)</p> <p>atomic mass: 85.5</p> <p>metal extremely soft grey solid</p> <p>explodes in water</p> <p>compounds: RbCl, Rb₂O</p>

<p>Strontium (Sr)</p> <p>atomic mass: 87.6</p> <p>metal moderately soft silvery solid</p> <p>reacts vigorously with water</p> <p>compounds: SrCl₂, SrO</p>	<p>Tellurium (Te)</p> <p>atomic mass: 127.6</p> <p>metalloid silvery solid semiconductor</p> <p>compounds: H₂Te, TeCl₂</p>	<p>Iodine (I)</p> <p>atomic mass: 126.9</p> <p>nonmetal bluish, black solid</p> <p>very reactive</p> <p>compounds: NaI, CaI₂, HI</p>
<p>Xenon (Xe)</p> <p>atomic mass: 131.3</p> <p>nonmetal odorless gas</p> <p>very unreactive</p> <p>compounds: XeF₆, XeF₄</p>	<p>Indium (In)</p> <p>atomic mass: 114.8</p> <p>metal very soft silvery solid</p> <p>compounds: InCl₃</p>	<p>Tin (Sn)</p> <p>atomic mass: 118.7</p> <p>metal soft silvery gray solid</p> <p>compounds: SnO₂, SnCl₄</p>

Build a Periodic Table Activity

1. How many columns are in your table? _____

2. What criteria did you use to organize the elements into groups?

3. Did you see any patterns or trends with respect to the atomic mass?

4. Did you see any patterns or trends with respect to atomic size as you look across the rows and down the columns?

5. Suggest an explanation why a calcium atom is bigger than a lithium atom.

6. Were there elements that did not seem to fit into the table according to the trend that you noticed?

7. How were these elements arranged to accommodate this break in the trend?

8. Were there holes in your table? Why do think that there were holes?
