

Color Coding the Periodic Table

Student Information Sheet

The Periodic Table is a list of all the known elements. It is organized by increasing _____ and _____. There are two main groups on the periodic table: _____ and _____. The left side of the table contains elements with the greatest _____ properties. As you move from the left to the right, the elements become less metallic with the far right side of the table consisting of _____. The elements in the middle of the table are called "_____ " elements because they are changed from metallic properties to nonmetallic properties. A small group whose members touch the zigzag line are called _____ because they have both metallic and nonmetallic properties.

The table is also arranged in vertical columns called " _____ " or " _____ " and horizontal rows called " _____ ." Each arrangement is significant. The elements in each vertical column or group have similar properties. Group 1 elements all have _____ electron in their outer shell. This gives them similar properties. Group 2 elements all have _____ electrons in their outer shells. This also gives them similar properties. Not all of the groups, however, hold true for this pattern. The elements in the first period or row all have _____ shell. The elements in period 2 all have _____ shells. The elements in period 3 have _____ shells and so on.

There are a number of major groups with similar properties. They are as follows:

Hydrogen: This element does not match the properties of any other group so it stands alone. It is placed above group 1 or group 17 but it is not part of either group. Sometimes it is placed by itself at the top of the periodic table. It is a very reactive, colorless, odorless gas at room temperature. (1 outer level electron)

Group 1: _____ Metals – These metals are extremely _____ and are never found in nature in their pure form. They are _____ colored and _____. Their density is extremely low so that they are soft enough to be cut with a knife. (_____ outer level electron)

Group 2: _____ Metals – Slightly less _____ than alkali metals. They are silver colored and more dense than alkali metals. (_____ outer level electrons)

1

Groups 3 – 12: _____ **Metals** – These metals have a _____ range of reactivity and a wide range of properties. In general, they are shiny and good conductors of heat and electricity. They also have higher densities and melting points than groups 1 & 2. Most are _____ or have more than one charge. (1 or 2 outer level electrons)

_____ and _____: (_____ metals) These are also transition metals that were taken out and placed at the bottom of the table so the table wouldn't be so wide. The elements in each of these two periods share many properties. The lanthanides are shiny and reactive. The actinides are *all* _____ and are therefore unstable. Elements 95 through 103 do not exist in nature but have been _____ in the lab.

Group 13: _____ **Group** – Contains one _____ and _____ metals. Reactive. Aluminum is in this group. It is also the most abundant metal in the earth's crust. (_____ outer level electrons)

Group 14: _____ **Group** – Contains _____ nonmetal, _____ metalloids, and _____ metals. Varied reactivity. (_____ outer level electrons)

Group 15: _____ **Group** – Contains _____ nonmetals, _____ metalloids, and _____ metal. Varied reactivity. (_____ outer level electrons)

Group 16: _____ **Group** – (_____) Contains _____ nonmetals, _____ metalloid, and _____ metal. Reactive group. (_____ outer level electrons)

Groups 17: _____ – All _____. Very reactive. Poor conductors of heat and electricity. Tend to form _____ with metals. Ex. NaCl: sodium chloride also known as "table salt". (_____ outer level electrons)

Groups 18: _____ – _____ nonmetals. All are colorless, odorless _____ at room temperature. All found in earth's atmosphere in small amounts. (_____ outer level electrons)

Color Coding the Periodic Table Student Worksheet

This worksheet will help you understand how the periodic table is arranged. Your teacher will give you a copy of the periodic table to color. Using colored pencils, color each group on the table as follows: (Check off each step when complete.)

_____ 1. Using dark black, trace the zigzag line that separates the metals from the nonmetals. Extend the line above and below the periodic table. Draw an ← on the extended line and write metals. Draw an → on the extended line and write non-metals. (metals ←|→ non-metals)

_____ 2. Color the square for Hydrogen **pink**.

_____ 3. Color all the **alkali metals** (Group 1) **orange**. Write the group name and +1 on top of this family.

_____ 4. Color all the **alkaline earth metals** (Group 2) **brown**. Write the group name and +2 on top of this family.

_____ 5. Color all of the **transition metals** (Groups 3-12) **yellow**. Write transition metals over this group and the word Polyvalent.

_____ 6. Color the **rare earth metals** (lanthanides & actinides) **light black**. Write the names of each series next to the series.

_____ 7. Color the metalloids **purple**. (B, Si, Ge, As, Sb, Te, Po & At)

_____ 8. Color the **noble gases** (Group 18) **red**. Write noble gases over this group.

_____ 9. Color the **halogens** (Group 17) **dark green**. Write the group name and -1 on top of this family

_____ 10. Color the remaining non-metals **blue**.

_____ 11. Color the remaining metals **light green** .

_____ 12. Write the name and -2 on top of the **Oxygen-Chalcogen family** (Group 16).

_____ 13. Write the name and -3 on top of the **Nitrogen family** (Group 15).

_____ 14. Write the name and + / - 4 on top of the **Carbon family** (Group 14).

_____ 15. Write the name +3 on top of the **Boron family** (Group 13).

When you are finished, make a key that indicates which color identifies which group.

NAME: _____ MOD: _____

Follow the instructions below to label the major groups and divisions of the periodic table. (2 pts each)

1. The vertical columns on the periodic table are called _____.
2. The horizontal rows on the periodic table are called _____.
3. Most of the elements in the periodic table are classified as _____.
4. The elements that touch the zigzag line are classified as _____.
5. The elements in the far upper right corner are classified as _____.
6. Elements in the first group have one outer shell electron and are extremely reactive. They are called _____.
7. The elements in the first group have a _____ ionic charge.
8. Elements in the second group have 2 outer shell electrons and are also very reactive. They are called _____.
9. Elements in the second group have a _____ ionic charge.
10. Elements in groups 3 through 12 have many useful properties and are called _____.
11. Elements in group 14 have a _____ ionic charge.
12. Elements in group 15 have a _____ ionic charge.
13. Elements in group 17 are known as "salt formers". They are called _____.
14. Elements in group 17 have a _____ ionic charge.
15. Elements in group 18 are very unreactive. They are said to be "inert". We call these the _____.
16. Elements in group 18 have a _____ ionic charge.
17. Elements in group 16 have a _____ ionic charge.
18. The elements at the bottom of the table were pulled out to keep the table from becoming too long. The first period at the bottom called the _____.
19. The second period at the bottom of the table is called the _____.
20. Elements in group 13 have a _____ ionic charge.

Notes: Groups Properties

Notes : Periodic Trends

Chemistry Periodicity #1

CLASSWORK: Circle the correct answer:

1.	Lowest EN	Be	Ca	Sr	Ra
2.	Highest IE	Cs	W	Pb	At
3.	Highest AR	Na	Al	P	Cl
4.	Lowest IR	V	Ga	Se	Br
5.	Highest IE	Be	Mg	Sr	Ba
6.	Highest EN	O	S	Se	Te
7.	Highest AR	Nb	Al	Cl	Fr
8.	Lowest IE	O	Al	Mn	Cs
9.	Highest AR	K	V	Ga	Br
10.	Lowest IE	Li	K	Cs	Fr
11.	Highest EN	Cl	K	Te	Cs
12.	Highest AR	Rb	Ag	Sn	Xe
13.	Highest IR	Be	Mg	Sr	Ba
14.	Highest AR	Ne	Si	Fe	Rb
15.	Lowest EN	O	Ge	Mo	Ba
16.	Highest IR	F	Cl	I	At
17.	Lowest IR	N	As	Sb	Bi
18.	Lowest IE	N	P	Sb	Bi

Chemistry #2 Periodicity

CLASSWORK: Circle the correct answer:

1.	Highest IR	Be	Ca	Sr	Ra
2.	Lowest AR	Cs	W	Pb	At
3.	Highest EN	Na	Al	P	Cl
4.	Lowest IE	V	Ga	Se	Br
5.	Highest AR	Be	Mg	Sr	Ba
6.	Highest IR	O	S	Se	Te
7.	Highest IE	Nb	Al	Cl	Fr
8.	Lowest IE	O	Al	Mn	Cs
9.	Highest IR	K	V	Ga	Br
10.	Lowest AR	Li	K	Cs	Fr
11.	Highest EN	Cl	K	Te	Cs
12.	Highest IE	Rb	Ag	Sn	Xe
13.	Highest EN	Be	Mg	Sr	Ba
14.	Highest AR	Ne	Si	Fe	Rb
15.	Lowest IR	O	Ge	Mo	Ba
16.	Highest IE	F	Cl	I	At
17.	Lowest AR	N	As	Sb	Bi
18.	Lowest IE	N	P	Sb	Bi

Name _____

Date _____

Periodic Trends Worksheet

Directions: Use your notes to answer the following questions.

1. Rank the following elements by increasing atomic radius: carbon, aluminum, oxygen, potassium.
2. Rank the following elements by increasing electronegativity: sulfur, oxygen, neon, aluminum.
3. Why does fluorine have a higher ionization energy than iodine?
4. Why do elements in the same family generally have similar properties?
5. Indicate whether the following properties increase or decrease from left to right across the periodic table.
 - a. atomic radius
 - b. first ionization energy
 - c. electronegativity (excluding noble gases)
6. What trend in atomic radius occurs across the periodic table? What causes this trend?
7. What trend in ionization energy occurs across a period on the periodic table? What causes this trend?
8. Circle the atom in each pair that has the largest radius.

a. Al or B	G. Na or Na ⁺
b. Na or Al	H. K ⁺ or Mg ²⁺
c. S or O	I. O or O ²⁻
d. O or F	J. Cl ⁻ or Br ⁻
e. Br or Cl	
f. Mg or Ca	

Name _____

Date _____

9. Circle the atom in each pair that has the greater ionization energy.

- a. Li or Be
- b. Ca or Ba
- c. Na or K
- d. P or Ar
- e. Cl or Si
- f. Li or K

10. Define electronegativity.

11. Circle the atom in each pair that has the greater electronegativity.

- a. Ca or Ga
- b. Br or As
- c. Li or O
- d. Ba or Sr
- e. Cl or S
- f. O or S

Notes: Bohr Model

||

Bohr's Model of the Hydrogen Atom

1. What wavelength of light is emitted when an electron relaxes from $n=4$ to $n=2$?
2. What wavelength of light is emitted when an electron relaxes from $n=5$ to $n=3$?
3. An electron moves from $n=3$ to $n=5$. Is energy emitted or absorbed?
4. An electron moves from $n=2$ to $n=1$. Is energy emitted or absorbed?
5. What electron transformation(s) cause(s) red light to be emitted?
6. What electron transformation(s) cause(s) UV light to be emitted?

LIGHT WORKSHEET, WAVELENGTH, FREQUENCY AND ENERGY

Name _____ Date _____ Period _____

Useful Information You May Need:

Red 700 - 650 nm

Orange 649 - 580 nm

Yellow 579 - 575 nm

Green 574 - 490 nm

Blue 489 - 455 nm

Indigo 454 - 425 nm

Violet 424 - 400 nm

1. Which has the greater λ blue or indigo light?

2. Which has the greater ν red or yellow light?

3. Which has the greater energy, a photon of yellow light or a photon of green light?

_____ 4. Which has the longer wavelength, light with a frequency of 7.32×10^{14} Hz or light with a frequency of 6.0×10^{14} Hz?

_____ 5. Which has higher energy, λ of 674 nm or 480 nm?

_____ 6. Which has a higher frequency, orange light or indigo light?

_____ 7. A certain red light has a wavelength of 725 nm and another red light has a frequency of 4.28×10^{14} /sec. Which would have higher energy per photon?

_____ 8. Which would have the higher frequency, light of wavelength of 521 nm or light with a wavelength of 605 nm?

_____ 9. Which would have the longer wavelength, light with a frequency of 4.5×10^{14} Hz or light with a frequency of 6.19×10^{14} Hz?

_____ 10. Which would have the longer wavelength, a photon with energy of 4.59×10^{-19} J or a photon with energy of 3.01×10^{-19} J?

Notes: Electron Configuration

Electron Configuration Classwork

A. Write the complete electron configuration for the following:

1. Na: _____

2. Sb: _____

3. Sr: _____

4. Zr: _____

5. N: _____

6. Ag: _____

7. Ti: _____

8. Ca: _____

9. Cl: _____

10. Mg: _____

11. sodium _____

12. iron _____

13. bromine _____

14. barium _____

15. Palladium _____

B. Identify the following elements:

16. $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^4$: _____

17. $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^8$: _____

18. $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6 5s^2 4d^{10} 5p^6 6s^2$: _____

Notes: Orbital Notation

C. In the space below, write the Noble Gas (abbreviated) electron configurations of the following elements:

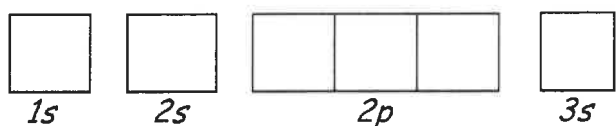
- 1) cobalt _____
- 2) Molybdenum _____
- 3) tellurium _____
- 4) radium _____
- 5) zinc _____

D. Determine what elements are denoted by the following electron configurations:

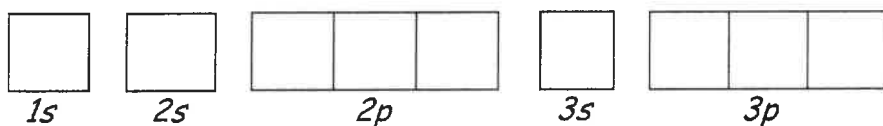
- 6) $1s^2 2s^2 2p^6 3s^2 3p^4$ _____
- 7) $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6 5s^1$ _____
- 8) $[\text{Kr}] 5s^2 4d^{10} 5p^3$ _____
- 9) $[\text{Xe}] 6s^2 4f^{14} 5d^6$ _____
- 10) $[\text{Kr}] 5s^2 4d^5$ _____

E. Write the full electron configuration, short-hand electron configuration, and fill in the orbital diagrams, for the following elements.

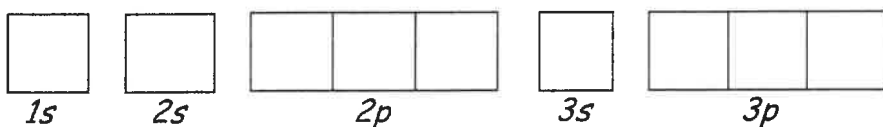
1. Nitrogen _____



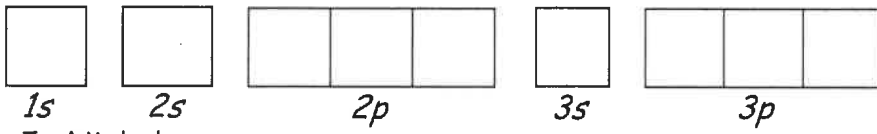
2. Chlorine _____



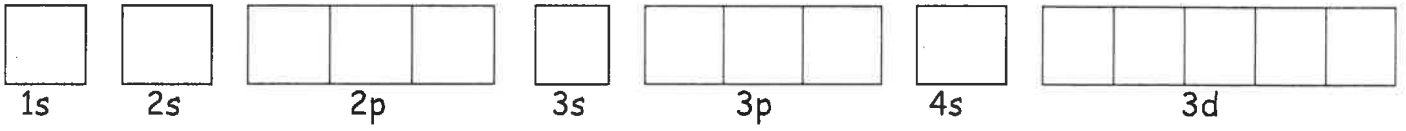
3. Sodium _____



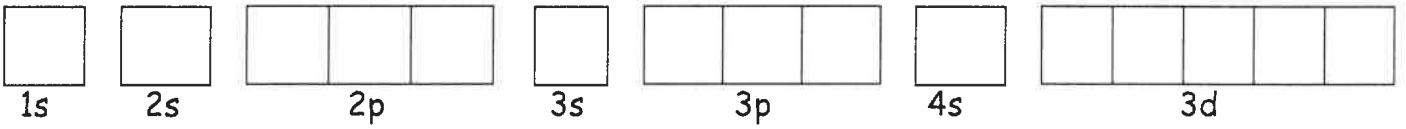
4. Neon _____



5. Nickel _____



6) Vanadium _____



7) Copper _____

8) Oxygen _____

9) Iron _____

Notes: Noble Gas Notation

Electron Configurations, Noble Gas Notation & Orbital Notation

Part 1: Write the electron configuration for the following elements.

1. Fluorine: _____
2. Vanadium: _____
3. Arsenic: _____
4. Lithium: _____
5. Silver: _____
6. Yttrium: _____
7. Antimony: _____
8. Hydrogen: _____

Part 2: Write the noble gas configuration for the following elements.

9. Chlorine: _____
10. Zirconium: _____
11. Oxygen: _____
12. Magnesium: _____
13. Tin: _____
14. Xenon: _____
15. Ruthenium: _____

Notes: Ions

Part 3. Write the orbital notation for the following elements.

1. Calcium

2. Silver

3. Nitrogen

4. Aluminum +3 ion

5. Copper +2 ion

6. Zirconium +2 ion

Write the complete electron configuration for the following ions:

7. O^{2-} : _____

8. Fe^{2+} : _____

9. B^{3+} : _____

10. Ni^{2+} : _____

11. K^+ : _____

12. Co^{3+} : _____