

Part 6 Periodic Table

Name: _____
Due Date: _____

Periodic Table of the Elements

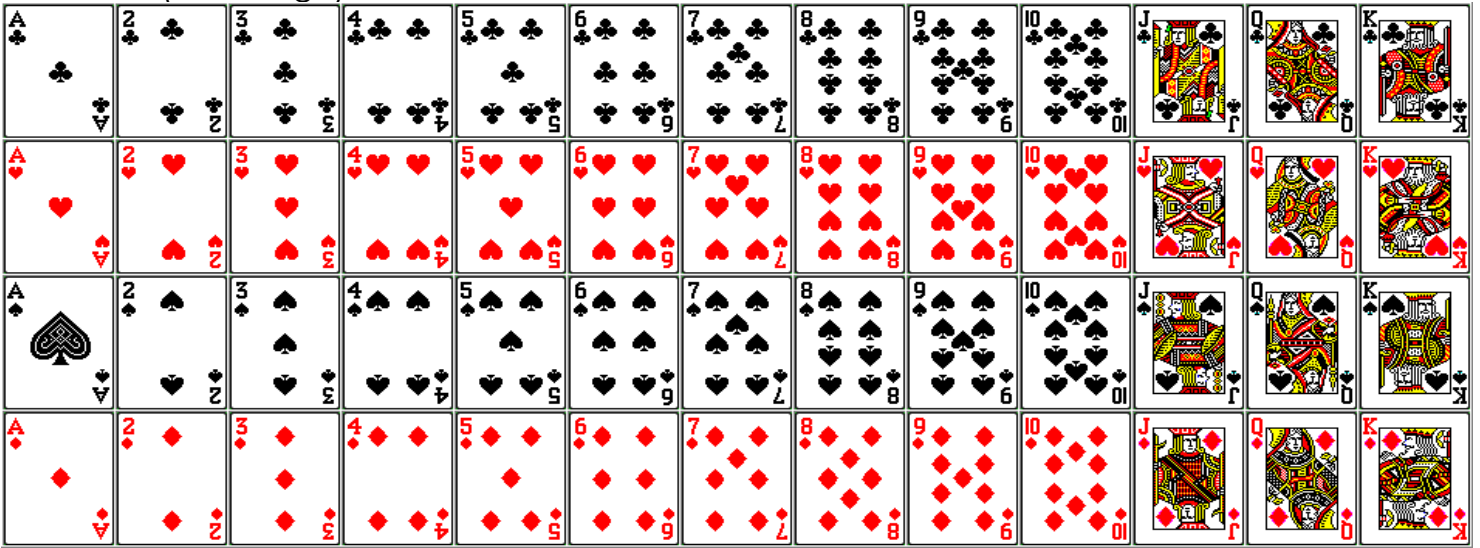
| | | | | | | | | | | | | | | | | | |
|---------------------------------------|---------------------------------------|--------------------------------------|--|---------------------------------------|---|--|--|---|---|--|--|---------------------------------------|--|--|--|---|--|
| 1 H Hydrogen 1.01 | | | | | | | | | | | | | | | | | 2 He Helium 4.00 |
| 3 Li Lithium 6.94 | 4 Be Beryllium 9.01 | | | | | | | | | | | 5 B Boron 10.81 | 6 C Carbon 12.01 | 7 N Nitrogen 14.01 | 8 O Oxygen 16.00 | 9 F Fluorine 19.00 | 10 Ne Neon 20.18 |
| 11 Na Sodium 22.99 | 12 Mg Magnesium 24.31 | | | | | | | | | | | 13 Al Aluminum 26.98 | 14 Si Silicon 28.09 | 15 P Phosphorus 30.97 | 16 S Sulfur 32.06 | 17 Cl Chlorine 35.45 | 18 Ar Argon 39.95 |
| 19 K Potassium 39.10 | 20 Ca Calcium 40.08 | 21 Sc Scandium 44.96 | 22 Ti Titanium 47.88 | 23 V Vanadium 50.94 | 24 Cr Chromium 51.99 | 25 Mn Manganese 54.94 | 26 Fe Iron 55.85 | 27 Co Cobalt 58.93 | 28 Ni Nickel 58.69 | 29 Cu Copper 63.55 | 30 Zn Zinc 65.38 | 31 Ga Gallium 69.72 | 32 Ge Germanium 72.63 | 33 As Arsenic 74.92 | 34 Se Selenium 78.97 | 35 Br Bromine 79.90 | 36 Kr Krypton 83.80 |
| 37 Rb Rubidium 85.47 | 38 Sr Strontium 87.62 | 39 Y Yttrium 88.91 | 40 Zr Zirconium 91.22 | 41 Nb Niobium 92.91 | 42 Mo Molybdenum 95.95 | 43 Tc Technetium 98.91 | 44 Ru Ruthenium 101.07 | 45 Rh Rhodium 102.91 | 46 Pd Palladium 106.42 | 47 Ag Silver 107.87 | 48 Cd Cadmium 112.41 | 49 In Indium 114.82 | 50 Sn Tin 118.71 | 51 Sb Antimony 121.76 | 52 Te Tellurium 127.6 | 53 I Iodine 126.90 | 54 Xe Xenon 131.29 |
| 55 Cs Cesium 132.91 | 56 Ba Barium 137.33 | 57-71 Lanthanides | 72 Hf Hafnium 178.49 | 73 Ta Tantalum 180.95 | 74 W Tungsten 183.85 | 75 Re Rhenium 186.21 | 76 Os Osmium 190.23 | 77 Ir Iridium 192.22 | 78 Pt Platinum 195.08 | 79 Au Gold 196.97 | 80 Hg Mercury 200.59 | 81 Tl Thallium 204.38 | 82 Pb Lead 207.20 | 83 Bi Bismuth 208.98 | 84 Po Polonium [208.98] | 85 At Astatine 209.98 | 86 Rn Radon 222.02 |
| 87 Fr Francium 223.02 | 88 Ra Radium 226.03 | 89-103 Actinides | 104 Rf Rutherfordium [261] | 105 Db Dubnium [262] | 106 Sg Seaborgium [266] | 107 Bh Bohrium [264] | 108 Hs Hassium [269] | 109 Mt Meitnerium [278] | 110 Ds Darmstadtium [281] | 111 Rg Roentgenium [280] | 112 Cn Copernicium [285] | 113 Nh Nihonium [286] | 114 Fl Flerovium [289] | 115 Mc Moscovium [289] | 116 Lv Livermorium [293] | 117 Ts Tennessine [294] | 118 Og Oganesson [294] |

- Alkali Metal
- Alkaline Earth
- Transition Metal
- Basic Metal
- Metalloid
- Nonmetal
- Halogen
- Noble Gas
- Lanthanide
- Actinide

| | | | | | | | | | | | | | | |
|--|--------------------------------------|---|--|---|--|--|---|--|--|---|---------------------------------------|---|--|---|
| 57 La Lanthanum 138.91 | 58 Ce Cerium 140.12 | 59 Pr Praseodymium 140.91 | 60 Nd Neodymium 144.24 | 61 Pm Promethium 144.91 | 62 Sm Samarium 150.36 | 63 Eu Europium 151.96 | 64 Gd Gadolinium 157.25 | 65 Tb Terbium 158.93 | 66 Dy Dysprosium 162.50 | 67 Ho Holmium 164.93 | 68 Er Erbium 167.26 | 69 Tm Thulium 168.93 | 70 Yb Ytterbium 173.06 | 71 Lu Lutetium 174.97 |
| 89 Ac Actinium 227.03 | 90 Th Thorium 232.04 | 91 Pa Protactinium 231.04 | 92 U Uranium 238.03 | 93 Np Neptunium 237.05 | 94 Pu Plutonium 244.06 | 95 Am Americium 243.06 | 96 Cm Curium 247.07 | 97 Bk Berkelium 247.07 | 98 Cf Californium 251.08 | 99 Es Einsteinium [254] | 100 Fm Fermium 257.10 | 101 Md Mendelevium 258.10 | 102 No Nobelium 259.10 | 103 Lr Lawrencium [262] |

Part 6 Lesson 1 Periodic Table of the Elements

Please describe how this arrangement of playing cards relates to the periodic table of elements. (Next Page)



A large area with horizontal blue lines for writing, intended for the student to describe the relationship between the playing cards and the periodic table of elements.

Describe some information about the chemists below.



Warning 5 part question! Check each diamond when complete

◇ **Color code** the following: Noble Gases, Non-Metals, Metalloids, Alkali Metals, Halogens, Alkaline-Earth Metals, and Transition Metals.

◇ Next to period 1, 2, 3, 4, 5, (make a sketch of the number of electron orbitals)

◇ Draw arrows showing the direction of increasing atomic number and atomic mass

◇ Show an arrow showing increasing electron negativity.

| | | | | | | | | | | | |
|----|----|----|----|----|----|----|----|----|----|----|--|
| H | | | | | | | | | | He | |
| Li | Be | | | B | C | N | O | F | Ne | | |
| Na | Mg | | | Al | Si | P | S | Cl | Ar | | |
| K | Ca | Sc | Ti | Ga | Ge | As | Se | Br | Kr | | |

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Key

() _____ () _____ () _____

() _____ () _____ () _____

() _____ () _____

PART 6 Lesson 2 Arrangement / Elements in the Periodic Table

The periodic table of the elements is a...

A chart of all the _____ elements.

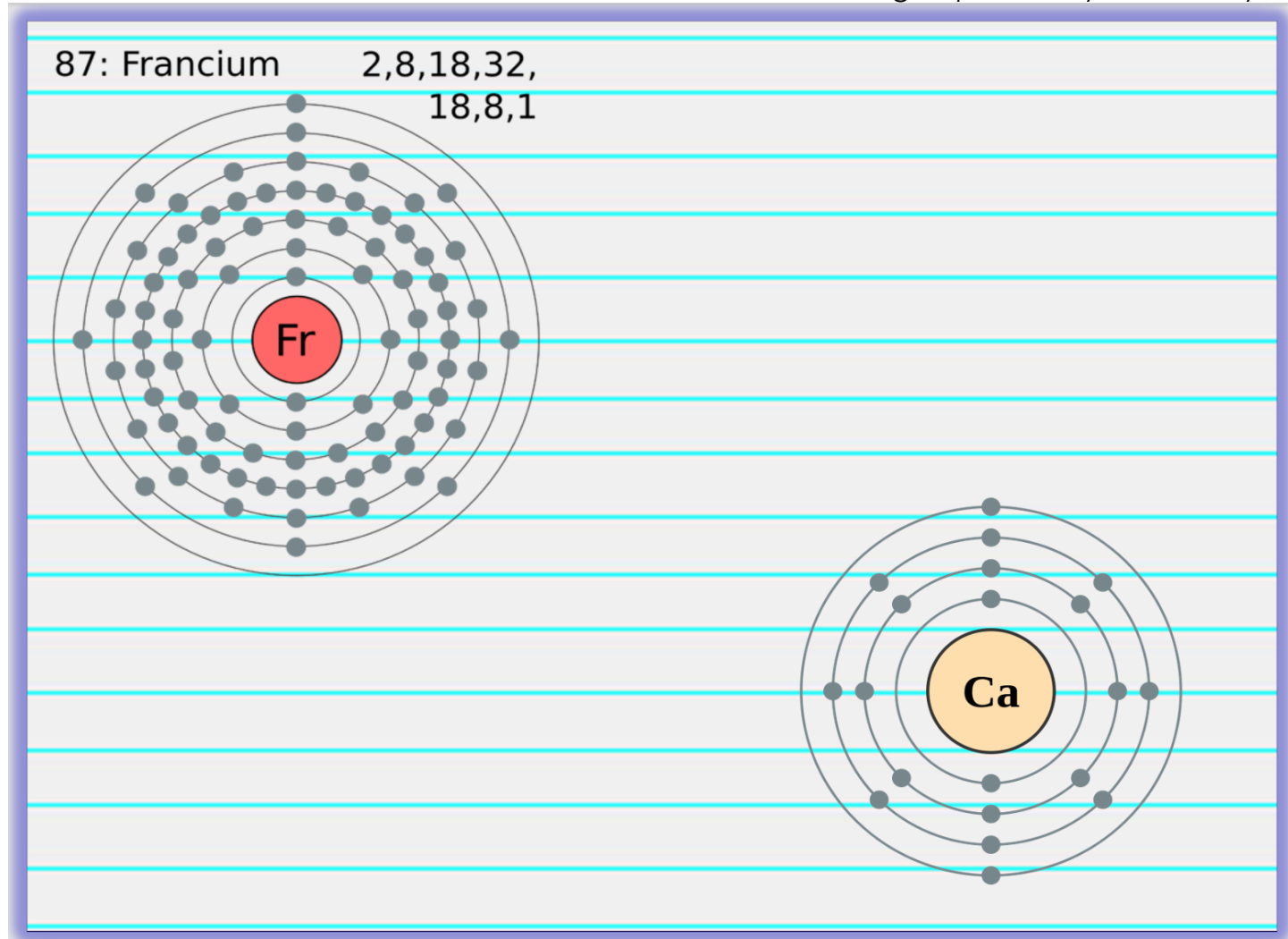
Is in order of _____ atomic number and mass.

The table puts elements into groups with _____ characteristics.

Allows us to recognize _____ over the whole array of elements

PART 6 Lesson 3 Arrangement / Metals

Record some information about the two elements below. What group are they in and why?



Transition Metals, found in middle

Metal's that are malleable and ductile

Ductile- Made into _____

Malleable - Made into _____

Metals are also...

Good conductors of _____

Have a high _____ (shine).

Mostly _____ (Hg is a liquid).

Metallically Bonded

Many metals are _____ reactive

Most have a _____ density.

Almost _____ of all elements are classified as metals.

Alloys: Metals are easily _____

Some of the metals

Actinide Metals, Lanthanide Metals, Alkali Metals, Alkaline-Earth Metals, Noble Metals, and Transition Metals.

Non-Metals

They're _____ metals
 H and He are non-metals
 They are poor _____
 They are _____, not ductile
 They show _____ metallic luster
 They may be transparent or translucent
 They have _____ density
 _____ bonded.

SPONCH -25 of the elements are essential for life.

These are the Biologically Important Elements

(These letters deserve to look cool, please put their names below)

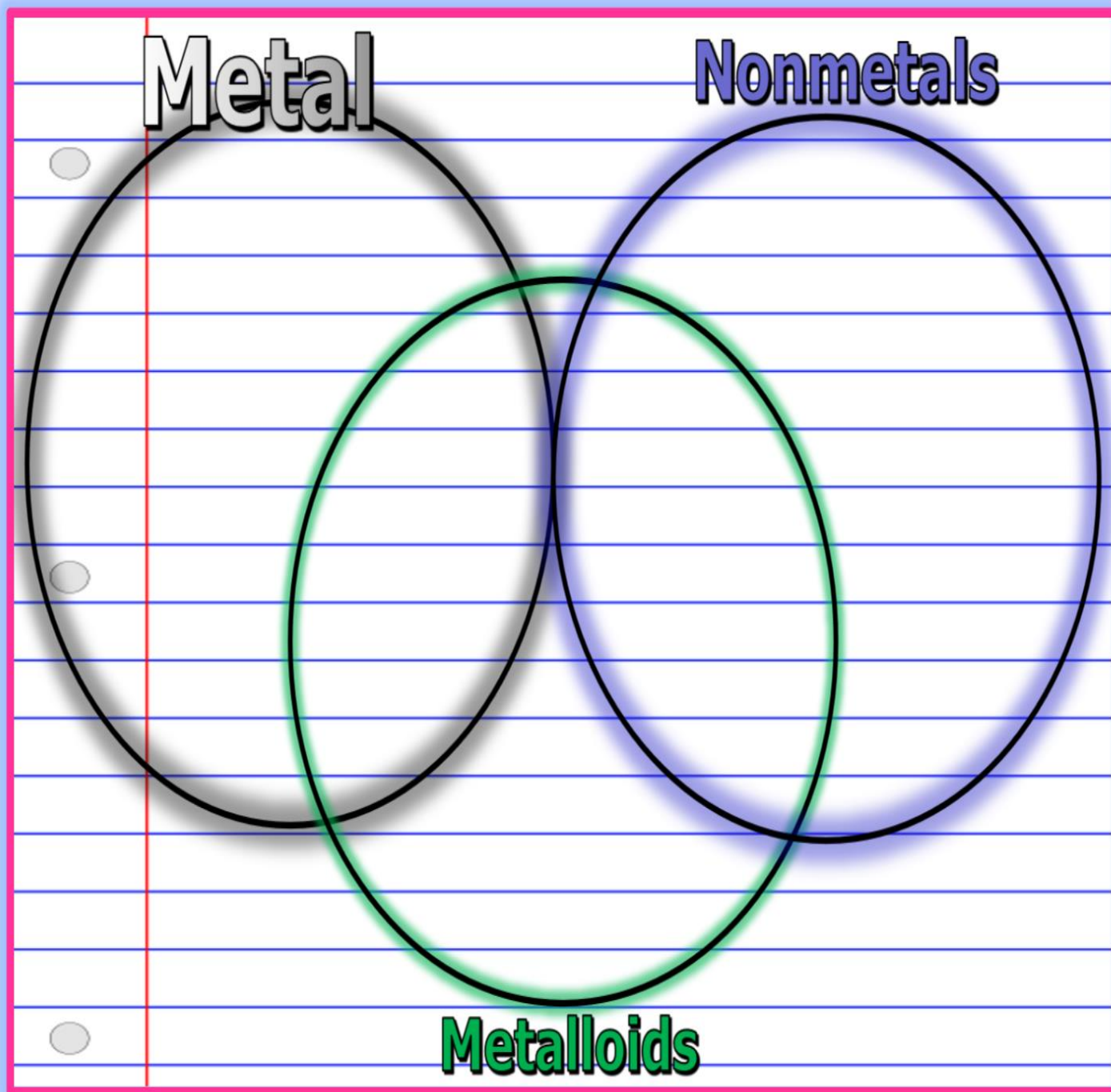
| | | | | | |
|--|--|--|--|--|--|
| | | | | | |
|--|--|--|--|--|--|

| | | | | | |
|--------------------|--|--|--|--|--|
| Name | | | | | |
| % in living things | | | | | |

Animal / SPONCH Graph



Describe some the similarities and differences between metals, nonmetals, and metalloids?



Name some...

| Metals | Non-metals | Metalloids |
|--------|------------|------------|
| | | |
| | | |
| | | |
| | | |
| | | |

Which elements had properties of more than one group?



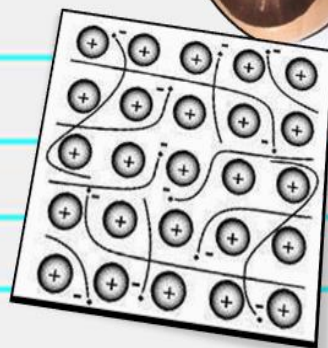
Predict the physical and chemical properties of Calcium, Cadmium, and Selenium.



Complete the chart below from the metals, non-metals, and metalloids investigation.



Please describe unique properties of metals, non-metals, and metalloids in the correct boxes below. Use ductile, malleable, luster, electrical conduction, and other property that you know.



PART 6 Lesson 5 Noble Gases, Halogens, Other Elements

The noble gases make up a class of chemical elements with similar properties; under standard conditions, they are all _____, colorless, with very _____ chemical reactivity.

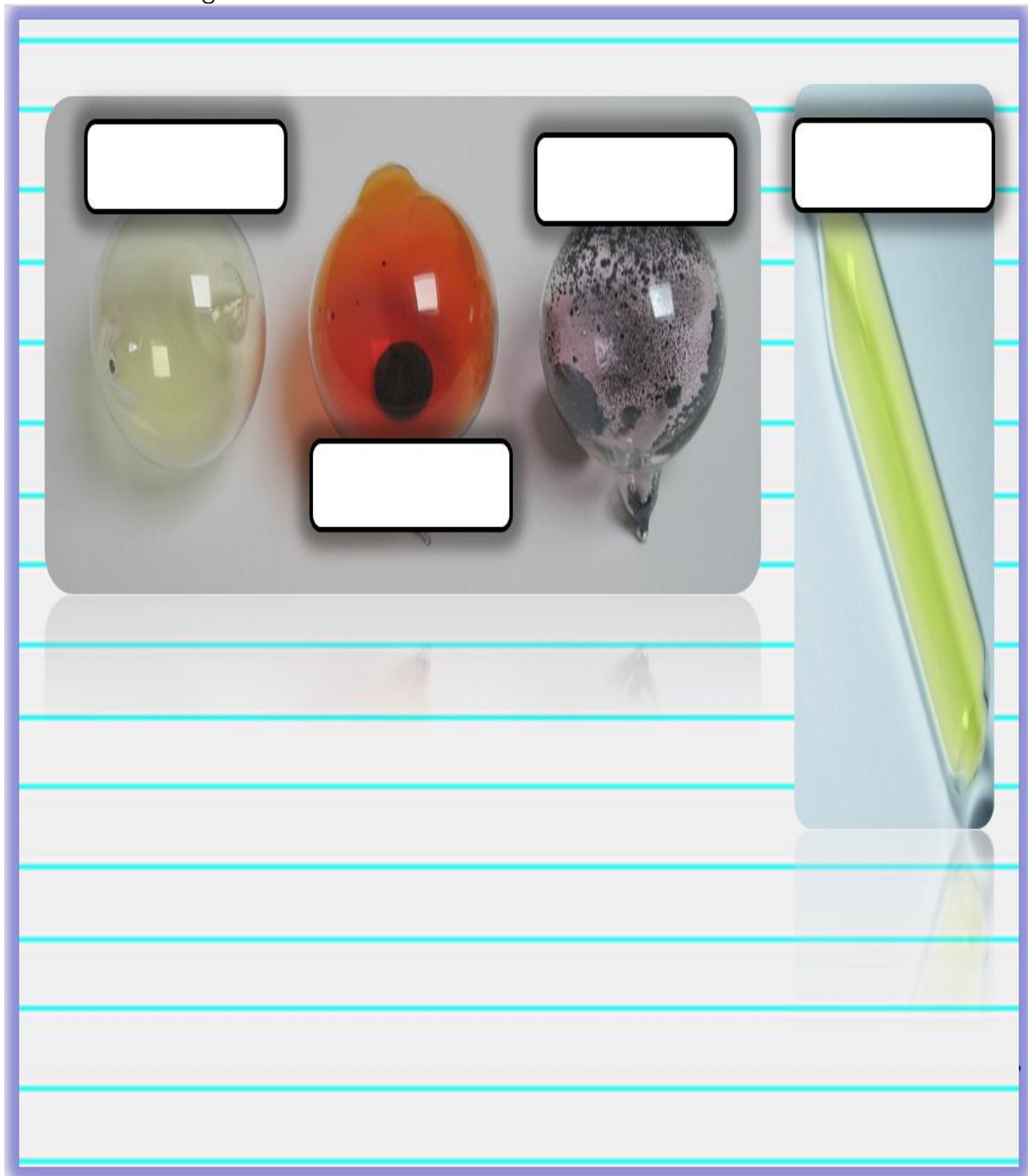
- The six naturally occurring noble gases are helium, neon, argon, krypton, xenon, and the radioactive radon.

The diagram illustrates the atomic structure of Sodium (Na) and Neon (Ne). Sodium (Na) is shown with a red nucleus and three concentric electron shells: the innermost shell has 2 electrons, the middle shell has 8 electrons, and the outermost shell has 1 electron. Neon (Ne) is shown with a light blue nucleus and two concentric electron shells: the inner shell has 2 electrons and the outer shell has 8 electrons. Below the Sodium atom is a historical illustration of a woman and a man in medieval attire, with labels: 'Hood with liripipe', 'Coif', 'Tunic', and 'Hose'. Below the Neon atom is a historical illustration of a man and a woman in 16th-century attire.

Halogens readily combine with most elements and are never seen _____ in nature.

Diatomic - Chlorine (___) Bromine (___), Iodine (___), Fluorine (___)

Notes on the halogens and other elements.

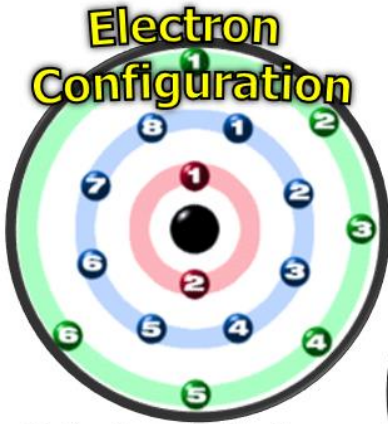


PART 6 Lesson 6 Wrap-Up, Review, Quiz, and Project

Example of Periodic Table Research Project

Name of Element _____ Atomic # _____


Name of Element _____ Atomic # _____



Electron Configuration

Sulfur has 16 Electrons and 16 Protons. It is a perfect element and usually doesn't occur as an Isotope. Electron Configuration
1s² 2s² 2p⁶ 3s² 3p⁴


16



Sulfur
32.065 amu


This is a picture of Sulfur. It is a non-metal. It does not have luster, it is brittle, and does not conduct electricity.

Sulfur is often found near volcanoes and can be collected in mines and sometimes at the surface.



Found?

Sulfur is a part of gun powder and used in explosives. The ancient Chinese were among the first to discover it's power.



Uses




Image of Element

Jefferson Lab. (2011) Interactive Periodic Table. Retrieved from <http://education.jlab.org/itselemental/>

Your Name!
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- Article title not italicised, journal title and volume number are
- All words in journal title should be capitalised

Author surname, initial (s). (Year). *Article title*. *Journal Title*, *Volume Number*(issue or part number, optional), page numbers. DOI or Retrieved from URL

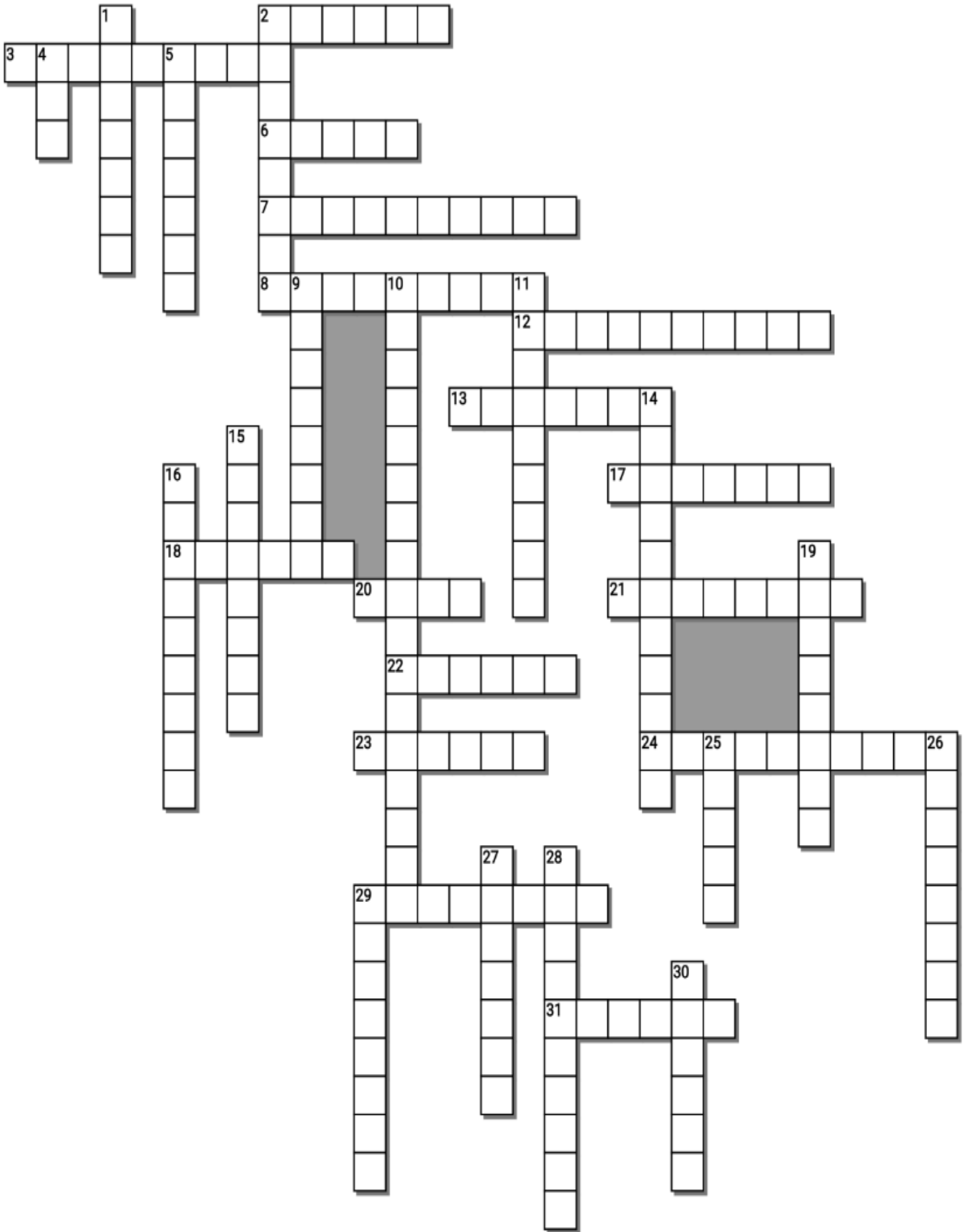
Only included if the article is online
Note: DOI is preferred

Quiz Wiz 1-20 Name that Element

| | | | |
|------------------|------------------|----|----|
| 1 | 2 | 3 | 4 |
| 5 | 6 | 7 | 8 |
| 9 | 10 | 11 | 12 |
| 13 | 14 | 15 | 16 |
| 17 | 18 | 19 | 20 |
| *21 Bonus | *22 Bonus | | |

Please visit the class periodic table of elements and record information about elements in the space below. Please describe the elements uses, unique properties, isotopes, location of earth, etc.

The form consists of four rectangular boxes with light blue horizontal lines on a white background, arranged in a 2x2 grid. Each box is outlined with a thick, multi-colored border. The top-left box has a purple border, the top-right has a yellow border, the bottom-left has a green border, and the bottom-right has a pink border. The boxes are intended for students to write their answers to the quiz questions.



Across

2. Vertical column is called a group/_____.
(Same # of valence electrons)
3. Antoine-Laurent de_____: A French nobleman and chemist. He had large influence on both the histories of chemistry and biology. He is widely considered to be the "Father of Modern Chemistry."
6. The _____ gases make up a class of chemical elements with similar properties; under standard conditions, they are all odorless, colorless, with very low chemical reactivity.
7. Elements with low _____ energies have a low electronegativity because their nuclei do not exert a strong attractive force on electrons.
8. To be shaped / made into sheets.
12. The Rare Earth Elements are made up of two series of elements, the _____ and Actinide Series
13. Made into wire.
17. This is a liquid metal at room temperature
18. The periodic table is arranged in order of increasing atomic _____ and mass.
20. Metals often conduct _____
21. All of the elements in a period have the same number of atomic _____.
22. 1st Group _____ Metals
23. _____ things are made of these elements. SPONCH or CHNOPS
24. These metals are found in the middle of Periodic Table
29. _____ an odd ball. It's grouped with the alkali metals because it has a similar outer shell electron configuration as they do. It's not metal?
31. Metals often have a high _____ (shine).

Down

1. The higher the electronegativity of an atom, the greater its attraction for _____ electrons.
2. The least electronegative element is _____
4. _____ increases from left to right and top to bottom.
5. The table puts elements into groups with _____ characteristics.
9. The _____ Earth Elements are metallic elements found in the second period of the periodic table.
10. _____ increases from lower left to upper right.
11. Electronegativity is a measure of the attraction of an atom for the _____ in a chemical bond.
14. Metals are usually good conductors of _____
15. Periodic Table of the...
16. Dimitri _____, the father of The Periodic Table of the Elements.
19. The most strongly electronegative element _____.
25. Metals are easily combined to create a _____
26. A _____ is a chemical element that mostly lacks the characteristics of a metal. Physically, a nonmetal tends to have a relatively low melting point, boiling point, and density.
27. British chemist Henry _____ in 1913. He proposed that the atom contains in its nucleus a number of positive nuclear charges that is equal to its (atomic) number in the periodic table.
28. _____ / Semi metals: Properties of metals and non-metals
29. Group 17, (Salt-former) They exist, at room temperature, in all three states of matter.
30. Horizontal row is called a _____
-Same # of orbitals

Part 6 Review Game

1-10 = 10 pts * = Bonus + 1 pt,
 (Secretly write owl in correct space +1 pt)
 Final Question = 5 pt wager

Lesson 7

Name: _____
 Due: Today
 Score ____ / 100

| IN YOUR ELEMENT | HEAVY METAL | TOO CRUMBLY | NAME GAME | ROBOTO Bonus round 1 pt each |
|-----------------|-------------|-------------|-----------|------------------------------------|
| 1) | 6) | 11) | 16) | *21) |
| 2) | 7) | 12) | 17) | *22) |
| 3) | 8) | 13) | 18) | *23) |
| 4) | 9) | 14) | 19) | *24) |
| 5) | 10) | 15) | 20) | *25) |

Final Question Wager ____ /5 Answer: _____

Name:

Due Date:

| | | | | | | | | | | | | | | | | | | | | | |
|-----------------------|---------------------|-----------------------|--------------------|-----------------------|---------------------|-----------------------|--------------------|-----------------------|---------------------|-----------------------|---------------------|----------------------|---------------------|-----------------------|--------------------|-----------------------|---------------------|----------------------|-------------------|----------------------|---------------------|
| 1 H 1.00794 | | | | | | | | | | | | | | | | | 2 He 4.002602 | | | | |
| 3 Li 6.941 | 4 Be 9.012182 | | | | | | | | | | | | | | | 5 B 10.811 | 6 C 12.0107 | 7 N 14.00674 | 8 O 15.9994 | 9 F 18.9984032 | 10 Ne 20.1797 |
| 11 Na 22.989770 | 12 Mg 24.3050 | | | | | | | | | | | | | | | 13 Al 26.581538 | 14 Si 28.0855 | 15 P 30.973761 | 16 S 32.066 | 17 Cl 35.4527 | 18 Ar 39.948 |
| 19 K 39.0983 | 20 Ca 40.078 | 21 Sc 44.955910 | 22 Ti 47.867 | 23 V 50.9415 | 24 Cr 51.9961 | 25 Mn 54.938049 | 26 Fe 55.845 | 27 Co 58.933200 | 28 Ni 58.6534 | 29 Cu 63.545 | 30 Zn 65.39 | 31 Ga 69.723 | 32 Ge 72.61 | 33 As 74.92160 | 34 Se 78.96 | 35 Br 79.504 | 36 Kr 83.80 | | | | |
| 37 Rb 85.4678 | 38 Sr 87.62 | 39 Y 88.90585 | 40 Zr 91.224 | 41 Nb 92.90638 | 42 Mo 95.94 | 43 Tc (98) | 44 Ru 101.07 | 45 Rh 102.90550 | 46 Pd 106.42 | 47 Ag 196.56655 | 48 Cd 112.411 | 49 In 114.818 | 50 Sn 118.710 | 51 Sb 121.760 | 52 Te 127.60 | 53 I 126.90447 | 54 Xe 131.29 | | | | |
| 55 Cs 132.90545 | 56 Ba 137.327 | 57 La 138.9055 | 72 Hf 178.49 | 73 Ta 180.94.79 | 74 W 183.84 | 75 Re 186.207 | 76 Os 190.23 | 77 Ir 192.217 | 78 Pt 195.078 | 79 Au 196.56655 | 80 Hg 200.59 | 81 Tl 204.3833 | 82 Pb 207.2 | 83 Bi 208.58038 | 84 Po (209) | 85 At (210) | 86 Rn (222) | | | | |
| 87 Fr (223) | 88 Ra (226) | 89 Ac (227) | 104 Rf (261) | 105 Db (262) | 106 Sg (263) | 107 Bh (262) | 108 Hs (265) | 109 Mt (266) | 110 (269) | 111 (272) | 112 (277) | | | 114 (289) | 118 (293) | | | | | | |


Part 6 Periodic Table

| | | | | | | | | | | | | | |
|----------------------|------------------------|---------------------|-------------------|--------------------|---------------------|--------------------|-----------------------|--------------------|-----------------------|--------------------|-----------------------|--------------------|---------------------|
| 58 Ce 140.116 | 59 Pr 140.50765 | 60 Nd 144.24 | 61 Pm (145) | 62 Sm 150.36 | 63 Eu 151.964 | 64 Gd 157.25 | 65 Tb 158.92534 | 66 Dy 162.50 | 67 Ho 164.93032 | 68 Er 167.26 | 69 Tm 168.93421 | 70 Yb 173.04 | 71 Lu 174.967 |
| 90 Th 232.0381 | 91 Pa 231.035888 | 92 U 238.0289 | 93 Np (237) | 94 Pu (244) | 95 Am (243) | 96 Cm (247) | 97 Bk (247) | 98 Cf (251) | 99 Es (252) | 100 Fm (257) | 101 Md (258) | 102 No (259) | 103 Lr (262) |

Part 6 Lesson 1 Periodic Table of the Elements

Please describe how this arrangement of playing cards relates to the periodic table of elements. (Next Page)

Describe some information about the chemists below.

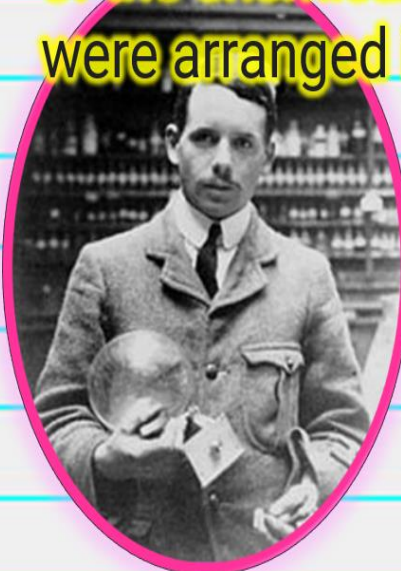


Antoine-Laurent de Lavoisier:


- A French nobleman and chemist.
- He had large influence on both the histories of chemistry and biology. He is widely considered to be the "Father of Modern Chemistry."

Discovery of the role of oxygen in combustion, Named sulfur (1777), oxygen (1778), and hydrogen (1783). He discovered that matter may change its form or shape, its mass always remains the same.

Dmitri Mendeleev devised the periodic classification of the chemical elements, in which the elements were arranged in order of increasing atomic weight.



Henry Moseley solved these inconsistencies by determining that the properties of elements were a function of their atomic numbers, i.e., the number of protons in the nucleus of the atom. Since this discovery, elements in the periodic table are arranged in order of increasing atomic number.



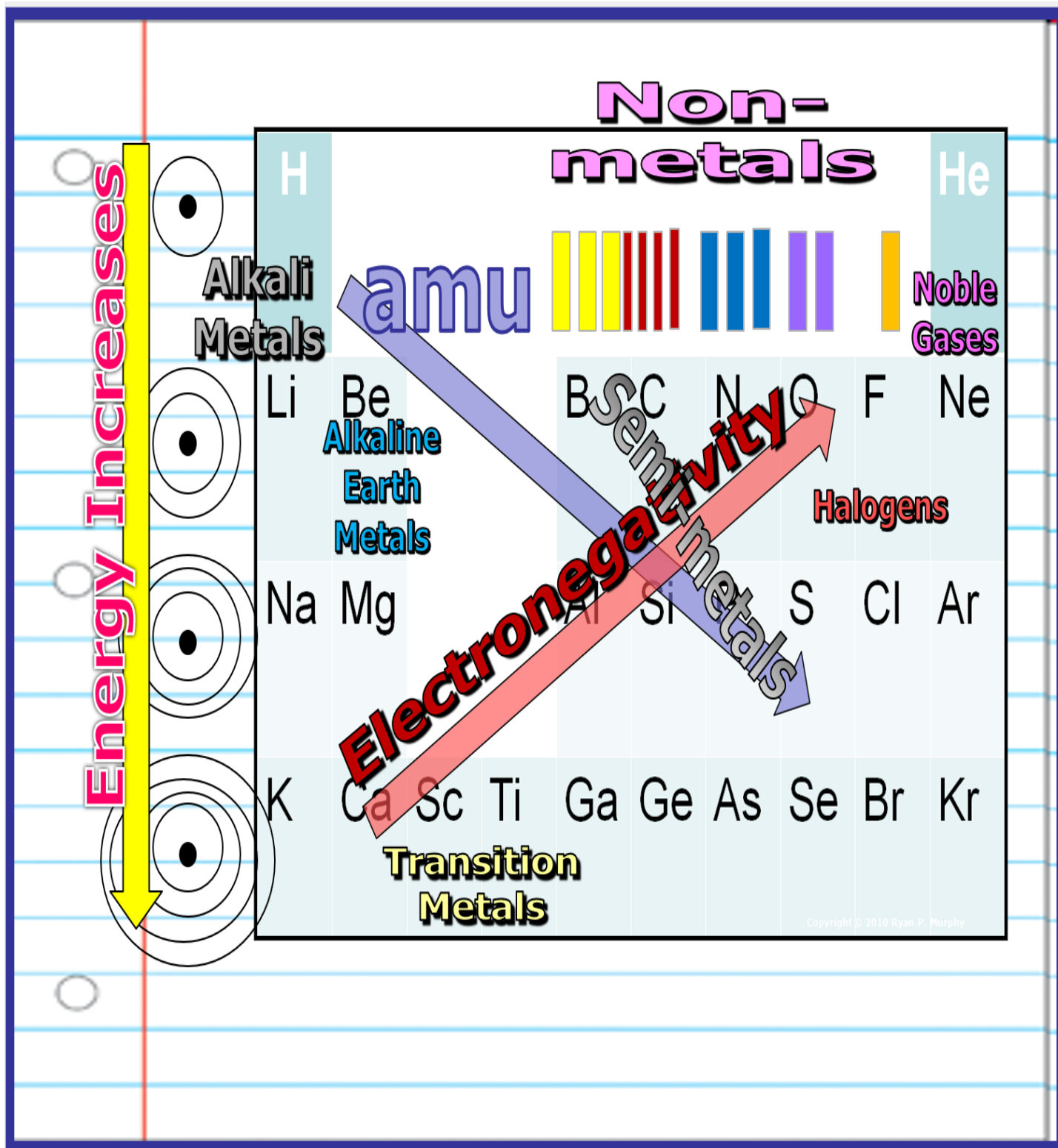
Warning 5 part question! Check each diamond when complete

◇ **Color code** the following: Noble Gases, Non-Metals, Metalloids, Alkali Metals, Halogens, Alkaline-Earth Metals, and Transition Metals.

◇ Next to period 1, 2, 3, 4, 5, (make a sketch of the number of electron orbitals)

◇ Draw arrows showing the direction of increasing atomic number and atomic mass

◇ Show an arrow showing increasing electron negativity.



PART 6 Lesson 2 Arrangement / Elements in the Periodic Table

The periodic table of the elements is a...

A chart of all the **known** elements.

Is in order of **increasing** atomic number and mass.

The table puts elements into groups with **similar** characteristics.

Allows us to recognize **trends** over the whole array of elements

Period is horizontal
Group/Family vertical

Periodic Table of the Elements

| | | | | | | | | | | | | | | | | | | | |
|---|----|-----|-----|------|-----|-----|-----|-------|------|-----|-----|-----|-----|----|----|----|----|----|----|
| | 1 | IA | | | | | | | | | | | | | | | | 2 | 0 |
| 1 | H | | | | | | | | | | | | | | | | | | He |
| 2 | 3 | IIA | 4 | | | | | | | | | 5 | 6 | 7 | 8 | 9 | 10 | | |
| | Li | | Be | | | | | | | | | B | C | N | O | F | Ne | | |
| 3 | 11 | | 12 | | | | | | | | | 13 | 14 | 15 | 16 | 17 | 18 | | |
| | Na | | Mg | IIIB | IVB | VB | VIB | VII B | VIII | IB | IIB | Al | Si | P | S | Cl | Ar | | |
| 4 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | |
| | K | Ca | Sc | Ti | V | Cr | Mn | Fe | Co | Ni | Cu | Zn | Ga | Ge | As | Se | Br | Kr | |
| 5 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 | 51 | 52 | 53 | 54 | |
| | Rb | Sr | Y | Zr | Nb | Mo | Tc | Ru | Rh | Pd | Ag | Cd | In | Sn | Sb | Te | I | Xe | |
| 6 | 55 | 56 | 57 | 72 | 73 | 74 | 75 | 76 | 77 | 78 | 79 | 80 | 81 | 82 | 83 | 84 | 85 | 86 | |
| | Cs | Ba | *La | Hf | Ta | W | Re | Os | Ir | Pt | Au | Hg | Tl | Pb | Bi | Po | At | Rn | |
| 7 | 87 | 88 | 89 | 104 | 105 | 106 | 107 | 108 | 109 | 110 | 111 | 112 | 113 | | | | | | |
| | Fr | Ra | +Ac | Rf | Ha | Sg | Ns | Hs | Mt | 110 | 111 | 112 | 113 | | | | | | |

| | | | | | | | | | | | | | | |
|---------------------|----|----|----|----|----|----|----|----|----|----|-----|-----|-----|-----|
| | 58 | 59 | 60 | 61 | 62 | 63 | 64 | 65 | 66 | 67 | 68 | 69 | 70 | 71 |
| * Lanthanide Series | Ce | Pr | Nd | Pm | Sm | Eu | Gd | Tb | Dy | Ho | Er | Tm | Yb | Lu |
| + Actinide Series | 90 | 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 | 100 | 101 | 102 | 103 |
| | Th | Pa | U | Np | Pu | Am | Cm | Bk | Cf | Es | Fm | Md | No | Lr |

AMU increases from left to right and up to down.

Electron negativity increases from lower left to upper right.

Electronegativity is a measure of the attraction of an atom for the electrons in a chemical bond.

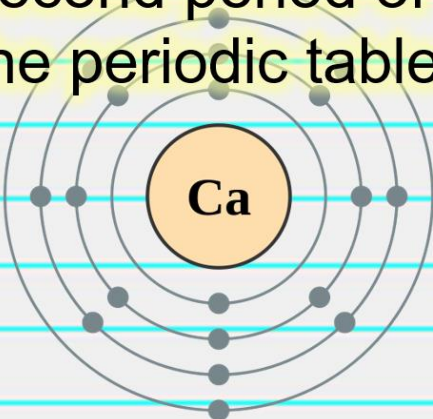
The higher the electronegativity of an atom, the greater its attraction for bonding electrons.

Elements with low ionization energies have a low electronegativity because their nuclei do not exert a strong attractive force on electrons.

Elements with high ionization energies have a high electronegativity due to the strong pull exerted on electrons by the nucleus.

PART 6 Lesson 3 Arrangement / Metals

Record some information about the two elements below. What group are they in and why?

| | | |
|--|----------------------|--|
| 87: Francium | 2,8,18,32, 18,8,1 | <p>Calcium, Atomic #20 is in the family of Alkaline Earth Elements. This is a metallic element found in the second period of the periodic table.</p> |
| <p>Francium: Atomic #87, extremely radioactive and second rarest element on earth. It takes less energy to remove that outer electron from the atom. This atom has a very low ionization energy. Also the lowest electronegativity of any element.</p> | |  |

Transition Metals, found in middle

Metal's that are malleable and ductile

Ductile- Made into **wire**

Malleable - Made into **sheets**

Metals are also...

Good conductors of **electricity**

Have a high **luster** (shine).

Mostly **Solid** (Hg is a liquid).

Metallically Bonded

Many metals are **extremely** reactive

Most have a **high** density.

Almost **75%** of all elements are classified as metals.

Alloys: Metals are easily **combined**

Some of the metals

Actinide Metals, Lanthanide Metals, Alkali Metals, Alkaline-Earth Metals, Noble Metals, and Transition Metals.

Non-Metals

- They're **not** metals
- H and He are non-metals
- They are **poor conductors**
- They are **brittle**, not ductile
- They show **no** metallic luster
- They may be transparent or translucent
- They have **low** density
- Covalently** bonded.

SPONCH -25 of the elements are essential for life.

These are the Biologically Important Elements

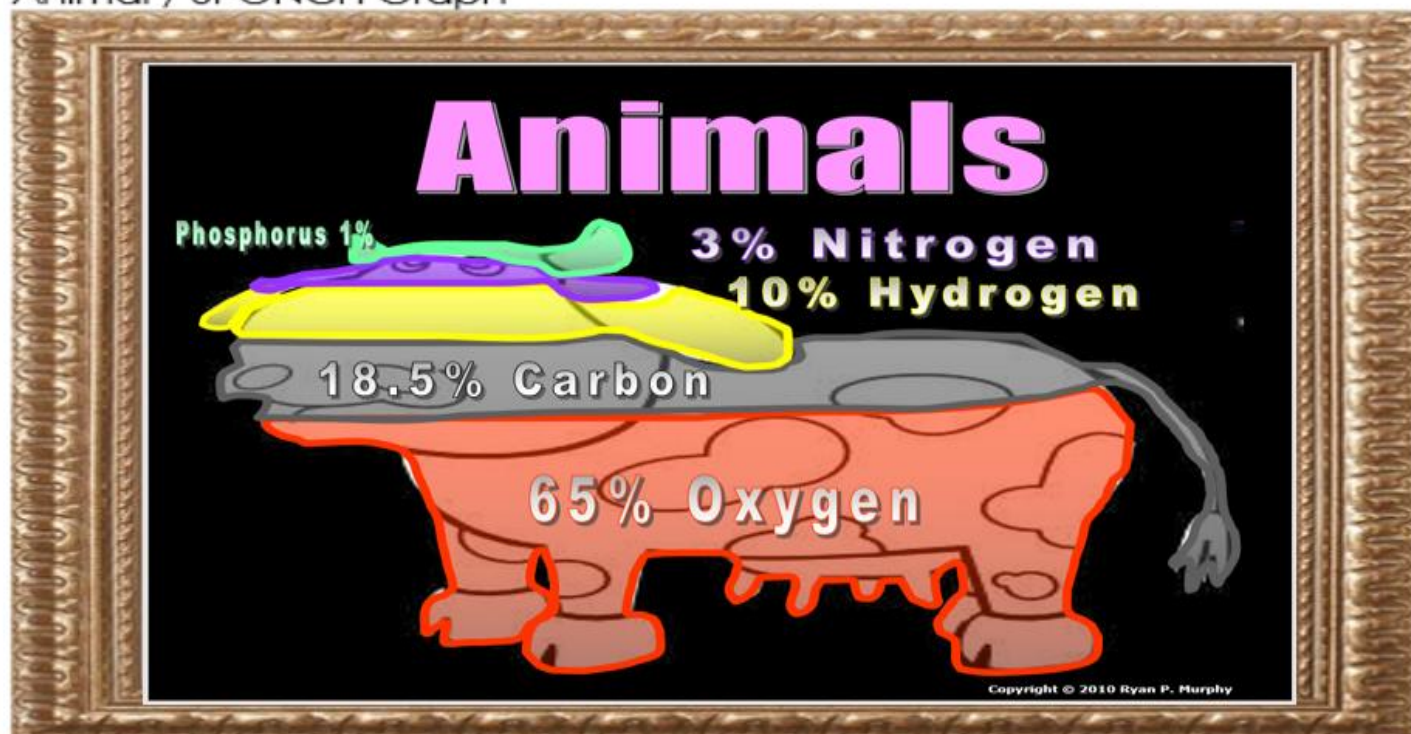
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These are the Biologically Important Elements

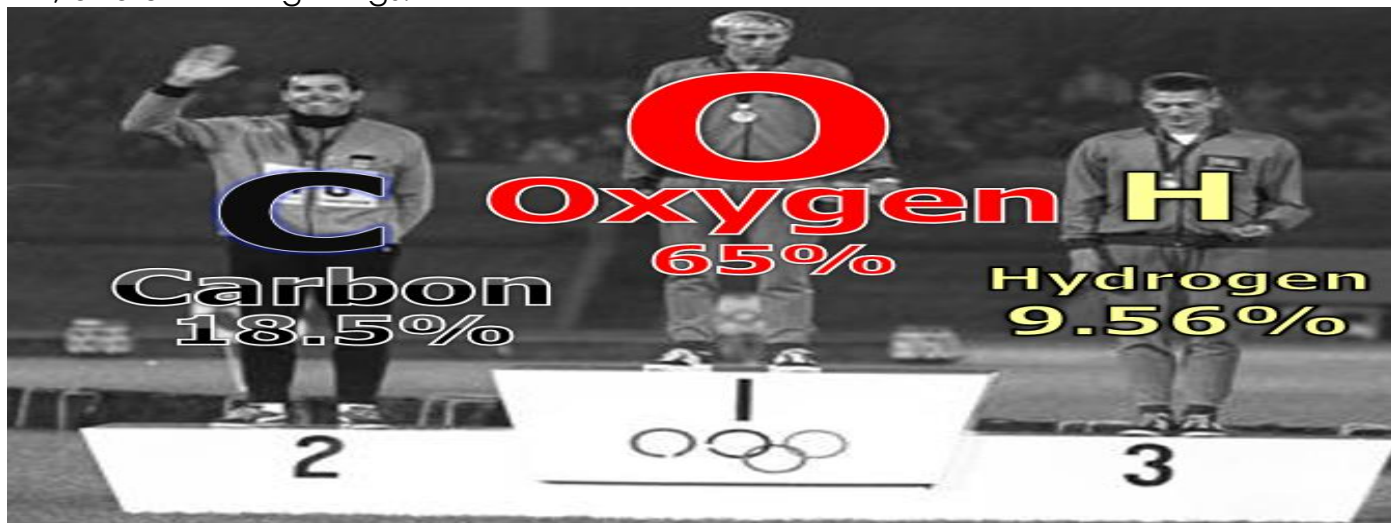
(These letters deserve to look cool, please put their names below)

| | | | | | |
|----------------------------------|-------------------|---------------|-----------------|---------------|-----------------|
| S | P | O | N | C | H |
| Name: Sulfur | Phosphorus | Oxygen | Nitrogen | Carbon | Hydrogen |
| % in living things: Trace | 1% | 65% | 3.3% | 18.5% | 9.56% |

Animal / SPONCH Graph



If these athletes were biologically important Elements, which element is used the most (1st), 2nd, and 3rd in living things.



Metalloids/Semimetals

Properties of metals and non-metals

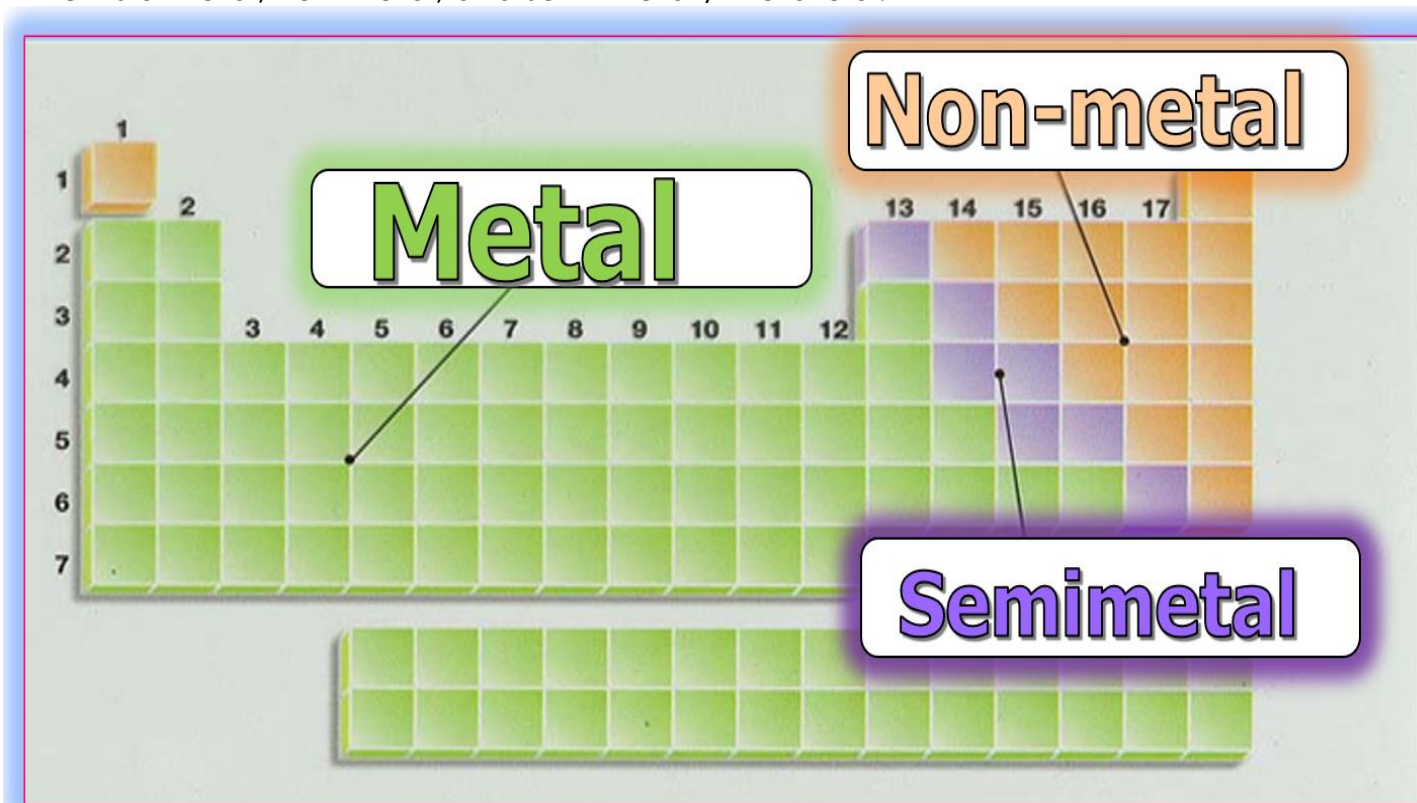
Semi-conductors

Brittle

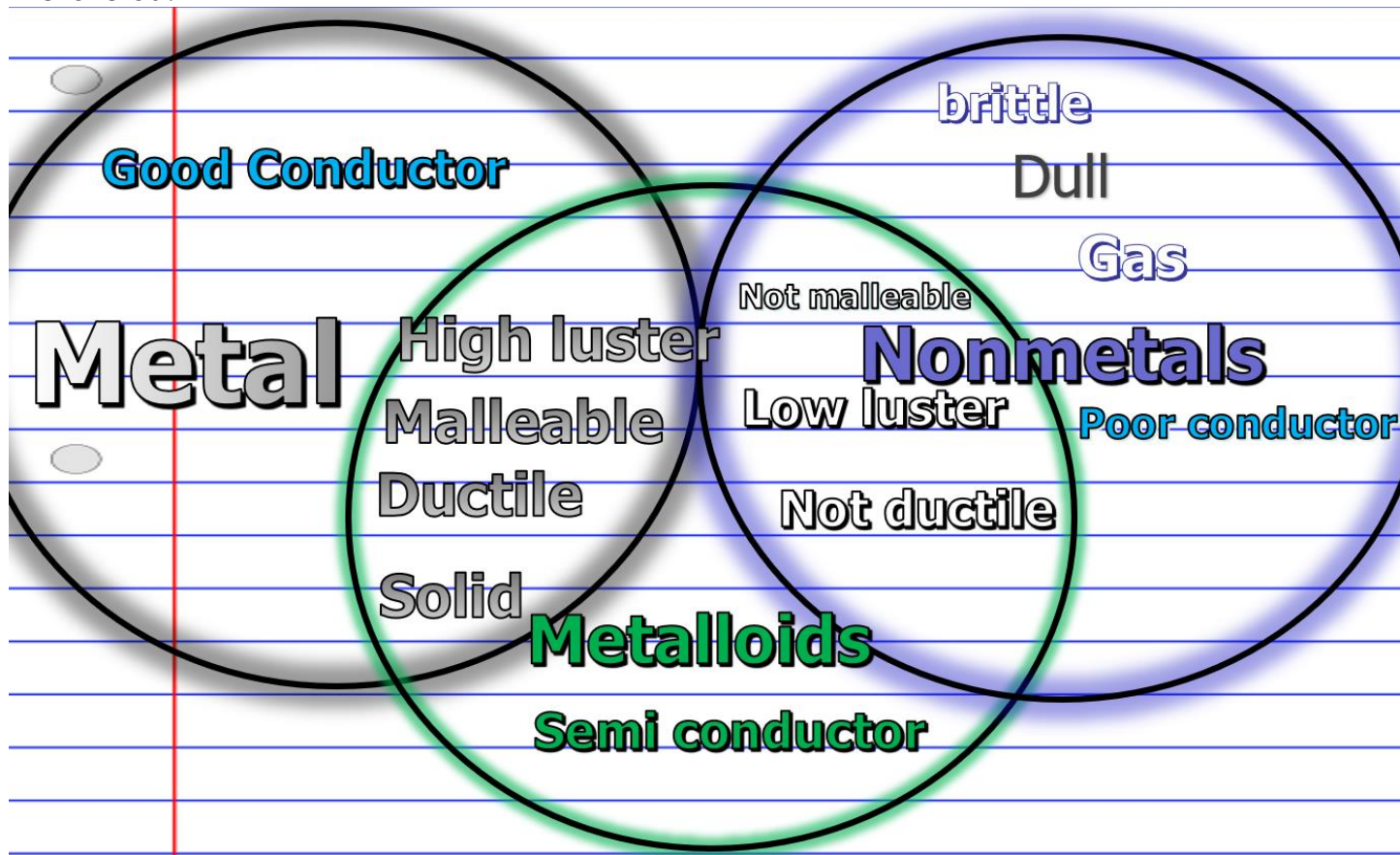
Can have luster

PART 6 Lesson 4 Metals, Non-metals, and metalloids investigation

Which is a metal, non-metal, and semi-metal / metalloid?



Describe some the similarities and differences between metals, nonmetals, and metalloids?



| Metal | Non-Metal | Metalloid |
|-----------|-----------|-----------|
| Magnesium | Sulfur | Silicon |
| Zinc | Carbon | |
| Aluminum | | |
| Copper | | |

Which elements had properties of more than one group?

Answer: Silicon had properties of metals and non-metals. It was like a metal because it conducted electricity and had luster. It was like a non-metal because it was brittle.

Predict the physical and chemical properties of Calcium, Cadmium, and Selenium.

Calcium: Metal, Reactive with Acid, luster, conductive. Similar to Magnesium

Cadmium: Metal, reactive with acid, conductive, similar to Zinc.

Selenium: Non-metal, brittle, poor conductor. Similar to Sulfur.

Complete the chart below from the metals, non-metals, and metalloids investigation.

| ELEMENT | CHEMICAL SYMBOL | COLOR | METALLIC LUSTER Y/N? | PHYSICAL PROPERTIES | BRITTLE Y/N? | REACTION With HCL? | REACTION with CuCl ₂ | CONDUCTS ELECTRICITY? |
|--------------|-----------------|-----------------|----------------------|--|--------------|--|---------------------------------|-----------------------|
| ALUMINUM | Al | Metallic luster | Yes | High Density Malleable Ductile | No | Bubbles, Heat, Color Change Brown/black | Bubbles, Color Change | Good Conductor |
| CARBON | C | Black | No | Low Density | Yes | Non-reactive | Non-reactive | Yes (graphite) |
| IRON FILINGS | Fe | Metallic luster | Yes | High Density Malleable Ductile | No | Bubbles, Heat, Color Change Brown/black | Bubbles, Color Change | Good Conductor |
| SILICON | Si | Metallic luster | Yes | High Density Not Malleable Ductile | No Yes | Non-reactive | Non-reactive | Semi Conductor |
| Magnesium | Mg | Metallic luster | Yes | High Density Malleable Ductile | No | Extremely Reactive Bubbles, Heat, | Bubbles, Color Change | Good Conductor |
| SULFUR | S | Yellow | No | Low Density Smells of Rotten Eggs | Yes | Non-reactive | Non-reactive | Poor Conductor |
| Zinc | Zn | Metallic luster | Yes | High Density Malleable Ductile | No | Reactive Bubbles, Heat, | Bubbles, Color Change | Good Conductor |



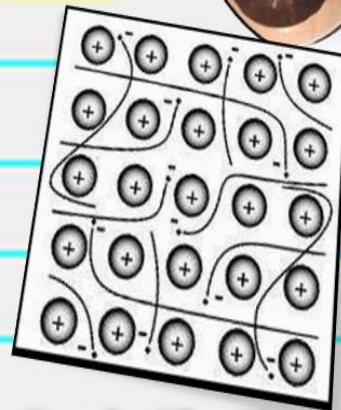
Marie Curie is famous for work in radioactivity. This transformed sciences understanding of that field. She discovered radium and polonium. She contributed to cancer treatments and inspire people today.

Please describe unique properties of metals, non-metals, and metalloids in the correct boxes below. Use ductile, malleable, luster, electrical conduction, and other property that you know.



Non-metals can be gas, liquid or solid. They aren't shiny (lustrous) and they don't conduct heat or electricity well. Usually, their melting points are lower than for metals, although there are exceptions. The solids usually break easily, and can't bend like metals

- Metals...
- high melting points.
- good conductors of electricity.
- good conductors of heat.
- high density.
- malleable.
- ductile.



Metallic Bonds: The Sharing of free electrons among a structure of positively charged ions.



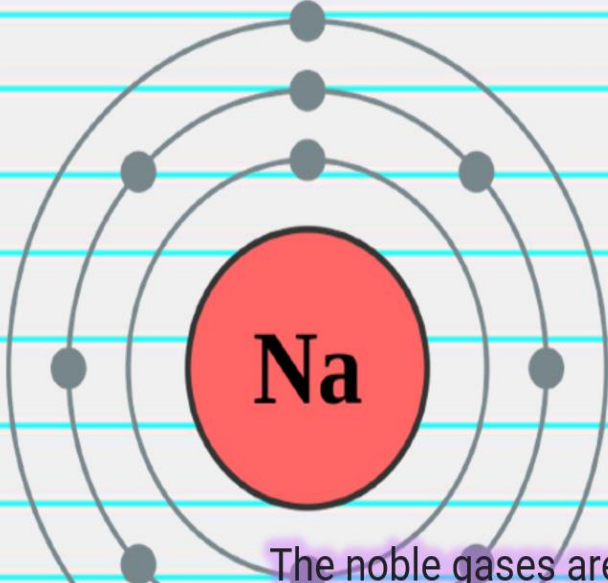
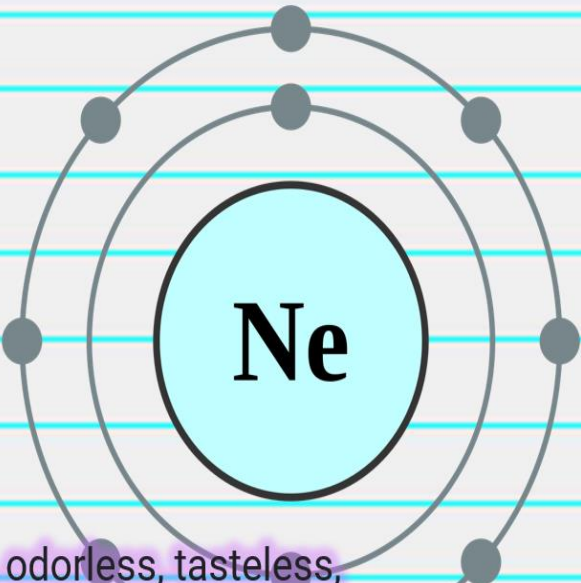
Semimetals (metalloids) are chemical elements that have properties of both metals and nonmetals. They can be important semiconductors, used in computer and other electronic devices.



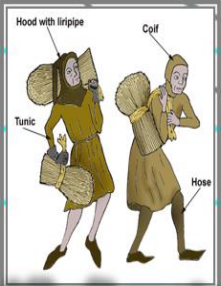

PART 6 Lesson 5 Noble Gases, Halogens, Other Elements

The noble gases make up a class of chemical elements with similar properties; under standard conditions, they are all **odorless**, colorless, with very **low** chemical reactivity.

- The six naturally occurring noble gases are helium, neon, argon, krypton, xenon, and the radioactive radon.

The noble gases are colorless, odorless, tasteless, and nonflammable under standard conditions. They were once labeled group 0 in the periodic table because it was believed they had a valence of zero, meaning their atoms cannot combine with those of other elements to form compounds.

Alkali metals are reactive because they are highly electropositive. Electropositivity is the property of an atom to lose its electrons. Metals (especially alkali and alkaline earth metals) tend to lose electrons easily i.e. they have very low electronegativities.

Halogens readily combine with most elements and are never seen **uncombined** in nature.

- Chlorine (Cl_2) Bromine (Br_2), Iodine (I_2), Fluorine (F_2)

Notes on the halogens and other elements.

Chlorine

Cl_2

Gas

Iodine

I_2

Solid

Fluorine

F_2

Gas

Bromine

Br_2

Liquid

Halogens share many similar properties including:

- They all form acids when combined with hydrogen.
- They are all fairly toxic.
- They readily combine with metals to form salts.
- They have seven valence electrons in their outer shell.
- They are highly reactive and electronegative.

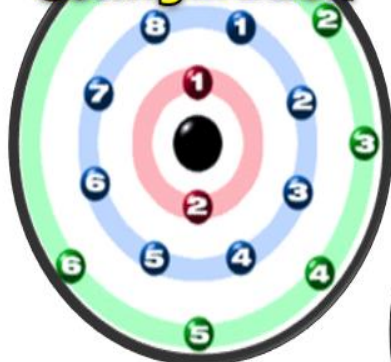
PART 6 Lesson 6 Wrap-Up, Review, Quiz, and Project

Example of Periodic Table Research Project

Name of Element _____ Atomic # _____

Name of Element _____ Atomic # _____

Electron Configuration



Sulfur has 16 Electrons and 16 Protons. It is a perfect element and usually doesn't occur as an Isotope. Electron Configuration
 $1s^2 2s^2 2p^6 3s^2 3p^4$



Image of Element

16



Sulfur

32.065 amu

This is a picture of Sulfur. It is a non-metal. It does not have luster, it is brittle, and does not conduct electricity.

Jefferson Lab. (2011) Interactive Periodic Table. Retrieved from <http://education.jlab.org/itselemental/>

Sulfur is often found near volcanoes and can be collected in mines and sometimes at the surface.



Sulfur is a part of gun powder and used in explosives. The ancient Chinese were among the first to discover its power.



Your Name!

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- Article title not italicised, journal title and volume number are
- All words in journal title should be capitalised

Author surname, initial (s). (Year). **Article title**. **Journal Title**, **Volume Number**(issue or part number, optional), page numbers. **DOI or Retrieved from URL**

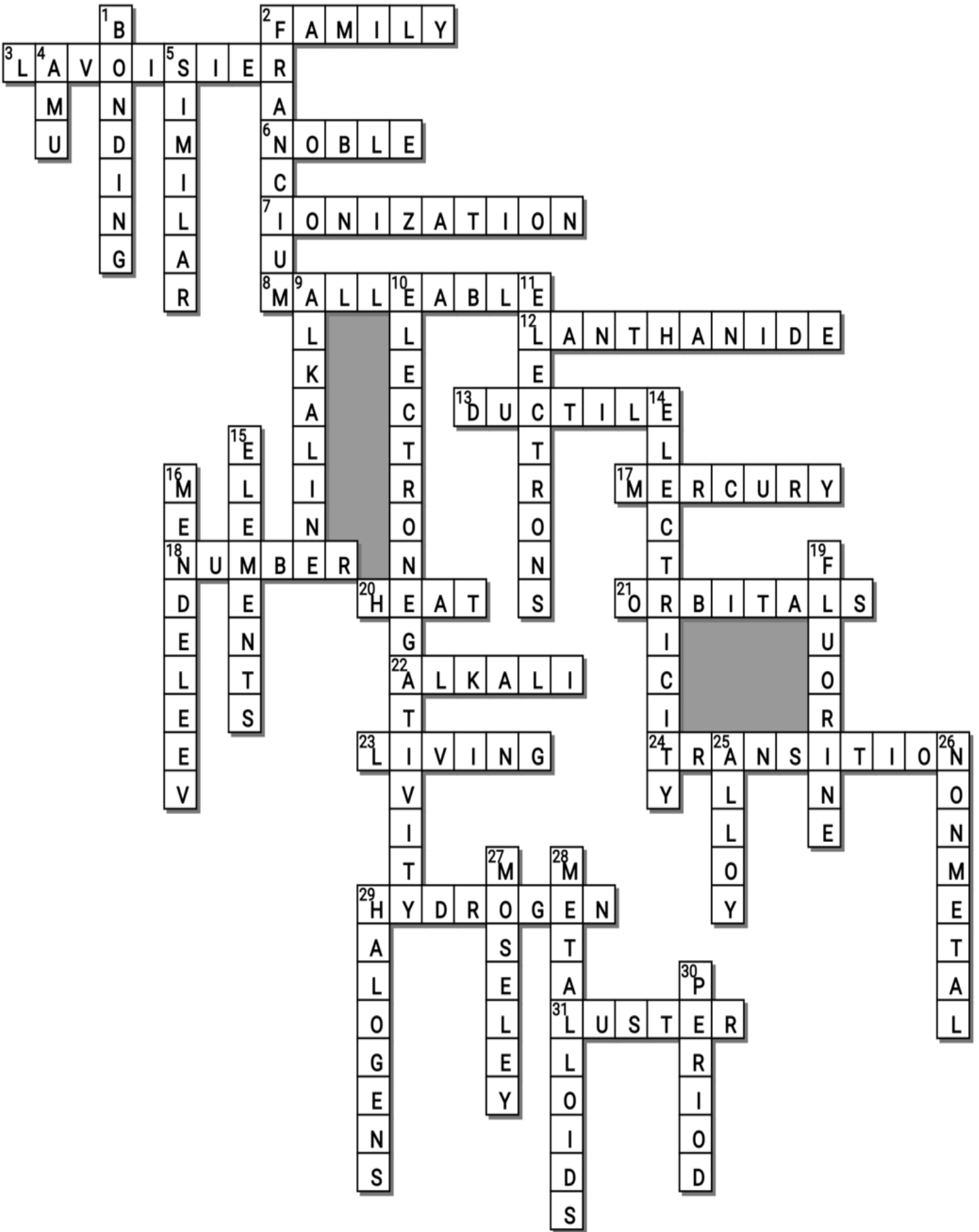
Only included if the article is online
 Note: DOI is preferred

Quiz Wiz 1-20 Name that Element

| | | | |
|---|---|-------------------------|-----------------|
| 1 Sulfur # 16 | 2 Nitrogen #7 | 3 Sodium #11 (+1 Ionic) | 4 Copper #29 |
| 5 Magnesium #12 | 6 Helium #2 | 7 Radon # 86 | 8 Silicon #14 |
| 9 Fluorine #9 | 10 Mercury #80 | 11 Tin #50 | 12 Aluminum #13 |
| 13 NEON #10 | 14 URANIUM #92 | 15 Boron #5 +1 Owl | 16 Francium #87 |
| 17 Carbon #6 | 18 Gallium #31 | 19 Iron #26 | 20 Oxygen # 8 |
| *21 Bonus Indiana Jones and the Raiders of the Los Ark | *22 Bonus Flint Lockwood & Sam Sparks | | |

Please visit the class periodic table of elements and record information about elements in the space below. Please describe the elements uses, unique properties, isotopes, location of earth, etc.

The form consists of four rectangular boxes with horizontal blue lines, arranged in two rows and two columns. Each box is designed for a student to write their response to one of the bonus questions. The boxes are outlined with a thick, multi-colored border (yellow, green, and purple).



Across

2. Vertical column is called a group/_____.
(Same # of valence electrons)
3. Antoine-Laurent de_____: A French nobleman and chemist. He had large influence on both the histories of chemistry and biology. He is widely considered to be the "Father of Modern Chemistry."
6. The _____ gases make up a class of chemical elements with similar properties; under standard conditions, they are all odorless, colorless, with very low chemical reactivity.
7. Elements with low _____ energies have a low electronegativity because their nuclei do not exert a strong attractive force on electrons.
8. To be shaped / made into sheets.
12. The Rare Earth Elements are made up of two series of elements, the _____ and Actinide Series
13. Made into wire.
17. This is a liquid metal at room temperature
18. The periodic table is arranged in order of increasing atomic _____ and mass.
20. Metals often conduct _____
21. All of the elements in a period have the same number of atomic _____.
22. 1st Group _____ Metals
23. _____ things are made of these elements. SPONCH or CHNOPS
24. These metals are found in the middle of Periodic Table
29. _____ an odd ball. It's grouped with the alkali metals because it has a similar outer shell electron configuration as they do. It's not metal?
31. Metals often have a high _____ (shine).

Down

1. The higher the electronegativity of an atom, the greater its attraction for _____ electrons.
2. The least electronegative element is _____
4. _ _ _ increases from left to right and top to bottom.
5. The table puts elements into groups with _____ characteristics.
9. The _____ Earth Elements are metallic elements found in the second period of the periodic table.
10. _____ increases from lower left to upper right.
11. Electronegativity is a measure of the attraction of an atom for the _____ in a chemical bond.
14. Metals are usually good conductors of _____
15. Periodic Table of the...
16. Dimitri _____, the father of The Periodic Table of the Elements.
19. The most strongly electronegative element _____.
25. Metals are easily combined to create a _____
26. A _____ is a chemical element that mostly lacks the characteristics of a metal. Physically, a nonmetal tends to have a relatively low melting point, boiling point, and density.
27. British chemist Henry _____ in 1913. He proposed that the atom contains in its nucleus a number of positive nuclear charges that is equal to its (atomic) number in the periodic table.
28. _____ / Semi metals: Properties of metals and non-metals
29. Group 17, (Salt-former) They exist, at room temperature, in all three states of matter.
30. Horizontal row is called a _____
-Same # of orbitals

Part 6 Review Game

1-10 = 10 pts * = Bonus + 1 pt,
 (Secretly write owl in correct space +1 pt)
 Final Question = 5 pt wager

Lesson 7

Name: _____

Due: Today

Score ____ / 100

| IN YOUR ELEMENT | HEAVY METAL | TOO CRUMBLY | NAME GAME | ROBOTO Bonus round 1 pt each |
|---|---------------------------------|--|--|------------------------------------|
| 1) Dmitri Mendeleev & Henry Moseley | 6) Electron-Negativity Trend | 11) Fluorine | 16) Mercury is a liquid at room temperature | *21) The Terminator |
| 2) 118 Range (108-128) | 7) D.) Extremely brittle. | 12) Noble Gases | 17) Radon | *22) Magneto |
| 3) B.) Is in order of increasing atomic number and mass. | 8) F.) Forms ionic bonds. | 13) A=Alkali Metals B=Na C= (Ar)4s1 D=37 | 18) Alkaline Earth Metals | *23) Usher |
| 4) 4 th Orbital 4 th Period | 9) Alloys | 14) Letter B | 19) Fluorine | *24) Carbonite |
| 5) A= Family Group B=Period | 10) Semimetals or Metalloids | 15) Hydrogen | 20) Uranium | *25) Jack and the Giant Slayer |

Final Question Wager ____/5 Answer: The first ten elements in the Modern Periodic Table are hydrogen, helium, lithium, beryllium, boron, carbon, nitrogen, oxygen, fluorine and neon