Activator

Write the questions:

- Make a list of information that you can get from the periodic table.
- Can you think of additional information you might be able to get from the periodic table?

Organizing a periodic table

- You will work in groups of six to build a periodic table containing the first 36 elements.
- Each group member will draw six periodic table tiles like the example provided next. Notice that your tile will contain the electron shell configuration in addition to the normal information.

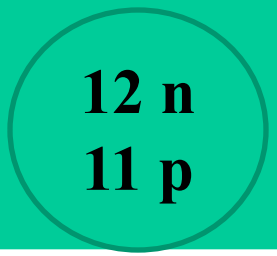
Sample

11

Na

Sodium

22.99



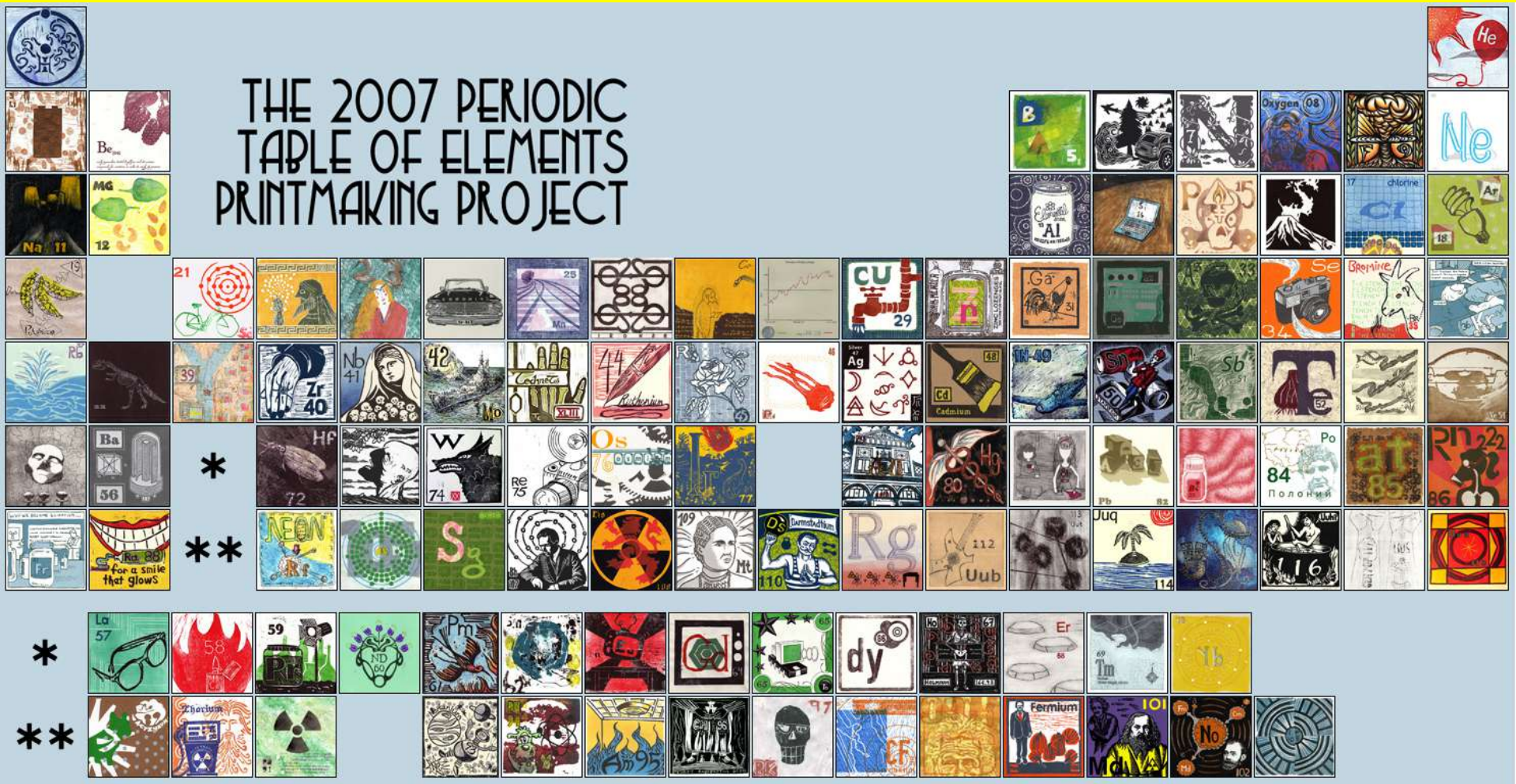
2)8)1

Activator

- How do you determine the number of protons?

- How do you determine the number of neutrons?

Ch. 5 The Periodic Table



Elements Song

Standards

SPS1. Obtain, evaluate, and communicate information from the Periodic Table to explain the relative properties of elements based on patterns of atomic structure.

- **b. Analyze and interpret data to determine trends of the following:**
- **Number of valence electrons**
- **Types of ions formed by main group elements**
- **Location and properties of metals, nonmetals, and metalloids**
- **Phases at room temperature**
- **Use the Periodic Table as a model to predict the above properties of main group elements.**

Write the Question

1. How do the vertical columns (groups) organize the elements? **Hint**: What does each element have in common as you move down a group?
2. How do the horizontal rows (periods) organize the elements? **Hint**: What does each element have in common as you move across a group? **Hint**: What changes from period to period as you move down a group?
3. How are the elements arranged within a row from left to right?

1. How do the vertical columns (groups) organize the elements? **Hint**: What does each element have in common as you move down a group?

They have the same number of valence electrons (electrons in the outer shell)

2.How do the horizontal rows (periods) organize the elements? **Hint**: What does each element have in common as you move across a group? **Hint**: What changes from period to period as you move down a group?

They have the same number of energy levels and the electron's increase by one as you move from left to right in the outer shell.

3.How are the elements arranged within a row from left to right?

By increasing atomic number (number of protons)

Summarizer

How many valence electrons are in:

a)Cs?

b)Ba?

c)Tl?

d)Pb?

e) Bi?

f) Po?

g) At?

h) Rn?

Activator

Write the questions:

•If an element has an atomic number of 26, what will be the atomic number of the element two places to the right?

•How many electrons are in the outside energy level of Francium (atomic number 87)?

Francium

2)8)18)32)18)8)1

Periodic Table Trends

Trend	How is the Trend Organized on the Periodic Table
Groups or families	• Vertical columns in the periodic table • There are 18 groups in total • Elements in Groups 1&2 and 13 to 18 are collectively called REPRESENTATIVE ELEMENTS
Groups/families	• Elements in the same group exhibit similar properties as they have the same valence electrons

Periodic Table Trends

Trend	How is the Trend Organized on the Periodic Table
Valence Electrons	
Types of Ions (Oxidation Number)	

Periodic Table Trends

Trend	How is the Trend Organized on the Periodic Table
Valence Electrons-Electrons in the outermost energy level	Organized by groups (vertical columns). Group 1 = 1 v e. Group 2 = 2 v e, Groups 3 – 12 = variable v e, Group 13 = 3 v e, Group 14 = 4 v e, Group 15 = 5 v e, Group 16 = 6 v e, Group 17 = 7 v e, Group 18 = 8 v e.
Types of Ions-By losing or gaining electrons (Oxidation Number)	

Periodic Table Trends

Trend	How is the Trend Organized on the Periodic Table
Valence Electrons	Organized by groups (vertical rows). Group 1 = 1 v e. Group 2 = 2 v e, Groups 3 – 12 = variable v e, Group 13 = 3 v e, Group 14 = 4 v e, Group 15 = 5 v e, Group 16 = 6 v e, Group 17 = 7 v e, Group 18 = 8 v e.
Types of Ions (Oxidation Number)	Organized by groups. Group 1 = 1+ Group 2 = 2+, Groups 3 – 12 = variable +, Group 13 = 3+, Group 14 = 4+/-, Group 15 = 3-, Group 16 = 2-, Group 17 = 1-, Group 18 = 0.

Periodic Table Trends

Trend	How is the Trend Organized on the Periodic Table
Period	
Noble Gases	
Reactivity	

Periodic Table Trends

Trend	How is the Trend Organized on the Periodic Table
Period	Organized by horizontal rows. Row 1: 1e$^-$ shell Row 2: 2e$^-$ shells Row 3: 3e$^-$ shells Row 4: 4e$^-$ shells Row 5: 5e$^-$ shells Row 6: 6e$^-$ shells Row 7: 7e$^-$ shells
Noble Gases	
Reactivity	

Periodic Table Trends

Trend	How is the Trend Organized on the Periodic Table
Period	Organized by horizontal rows. Row 1: $1e^-$ shell Row 2: $2e^-$ shells Row 3: $3e^-$ shells Row 4: $4e^-$ shells Row 5: $5e^-$ shells Row 6: $6e^-$ shells Row 7: $7e^-$ shells
Noble Gases	Group 18 – They are unreactive because their outside energy level is a complete octet (except He)
Reactivity	

Periodic Table Trends

Trend	How is the Trend Organized on the Periodic Table
Period	Organized by horizontal rows. Row 1: $1e^-$ shell Row 2: $2e^-$ shells Row 3: $3e^-$ shells Row 4: $4e^-$ shells Row 5: $5e^-$ shells Row 6: $6e^-$ shells Row 7: $7e^-$ shells
Noble Gases	Group 18 – They are unreactive because their outside energy level is a complete octet (except He)
Reactivity	Groups 1 & 17 are highly reactive. The reactivity increases as you go down group 1. The reactivity increases as you go up group 17.

Periodic Table Trends

Trend	How is the Trend Organized on the Periodic Table
Location of Metals	
Location of Metalloids	
Location of Nonmetals	

Periodic Table Trends

Trend	How is the Trend Organized on the Periodic Table
Location of Metals	Located to the left of the stair step. Characteristics include: form + ions, good conductors of electricity, shiny appearance, and malleable.
Location of Metalloids	
Location of Nonmetals	

Periodic Table Trends

Trend	How is the Trend Organized on the Periodic Table
Location of Metals	Located to the left of the stair step. Characteristics include form + ions, good conductors of electricity, shiny appearance, and malleable.
Location of Metalloids	Located along the stair step. Characteristics include some of both metal and nonmetal characteristics.
Location of Nonmetals	

Periodic Table Trends

Trend	How is the Trend Organized on the Periodic Table
Location of Metals	Located to the left of the stair step. Characteristics include form + ions, good conductors of electricity, shiny appearance, and malleable.
Location of Metalloids	Located along the stair step. Characteristics include some of both metal and nonmetal characteristics.
Location of Nonmetals	Located to the right of the stair step. Characteristics include: form – ions, poor conductors of electricity, dull appearance, and brittle.

Periodic Table Trends

Trends	How is the Trend Organized on the Periodic Table
Location of Gases	
Location of Liquids	
Location of Solids	

Periodic Table Trends

Trends	How is the Trend Organized on the Periodic Table
Location of Gases	18 He Ne A r K Xe Rn 17 F Cl 16 O 15 N 1 H
Location of Liquids	
Location of Solids	

Periodic Table Trends

Trends	How is the Trend Organized on the Periodic Table
Location of Gases	18 He Ne Ar K Xe Rn 17 F Cl 16 O 15 N 1 H
Location of Liquids	Hg, Br
Location of Solids	

Periodic Table Trends

Trends	How is the Trend Organized on the Periodic Table
Location of Gases	18 He Ne Ar K Xe Rn 17 F Cl 16 O 15 N 1 H
Location of Liquids	Hg, Br
Location of Solids	Everything that is not a gas or a liquid.

Periodic Table Trends

Trends	How is the Trend Organized on the Periodic Table
Reactivity of Group 1	Increases as you go down the group.
Reactivity of group 17	Increases as you go up the group

Activator

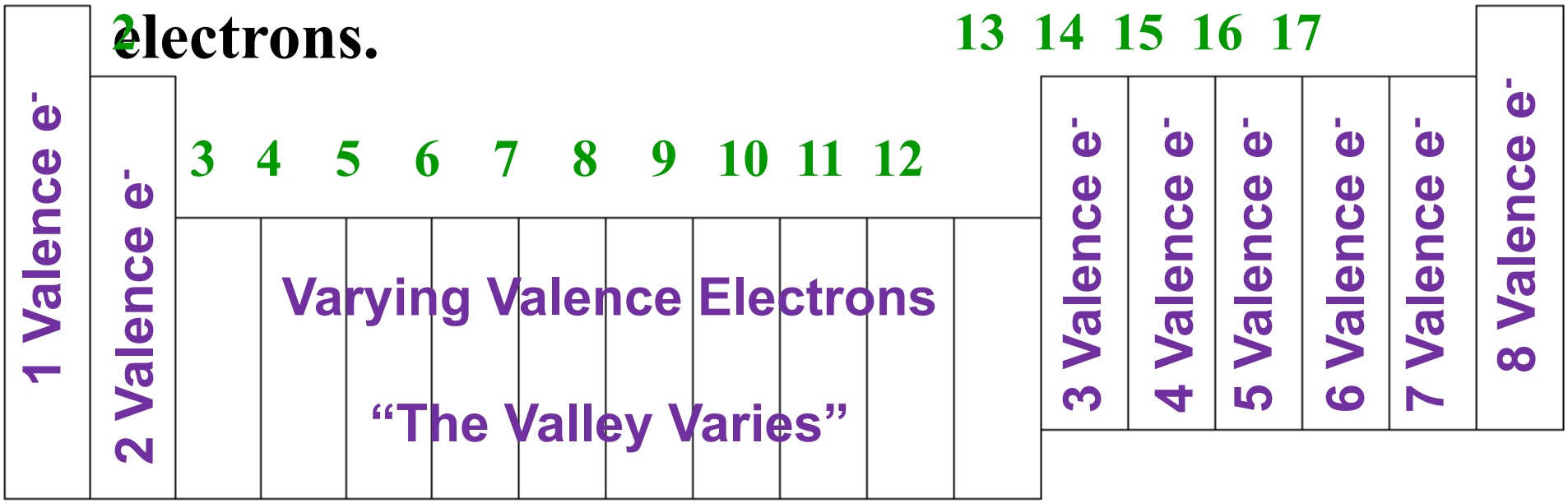
Write the questions:

1.How are group numbers related to valence electrons? Which groups do not follow the pattern?

2.How are periods related to the number of electron energy levels?

Groups or Families

Are the vertical Columns (up and Down) on the Periodic Table. They are numbered 1-18 and organize the elements by the number of valence electrons.



Valence electrons: electrons in the outside energy level, only electrons involved in making compounds

Group 1.

- H 1)
- Li 2)1
- Na 2)8)1
- K 2)8)8)1

- What do they have in common?

Group 2.

- Be 2)2
- Mg 2)8)2
- Ca 2)8)8)2

- What do they have in common?

Groups 3-12

- Cr 2)8)12)2 2)8)13)1
- Mn 2)8)13)2 2)8)14)1
- Fe 2)8)14)2 2)8)13)3

- Variable valence electrons

Group 13.

- B 2)3
- Al 2)8)3
- Ga 2)8)18)3

- What do they have in common?

Group 14.

- C 2)4
- Si 2)8)4
- Ge 2)8)18)4

- What do they have in common?

Group 15.

N 2)5
P 2)8)5
As 2)8)18)5

What do they have in common?

Group 16.

O 2)6
S 2)8)6
Se 2)8)18)6

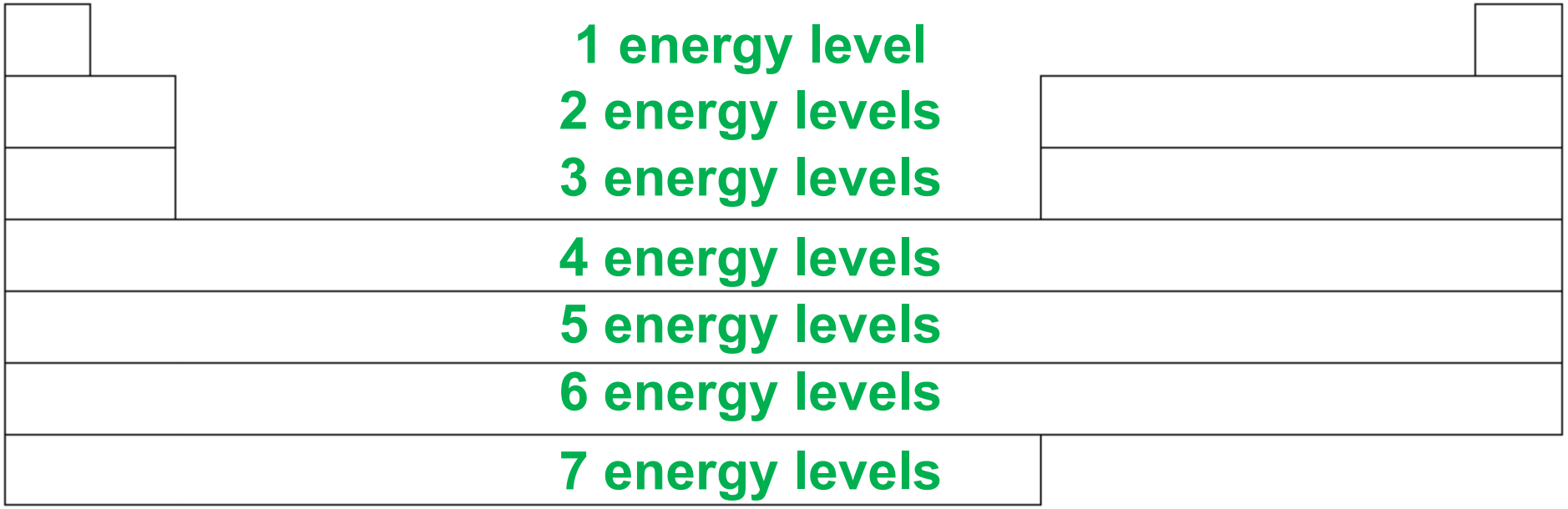
What do they have in common?

Group 17.

F 2)7
Cl 2)8)7
Br 2)8)18)7

What do they have in common?

Periods



Are the horizontal rows on the Periodic Table. They organize the elements by increasing atomic number and which energy level is filling.

Periods

- H 1)
- Li 2)1
- Na 2)8)1
- K 2)8)8)1

How many valence electrons?

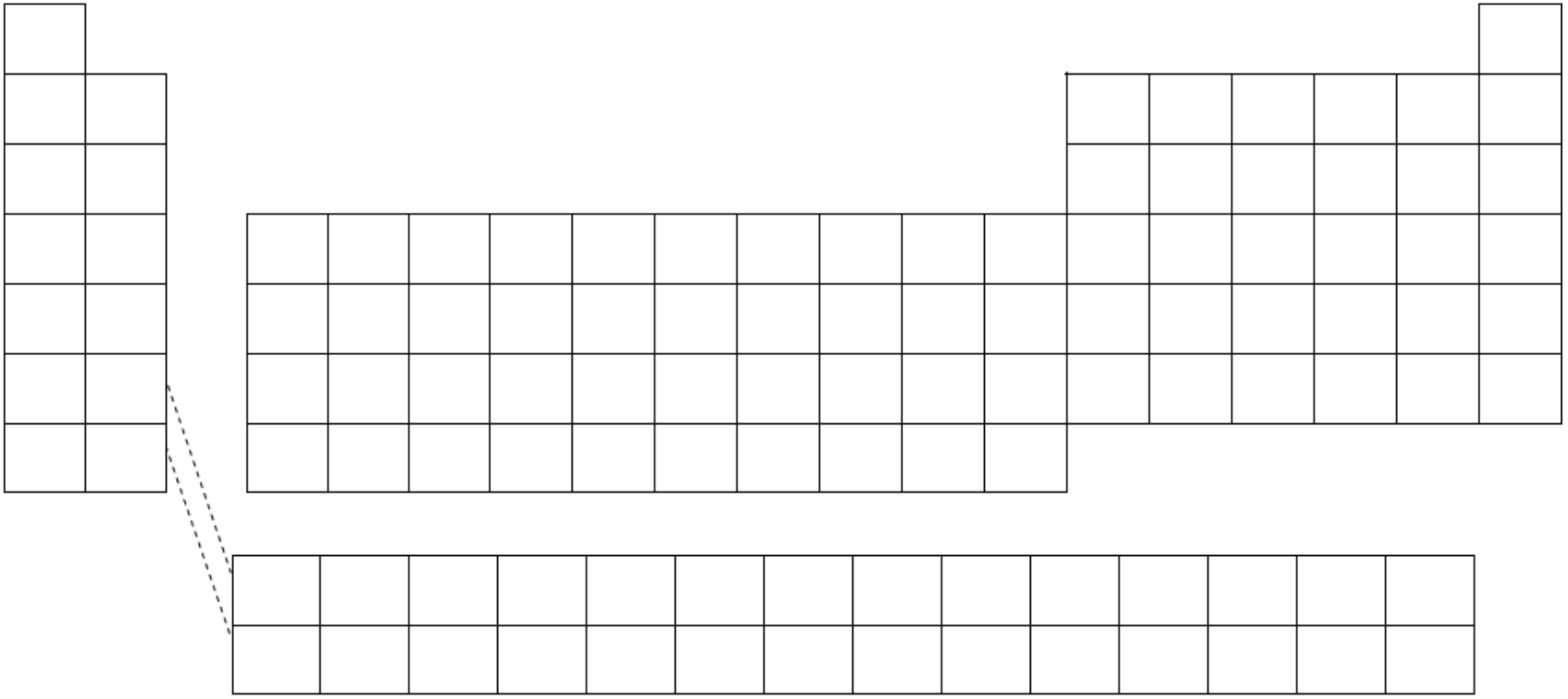
- Mg #12
- Fr #87
- Al #13
- Fe #26
- Si #14
- Br #35
- S #16

Summary

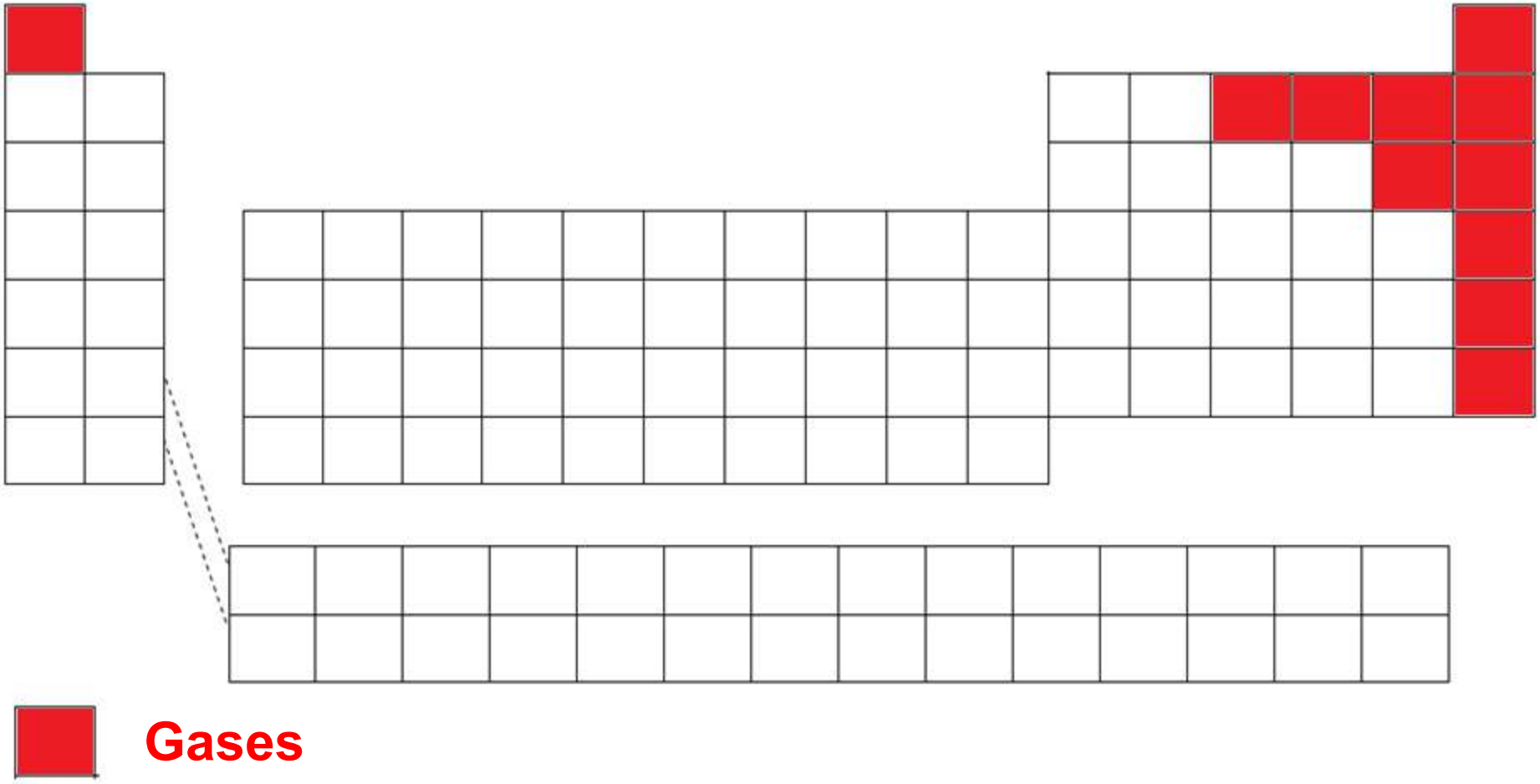
TOD

List 5 elements and the number of valence electrons for each of your 5 elements.

Phases of Matter and Reactivity

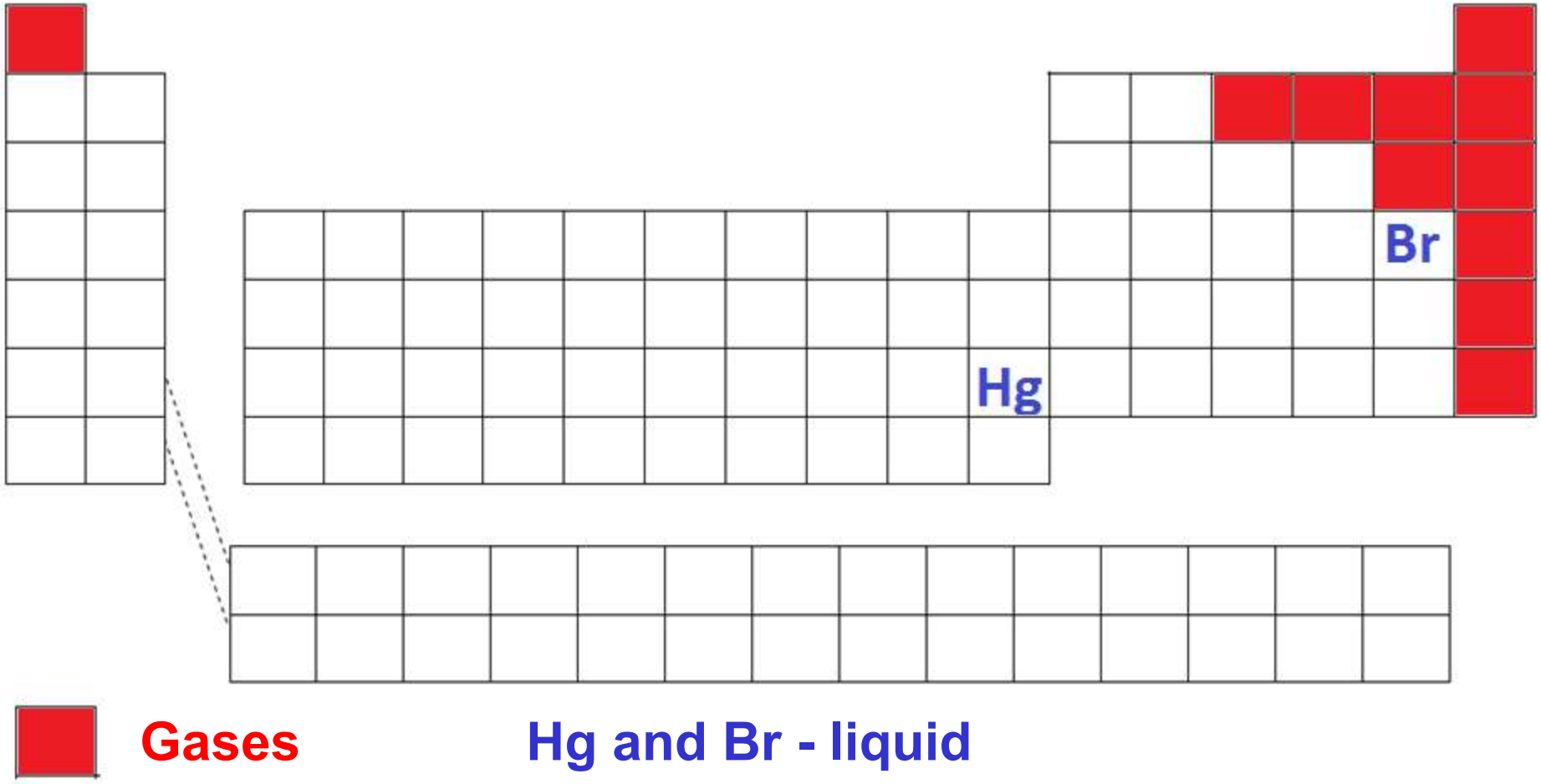


Phases of Matter and Reactivity

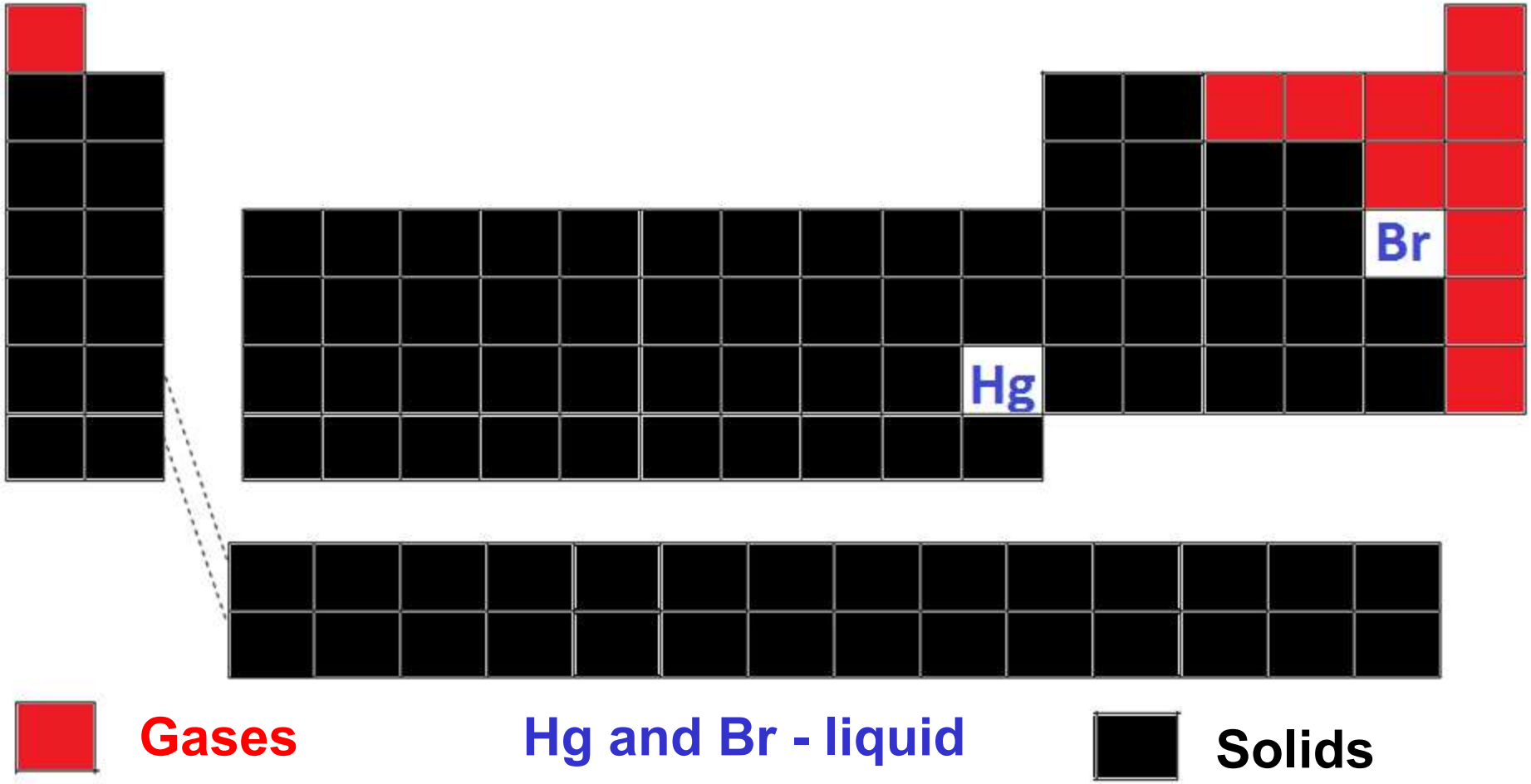


Gases

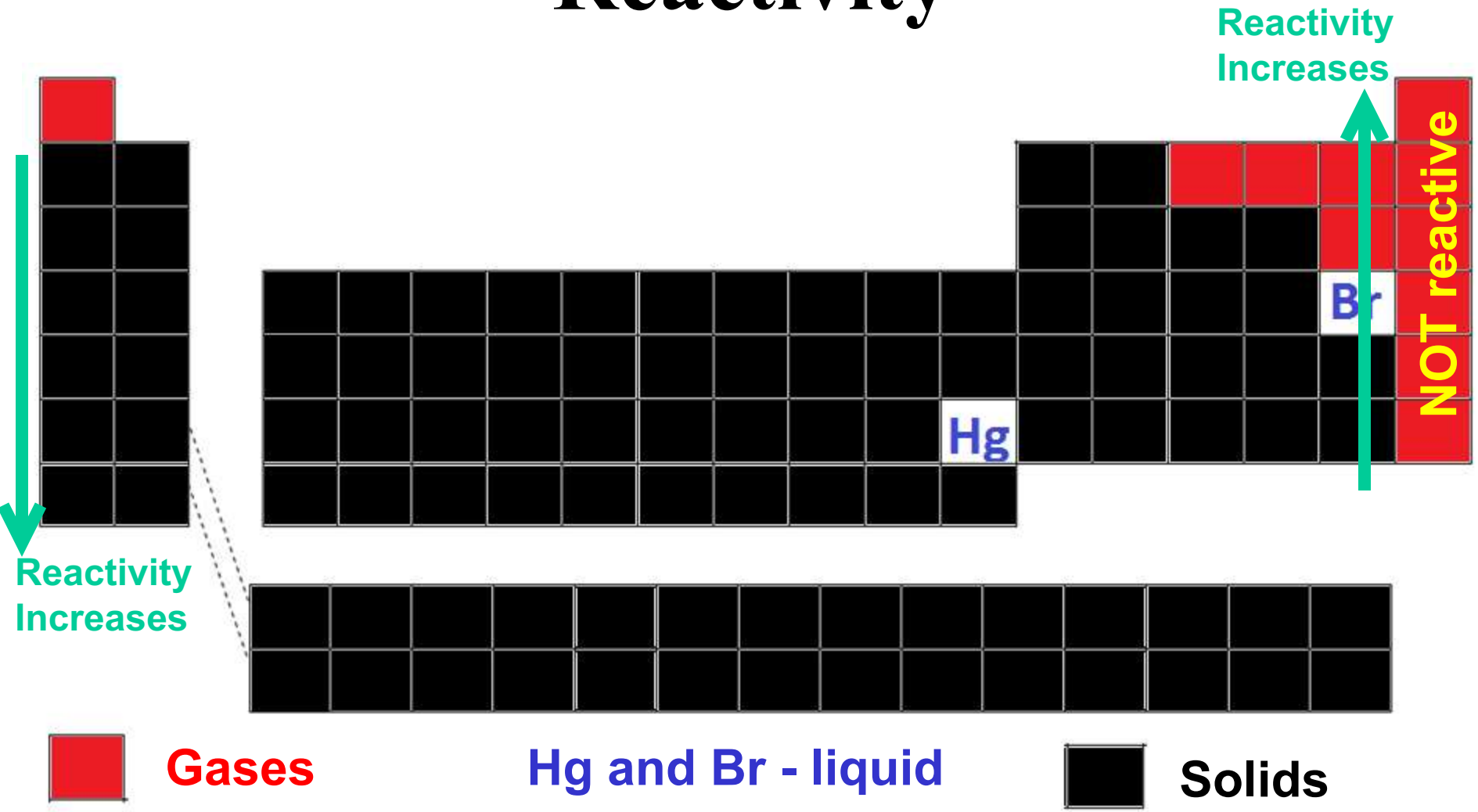
Phases of Matter and Reactivity



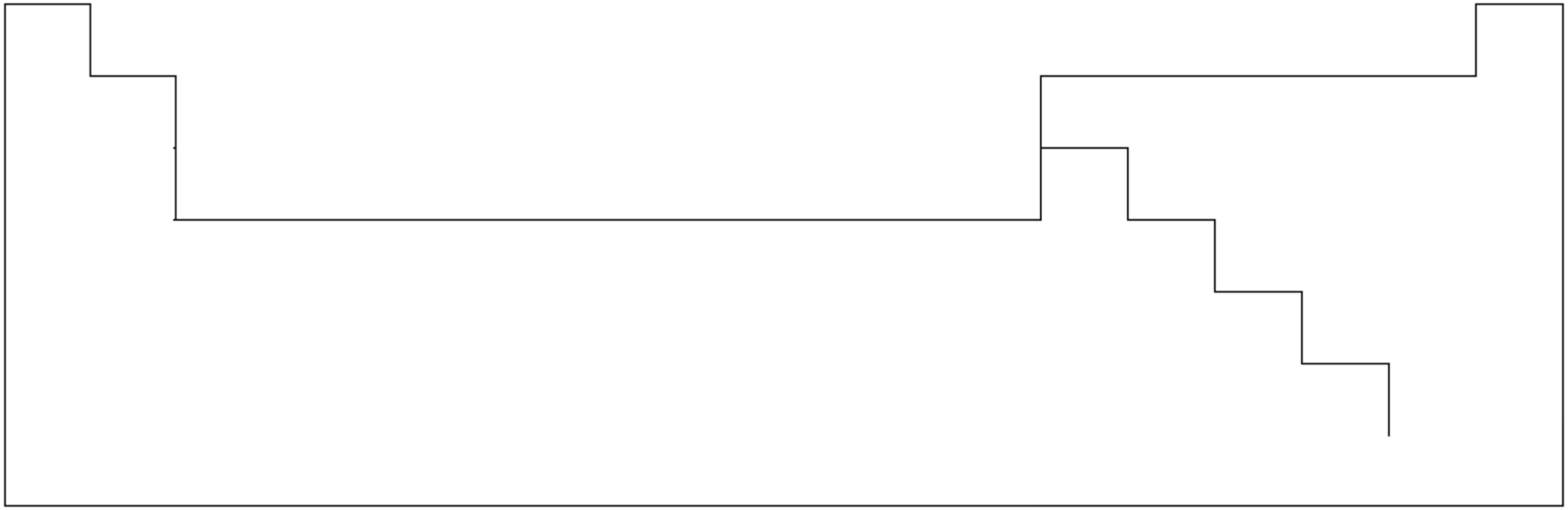
Phases of Matter and Reactivity



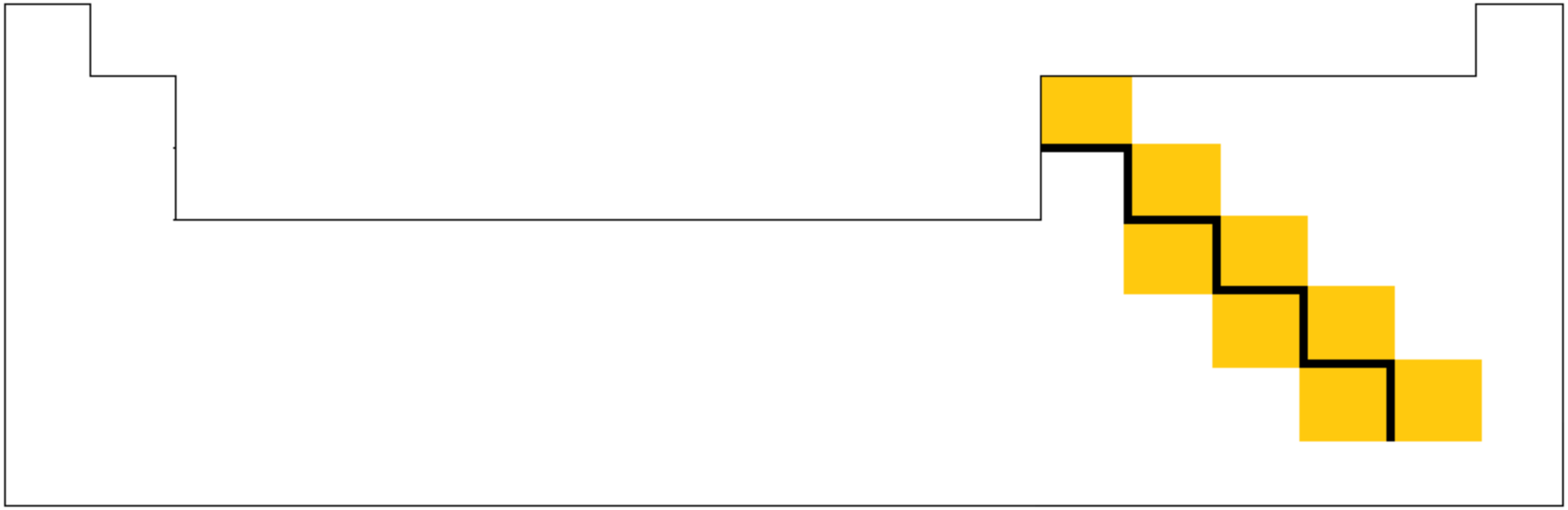
Phases of Matter and Reactivity



Metals, Nonmetals, & Metalloids

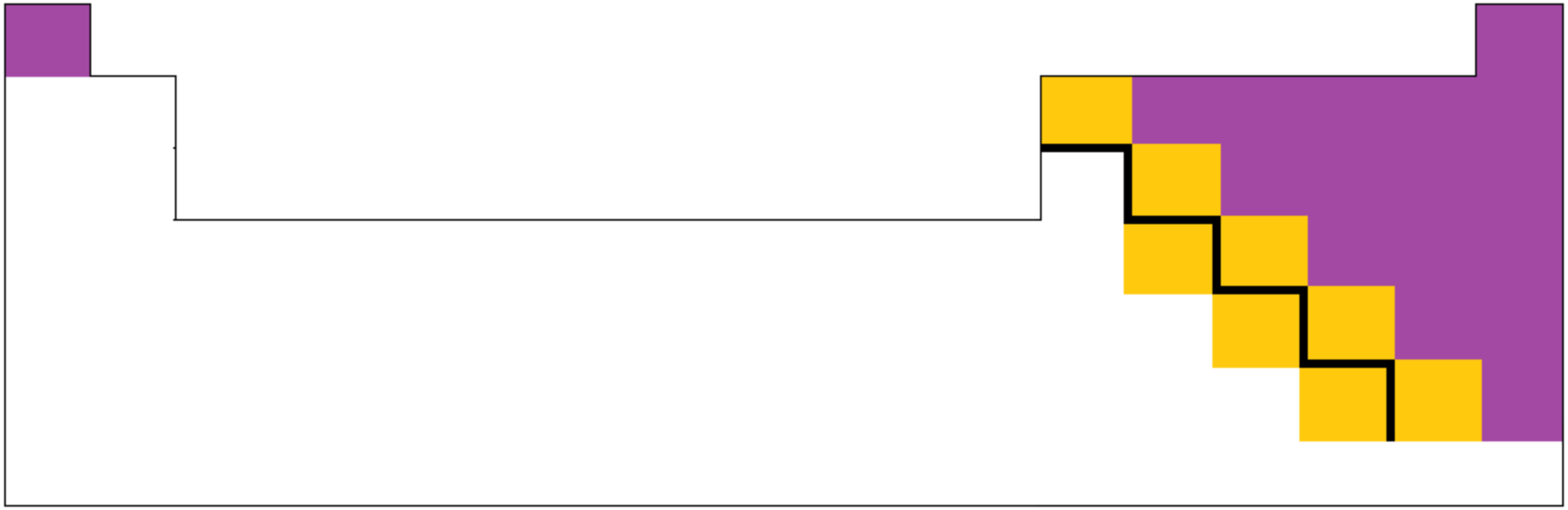


Metals, Nonmetals, & Metalloids



Metalloids

Metals, Nonmetals, & Metalloids



Metalloids **Nonmetals**

Metals, Nonmetals, & Metalloids

Metalloids Nonmetals Metals

Activator

Write the questions:

How many valence electrons and energy levels are in the following?

V.e^-. E.L.

Sr

a.Kr

b.Pb

c.Cs

d.Ga

e.Fe

Periodic Table EOC Cheat Sheet

- Identify & metals, nonmetals and metalloids.
- On the bottom of your paper define valence electrons: outer energy level electrons.
- Label your valence electrons.
- On the bottom of your paper define oxidation number: charge of an atom's ion.
- Label oxidation numbers.

Periodic Table EOC Cheat Sheet

- Draw a tree Memory key: family tree. Groups and families are vertical columns.
- Write family names: Alkali (1), Alkaline Earth(2), Transition Metals(3-12), Halogens and Noble Gases.
- Circle liquids.
- Shade the gases.

Activator

Determine the number of valence electrons, which energy level is filling, metal or nonmetal or metalloid, and phase of matter for:

		Valence e-	Energy level	metal?	Phase
1.	Cs				
2.	Si				
3.	I				
4.	Ru				

Periodic Table Video

1. “How was Mendeleev’s periodic table organized?”

2. “What was Mendeleev able to predict using his periodic table?”

Practice

element	Valence e-	Energy levels	Metal/ non-metal/ metalloid	phase
At				
Sb				
Sr				
Rb				
Mn				

To turn in

element	Valence e-	Energy levels	Metal/ non-metal/ metalloid	phase
Hg				
F				
Li				
Ti				
Ra				

Writing Activity

- Explain how to determine the periodic trend you are assigned and provide two examples.

Activator

Write the questions:

1. Where are the groups located on the periodic table? How do they organize the elements?

2. Where are the periods located on the periodic table? How do they organize the elements?

3. Explain the reactivity on group 1.
Explain the reactivity on group 17.

Manganese (Mn)

- Valence Electrons
  - Varies
- Number of Energy Levels
  - 4
- Metal, Nonmetal or Metalloid?
  - Metal
- Phase
  - Solid

Bromine (Br)

Valence Electrons	**7**
Number of Energy Levels	**4**
Metal, Nonmetal or Metalloid?	**Nonmetal**
Phase	**Liquid**

Nitrogen (N)

Valence Electrons	**5**
Number of Energy Levels	**2**
Metal, Nonmetal or Metalloid?	**Nonmetal**
Phase	**Gas**

Cesium (Cs)

Valence Electrons	**1**
Number of Energy Levels	**6**
Metal, Nonmetal or Metalloid?	**Metal**
Phase	**Solid**

Radon (Rn)

Valence Electrons	**8**
Number of Energy Levels	**6**
Metal, Nonmetal or Metalloid?	**Nonmetal**
Phase	**Gas**

Silicon (Si)

Valence Electrons	**4**
Number of Energy Levels	**3**
Metal, Nonmetal or Metalloid?	**Metalloid**
Phase	**Solid**

Bohrium (Bh)

Valence Electrons	**varies**
Number of Energy Levels	**7**
Metal, Nonmetal or Metalloid?	**Metal**
Phase	**Solid**

Radium (Ra)

Valence Electrons	**2**
Number of Energy Levels	**7**
Metal, Nonmetal or Metalloid?	**Metal**
Phase	**Solid**

Tin (Sn)

Valence Electrons	**4**
Number of Energy Levels	**5**
Metal, Nonmetal or Metalloid?	**Metal**
Phase	**Solid**

Aluminum (Al)

Valence Electrons	**3**
Number of Energy Levels	**3**
Metal, Nonmetal or Metalloid?	**Metal**
Phase	**Solid**

Astatine (At)

Valence Electrons	**7**
Number of Energy Levels	**6**
Metal, Nonmetal or Metalloid?	**Metalloid**
Phase	**Solid**

Mercury (Hg)

Valence Electrons	**varies**
Number of Energy Levels	**6**
Metal, Nonmetal or Metalloid?	**Metal**
Phase	**Liquid**