Guide to Mrs. Lewis' Chemistry packet:

- Pg. 1 (front):
  - instructions on ch. 7 vocab (please define all words)
  - Read Ch. 6 and 7
    - Focus on sample problems AND practice problems listed on these pages from your textbook
- Pg. 1 (back)
  - Polyatomic reference page
    - Includes a video link as an added resource
- Pg. 2 (front/back)
  - List of polyatomic ions (formulas and names) and flow chart on naming compounds
- Pg. 3 (front/back)
  - Periodic table (for reference purposes)
- Pg. 4-7 (front/back)
  - "Activity: e- configuration coloring....Who doesn't love to color?!?" with blank periodic table (will need colored pencils to complete)
    - This is a review of electron configuration
    - Follow the procedure (parts 1-4) to color/label/draw charts and then answer associated questions.
- Pg. 8 (front/back):
  - "Chemistry color by element type" (will need crayons/markers/colored pencils to complete)
  - "Naming covalent compounds worksheet" (16 questions)
- Pg. 9-11 (front/back; actually numbered 1-6)
  - "Naming Molecular Compounds"
    - Work through the packet and answer all questions using included reference pages/your textbook/*the packet you already obtained from me* that explains

Ch. 7 Vocab - Define the following
Pg. 234

binary compounds
monatomic ions
nomenclature
oxyanions
Salt
oxidation numbers
oxidation states
formula mass
percentage composition
empiracal formula

Ch. 6 Sample Problems AND Practice Problems
↳ Read, review, and comprehend

Pg. 163 6-1
Pg. 170 6-2
p. 171 6-3
p. 174 6-4

Ch. 7 Sample Problems AND Practice Problems
Read, Review, and comprehend

p. 207 7-1
p. 209 7-2
p. 211 7-3
p. 213 7-4
p. 217 7-5
p. 222 7-6 → If we are
p. 223 7-7 out past
p. 224 7-8 → Spring
p. 225 7-9 → Break
p. 227 7-10 & 11
p. 230 7-12 p. 231 7-13 p. 232 7-1

letter true lowercase (4) Memorize elements #1-42, 46-58, 78-92

POLYATOMIC IONS: MEMORIZE NAME, FORMULA, AND CHARGE!

Per____ate	______ate	______ite	hypo_____ite	Monatomic anions For REFERENCE
ClO_4^- perchlorate	ClO_3^- chlorate	ClO_2^- chlorite	ClO^- hypochlorite	Cl^- chloride
BrO_4^- perbromate	BrO_3^- bromate	BrO_2^- bromite	BrO^- hypobromite	Br^- bromide
IO_4^- periodate	IO_3^- iodate	IO_2^- iodite	IO^- hypoiodite	I^- iodide
xxx	NO_3^- nitrate	NO_2^- nitrite	xxx	N^{3-} nitride
xxx	SO_4^{2-} sulfate	SO_3^{2-} sulfite	xxx	S^{2-} sulfide
xxx	PO_4^{3-} phosphate	PO_3^{3-} phosphite	xxx	P^{3-} phosphide
xxx	CO_3^{2-} carbonate	xxx	xxx	C^{4-} carbide
xxx	CrO_4^{2-} chromate	xxx	xxx	xxx

per___ate: has one more oxygen than "ATE"
___ate: most common form
___ite: one less oxygen than "ATE"
hypo__ite: two less oxygens than "ATE"

Video:
https://youtu.be/69ZbHNNcfz0

OTHERS:

MnO_4^-	permanganate	$Cr_2O_7^{2-}$	dichromate
$C_2H_3O_2^-$	acetate	OH^-	hydroxide
HCO_3^-	hydrogen carbonate (bicarbonate)	CN^-	cyanide
NH_4^+	ammonium	(note positive charge)	

NOTE: The number should be shown before the charge BUT you would not lose credit if you had the charge first! Also, if a charge is either +1 or −1, you may show just the sign (+ or −). The 1 is not required to be shown.

POLYATOMIC IONS (charged building blocks)

Polyatomic ions are mostly made of two non-metals.

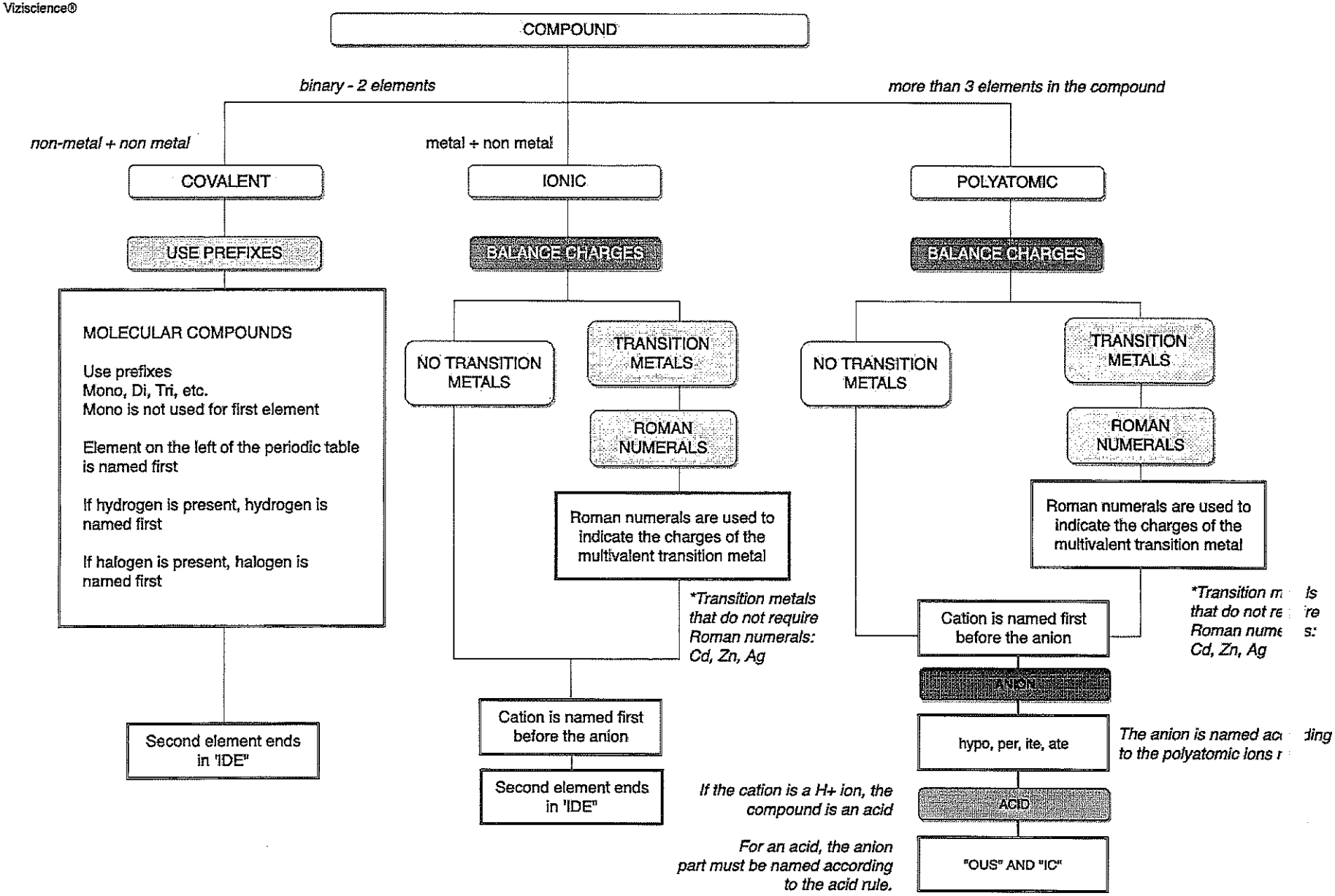
Ions with -1 charge	
perbromate	BrO_4^{-1}
bromate	BrO_3^{-1}
bromite	BrO_2^{-1}
hypobromite	BrO^{-1}
perchlorate	ClO_4^{-1}
chlorate	ClO_3^{-1}
chlorite	ClO_2^{-1}
hypochlorite	ClO^{-1}
periodate	IO_4^{-1}
iodate	IO_3^{-1}
iodite	IO_2^{-1}
hypoiodite	IO^{-1}

nitrate	NO_3^{-1}
nitrite	NO_2^{-1}
hydroxide	OH^{-1}
cyanide	CN^{-1}
acetate	$C_2H_3O_2^{-1}$
Permanganate	MnO_4^{-1}
bicarbonate	HCO_3^{-1}
Ions with a -2 Charge	
carbonate	CO_3^{-2}
sulfate	SO_4^{-2}

sulfite	SO_3^{-2}
chromate	CrO_4^{-2}
dichromate	$Cr_2O_7^{-2}$
oxalate	$C_2O_4^{-2}$
Ions with a -3 Charge	
phosphate	PO_4^{-3}
phosphite	PO_3^{-3}
arsenate	AsO_4^{-3}
Ions with +1 charge	
ammonium ion	NH_4^{+1}

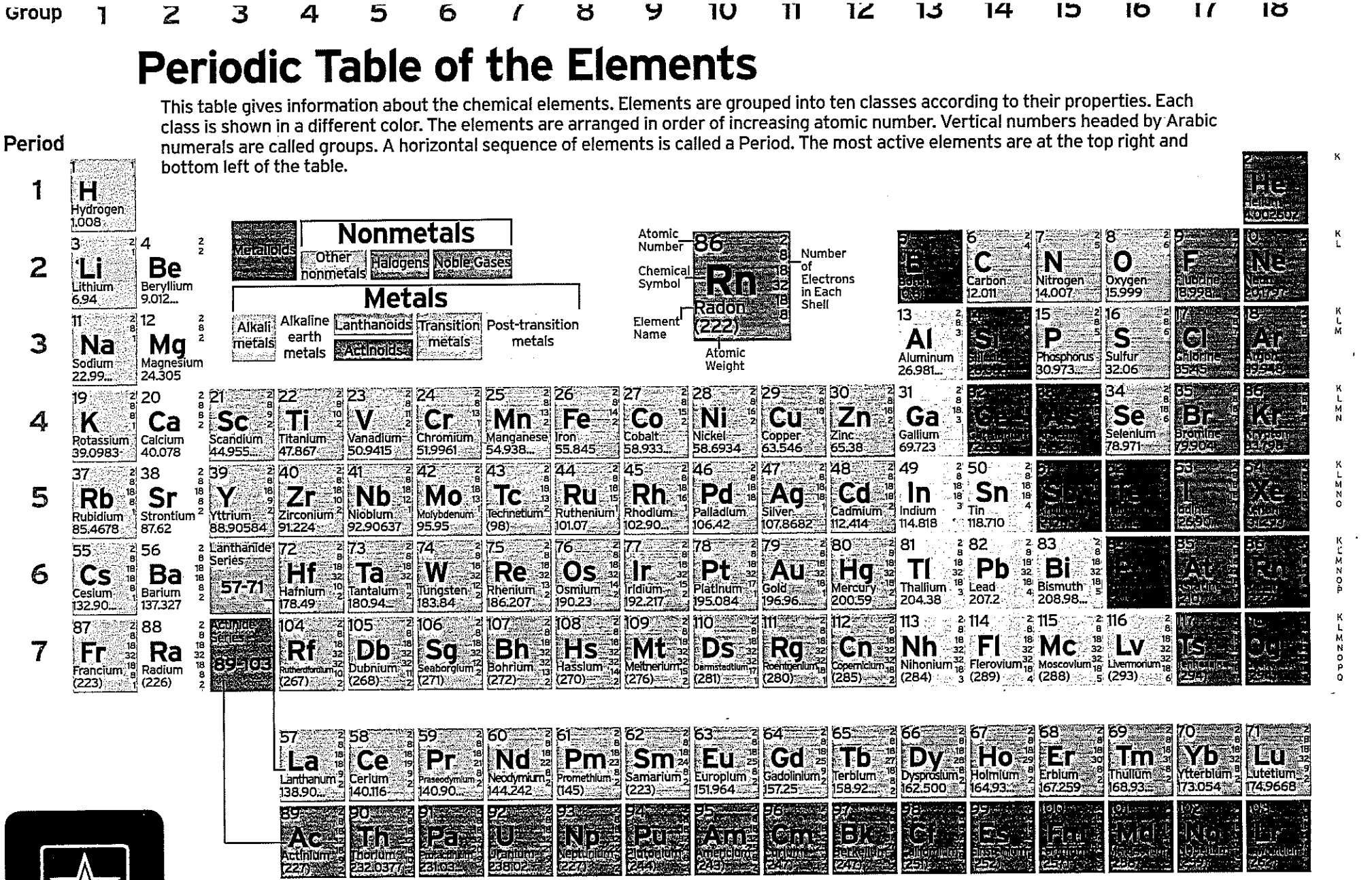
Flow chart for naming compounds

Vizscience®



Periodic Table of the Elements

This table gives information about the chemical elements. Elements are grouped into ten classes according to their properties. Each class is shown in a different color. The elements are arranged in order of increasing atomic number. Vertical numbers headed by Arabic numerals are called groups. A horizontal sequence of elements is called a Period. The most active elements are at the top right and bottom left of the table.



COMMON IONS

Acetate	$C_2H_3O_2^-$
Bicarbonate	HCO_3^-
Bisulfate	HSO_4^-
Carbonate	CO_3^{-2}
Chlorate	ClO_3^-
Chromate	CrO_4^{-2}
Ferricyanide	$Fe(CN)_6^{-3}$
Ferrocyanide	$Fe(CN)_6^{-4}$
Hypochlorite	ClO^-
Nitrate	NO_3^-
Nitrite	NO_2^-
Permanganate	MnO_4^-
Phosphate	PO_4^{-3}
Sulfate	SO_4^{-2}
Sulfite	SO_3^{-2}

SCIENTIFIC NOTATION

Multiplication by a positive power of 10 corresponds to moving the decimal point to the right; multiplication by a negative power of 10 corresponds to moving the decimal point to the left.

1.33×10^4 is 13,300

1.33×10^{-4} is 0.000133

Numbers expressed with powers of 10 cannot be added or subtracted directly unless the powers of 10 are the same.

$1.23 \times 10^4 + 1.23 \times 10^5 =$

$1.23 \times 10^4 + 12.3 \times 10^4 = 13.5 \times 10^4$

$1.23 \times 10^{-4} - 1.23 \times 10^{-5} =$

$1.23 \times 10^{-4} - 0.123 \times 10^{-4} = 1.11 \times 10^{-4}$

When the powers of 10 are multiplied, exponents are added; when divided, exponents are subtracted.

$(1.23 \times 10^4) \times (1.23 \times 10^5) =$

$(1.23 \times 1.23) \times (10^4 \times 10^5) = 1.51 \times 10^9$

$$\frac{1.23 \times 10^{-4}}{1.23 \times 10^{-5}} = \left(\frac{1.23}{1.23}\right) \times \left(\frac{10^{-4}}{10^{-5}}\right) = 1.00 \times 10^{1}$$

SOME ACID-BASE INDICATORS

	Color Change	
Indicator	**Acid**	**Basic**
Alizarin Yellow	Yellow	Red
Bromocresol Green	Yellow	Blue
Litmus	Red	Blue
Methyl Orange	Red	Yellow
Methyl Red	Red	Yellow
Phenolphthalein	Colorless	Pink
Thymol Blue	Red	Yellow

PRESSURES AND DENSITIES

$$\textbf{Pressure} = \frac{\text{Force}}{\text{Area}}$$

1 column of water 1 foot deep = 62.4 pounds per square foot, or 0.433 pounds per square inch. 1 column of water 1 centimeter deep = 1 gram per square centimeter.

$$\textbf{Density} = \frac{\text{Mass}}{\text{Volume}}$$

area. An increase in pressure is transmitted equally through the liquid.

Specific Gravity = number of times a substance is as heavy as an equal body of water, or Specific gravity (liquid) =

$$\frac{\text{Weight of Liquid}}{\text{weight of equal volume of water}}$$

Specific Gravity (Solid) =

$$\frac{\text{Weight of Body}}{\text{loss of weight in water}}$$

OR Specific Gravity (Solid)

$$\frac{\text{Weight of Body}}{\text{weight of equal volume of water}}$$

One cubic yard of air weighs about 2 pounds. Atmospheric pressure at sea level = about 15 pounds per square inch.

DEFINITIONS: CONCENTRATION OF SOLUTIONS

1) Mole Fraction: The number of moles of solute per total moles of solution.

2) Molarity: The number of moles of solute per liter of solution.

3) Molality: The number of moles of solute per 1,000 g. of solvent.

4) Formality: The number of formula weights of solute per liter of solution.

5) Normality: The number of equivalents of solute per liter of solution.

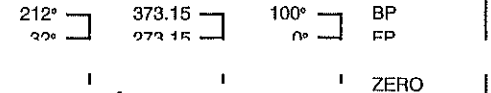
UNITS OF MEASUREMENT

Kilo - means one thousand (10^3)
Centi - means one-hundredth (10^{-2})
Milli - means one-thousandth (10^{-3})
Micro - means one-millionth (10^{-6})
1 Kilometer (km) =1,000 meters = 0.621 mile
Meter (m) = 100 centimeters = 39.4 inches
1 Centimeter (cm) = 10 millimeters (mm) = 0.394 inches
1 Kilogram (kg) = 1,000 grams = 2.20 pounds
1 Gram (g) = 1,000 milligrams (mg) = 0.0353 ounce.
1 Liter (l) = 1,000 milliliters = 1.06 quarts
1 Milliliter (ml) = 1 cubic centimeter (cc)
1 Atomic Mass Unit = 1.66×10^{-24}g
Avogadro's Number = 6.022×10^{23}

TEMPERATURE MEASUREMENTS

In scientific work, the Celsius or Centigrade (°C) and Kelvin (K) scales are most commonly used. The Kelvin scale is an absolute temperature scale, in which zero degrees ideally represents the lowest attainable temperature.

Comparison of Various Temperature Scales



(°F) Fahrenheit (K) Kelvin (°C) Celsius

Zero degrees Kelvin is the lowest possible temp.

In Kelvin absolute temperature scale:
water boils at 373K, freezes at 273K.

Fahrenheit - Celsius: Conversions

$C = 5/9(F-32)$

$F = 9/5C+32$

BASIC LAWS AND DEFINITIONS

Boyle's Law:

$P_1 \times V_1 = P_2 \times V_2$ at constant temperature.

Charles Law: $\frac{V_1}{V_2} = \frac{T_1}{T_2}$ at constant pressure.

Ideal Gas Law:

$$PV = nRT$$

The number of moles of a gas is directly related to the pressure, volume and temperature of the gas.

Mechanical Equivalent of Heat is the work required to produce a unit quantity of heat. 0.427 kilogram-meter (kg-m) = 1 calorie

$$\frac{\text{Work}}{\text{mechanical equivalent of heat}} = \text{heat}$$

One Btu is the heat required to raise the temperature of 1 pound of water through 1 degree Fahrenheit.

One calorie is the heat required to raise the temperature of 1 gram of water through 1 degree Celsius.

Specific Heat: heat required to raise the temperature of a unit mass of that substance through 1 degree. If q is total heat and m is mass,

$q = m \times s (t_2 - t_1)$.

Heat of melting, or heat of fusion, L, is the quantity of heat needed to melt one unit weight of a substance without changing its temperature, or $q = m \times L$

80 calories of heat is required to melt 1 gram of ice without raising its temperature.

Boiling Point of Liquid: that temperature at which the vapor pressure is equal to the pressure above the liquid.

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Chemistry
Lewis

Name: _____ Period: _____ Date: _____

ACTIVITY: e⁻ Configuration Coloring ... Who Doesn't Love to Color?!?

PURPOSE:
To find the relationship between electron configuration and organization of the periodic table.

MATERIALS:
- Copy of the periodic table
- Colored pencils
- List of electron configurations for elements 1-54

PROCEDURE:

Part 1:

1. For each electron configuration, circle (or highlight) the energy level with the highest number. This represents the OUTERMOST ENERGY LEVEL (OR VALENCE ELECTRONS) and may involve either one or two sub orbitals (s & p).

2. Write the number of valence electrons in the empty column.

Part 2:

1. On a new sheet of paper, make eight columns. Label them 1-8 for the valence electrons.

2. For each element, where the configuration ends in s or p only, place the atomic number and symbol under the appropriate column depending on what you circled in Step 1.

3. For each element that you have placed in columns 1 & 2; color their boxes on the PERIODIC TABLE red.

4. For each element that you placed in columns 3-8; color their boxes on the PERIODIC TABLE blue.

Lewis

Name: _____ Period: _____ Date: _____

Part 3:

1. In a separate table make two horizontal rows, label them 3d and 4d.
2. In the 3d row, place all elements that have only 3d electrons BUT NO 4p ELECTRONS.
3. In the 4d row, place all elements that have only 4d electrons BUT NO 5p ELECTRONS.
4. For each element that you have placed in 3d and 4d, color their boxes on the PERIODIC TABLE purple.

Part 4:

1. For each of the sections that you have already colored (Groups1 & 2, Groups 3-12, Groups 13-18on the periodic table) extend the shading to the bottom of each column. Ex: Color elements 55, 56, 87, & 88 the same color as the ones above them.
2. There should only be one section of the periodic table that is uncolored, at this point, at the very bottom of the table. Please, color these two rows of boxes on the PERIODIC TABLE green.

QUESTIONS:

1. How many horizontal rows are there on the periodic table? How many energy levels are there in the electron cloud?
2. How many columns did you make on your first chart? How many "A" columns are there on the periodic table?
3. How many columns are there in the "red" section on the periodic table? What is the significance of this number?
4. How many columns are there in the "blue" section on the periodic table? What is the significance of this number?
5. Add the answers from questions 3-4 together. What is the significance of this number?

Name: _____ Period: _____ Date: _____

6. How many elements are in any horizontal row that you created on your second chart? How many elements are there in any "purple" section on the periodic table?

7. Which column from your first chart would you place Cesium in?

8. Write the electron configuration for Cesium (Cs).

9. Look at the "green" section at the bottom of the table –the Lanthanide and Actinide Series. How many elements are there in the row that contains Lanthanum? What is the significance of this number?

10. Using your responses to the questions above, offer an explanation for the organization of the periodic table.

Challenge!

11. Write the electron configuration for Lanthanum (La).

12. Write the electron configuration for Cerium (Ce).

13. Write the electron configuration for Praseodymium (Pr).

14. Write the electron configuration for Lutetium (Lu).

15. Write the electron configuration for Lead (Pb).

16. Predict the electron configuration for element #118.

Lewis

Name: _____ Period: _____ Date: _____

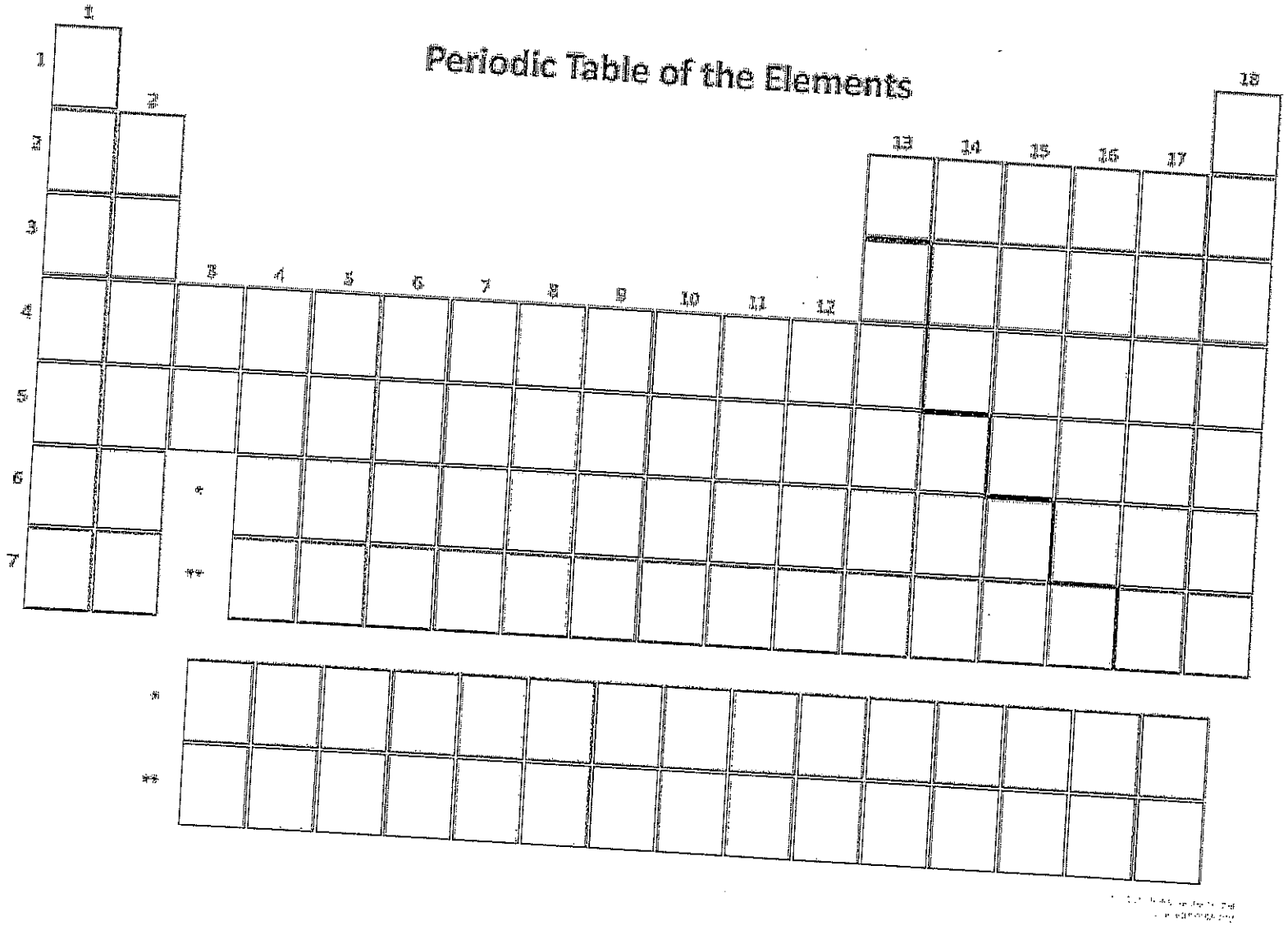
Element	Electrons	Electronic Configuration
Hydrogen (H)	1	$1s^1$
Helium (He)	2	$1s^2$
Lithium (Li)	3	$1s^2\ 2s^1$
Beryllium (Be)	4	$1s^2\ 2s^2$
Boron (B)	5	$1s^2\ 2s^2\ 2p^1$
Carbon (C)	6	$1s^2\ 2s^2\ 2p^2$
Nitrogen (N)	7	$1s^2\ 2s^2\ 2p^3$
Oxygen (O)	8	$1s^2\ 2s^2\ 2p^4$
Fluorine (F)	9	$1s^2\ 2s^2\ 2p^5$
Neon (Ne)	10	$1s^2\ 2s^2\ 2p^6$
Sodium (Na)	11	$1s^2\ 2s^2\ 2p^6\ 3s^1$
Magnesium (Mg)	12	$1s^2\ 2s^2\ 2p^6\ 3s^2$
Aluminum (Al)	13	$1s^2\ 2s^2\ 2p^6\ 3s^23p^1$
Silicon (Si)	14	$1s^2\ 2s^2\ 2p^6\ 3s^23p^2$
Phosphorous (P)	15	$1s^2\ 2s^2\ 2p^6\ 3s^23p^3$
Sulfur (S)	16	$1s^2\ 2s^2\ 2p^6\ 3s^23p^4$
Chlorine (Cl)	17	$1s^2\ 2s^2\ 2p^6\ 3s^23p^5$
Argon (Ar)	18	$1s^2\ 2s^2\ 2p^6\ 3s^23p^6$
Potassium (K)	19	$1s^2\ 2s^2\ 2p^6\ 3s^23p^6\ 4s^1$
Calcium (Ca)	20	$1s^2\ 2s^2\ 2p^6\ 3s^23p^6\ 4s^2$
Scandium (Sc)	21	$1s^2\ 2s^2\ 2p^6\ 3s^23p^6\ 4s^2\ 3d^1$
Titanium (Ti)	22	$1s^2\ 2s^2\ 2p^6\ 3s^23p^6\ 4s^2\ 3d^2$
Vanadium (V)	23	$1s^2\ 2s^2\ 2p^6\ 3s^23p^6\ 4s^2\ 3d^3$
Chromium (Cr)	24	$1s^2\ 2s^2\ 2p^6\ 3s^23p^6\ 4s^1\ 3d^5$
Manganese (Mn)	25	$1s^2\ 2s^2\ 2p^6\ 3s^23p^6\ 4s^2\ 3d^5$
Iron (Fe)	26	$1s^2\ 2s^2\ 2p^6\ 3s^23p^6\ 4s^2\ 3d^6$
Cobalt (Co)	27	$1s^2\ 2s^2\ 2p^6\ 3s^23p^6\ 4s^2\ 3d^7$
Nickel (Ni)	28	$1s^2\ 2s^2\ 2p^6\ 3s^23p^6\ 4s^2\ 3d^8$

Chemistry
Lewis

Name: _____ Period: _____ Date: _____

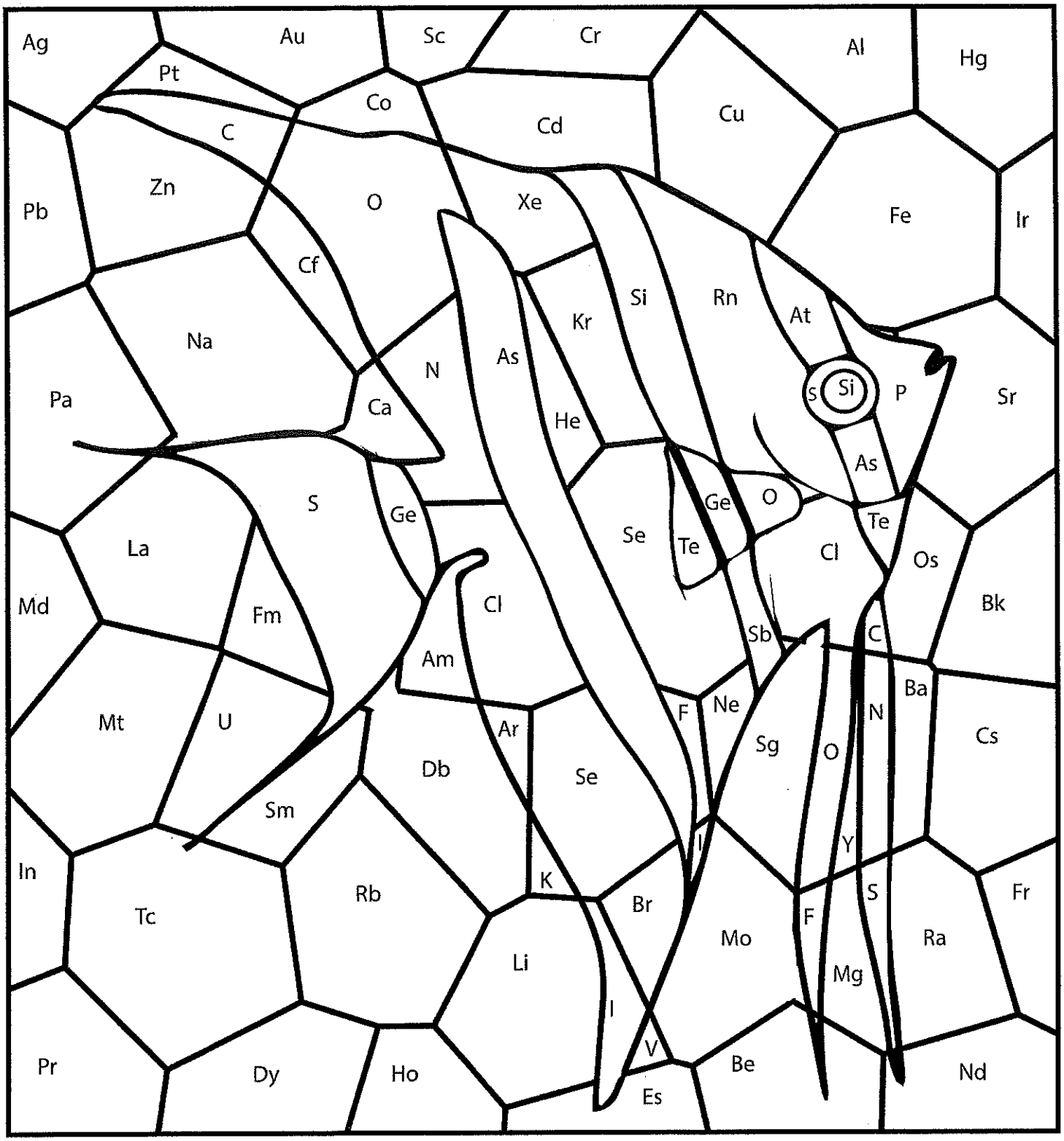
Copper (Cu)	29	$1s^2\ 2s^2\ 2p^6\ 3s^2 3p^6\ 4s^1\ 3d^{10}$
Zinc (Zn)	30	$1s^2\ 2s^2\ 2p^6\ 3s^2 3p^6\ 4s^2\ 3d^{10}$
Gallium (Ga)	31	$1s^2\ 2s^2\ 2p^6\ 3s^2 3p^6\ 4s^2\ 3d^{10}\ 4p^1$
Germanium (Ge)	32	$1s^2\ 2s^2\ 2p^6\ 3s^2 3p^6\ 4s^2\ 3d^{10}\ 4p^2$
Arsenic (As)	33	$1s^2\ 2s^2\ 2p^6\ 3s^2 3p^6\ 4s^2\ 3d^{10}\ 4p^3$
Selenium (Se)	34	$1s^2\ 2s^2\ 2p^6\ 3s^2 3p^6\ 4s^2\ 3d^{10}\ 4p^4$
Bromine (Br)	35	$1s^2\ 2s^2\ 2p^6\ 3s^2 3p^6\ 4s^2\ 3d^{10}\ 4p^5$
Krypton (Kr)	36	$1s^2\ 2s^2\ 2p^6\ 3s^2 3p^6\ 4s^2\ 3d^{10}\ 4p^6$
Rubidium (Rb)	37	$1s^2\ 2s^2\ 2p^6\ 3s^2 3p^6\ 4s^2\ 3d^{10}\ 4p^6 5s^1$
Strontium (Sr)	38	$1s^2\ 2s^2\ 2p^6\ 3s^2 3p^6\ 4s^2\ 3d^{10}\ 4p^6 5s^2$
Yttrium (Y)	39	$1s^2\ 2s^2\ 2p^6\ 3s^2 3p^6\ 4s^2\ 3d^{10}\ 4p^6 5s^2\ 4d^1$
Zirconium (Zr)	40	$1s^2\ 2s^2\ 2p^6\ 3s^2 3p^6\ 4s^2\ 3d^{10}\ 4p^6 5s^2\ 4d^2$
Niobium (Nb)	41	$1s^2\ 2s^2\ 2p^6\ 3s^2 3p^6\ 4s^2\ 3d^{10}\ 4p^6 5s^1\ 4d^4$
Molybdenum (Mb)	42	$1s^2\ 2s^2\ 2p^6\ 3s^2 3p^6\ 4s^2\ 3d^{10}\ 4p^6 5s^1\ 4d^5$
Technetium (Tc)	43	$1s^2\ 2s^2\ 2p^6\ 3s^2 3p^6\ 4s^2\ 3d^{10}\ 4p^6 5s^2\ 4d^5$
Ruthenium (Ru)	44	$1s^2\ 2s^2\ 2p^6\ 3s^2 3p^6\ 4s^2\ 3d^{10}\ 4p^6 5s^1\ 4d^7$
Rhodium (Rh)	45	$1s^2\ 2s^2\ 2p^6\ 3s^2 3p^6\ 4s^2\ 3d^{10}\ 4p^6 5s^1\ 4d^8$
Palladium (Pd)	46	$1s^2\ 2s^2\ 2p^6\ 3s^2 3p^6\ 4s^2\ 3d^{10}\ 4p^6 4d^{10}$
Silver (Ag)	47	$1s^2\ 2s^2\ 2p^6\ 3s^2 3p^6\ 4s^2\ 3d^{10}\ 4p^6 5s^1\ 4d^{10}$
Cadmium (Cd)	48	$1s^2\ 2s^2\ 2p^6\ 3s^2 3p^6\ 4s^2\ 3d^{10}\ 4p^6 5s^2\ 4d^{10}$
Indium (In)	49	$1s^2\ 2s^2\ 2p^6\ 3s^2 3p^6\ 4s^2\ 3d^{10}\ 4p^6 5s^2\ 4d^{10}\ 5p^1$
Tin (Sn)	50	$1s^2\ 2s^2\ 2p^6\ 3s^2 3p^6\ 4s^2\ 3d^{10}\ 4p^6 5s^2\ 4d^{10} 5p^2$
Antimony (Sb)	51	$1s^2\ 2s^2\ 2p^6\ 3s^2 3p^6\ 4s^2\ 3d^{10}\ 4p^6 5s^2\ 4d^{10} 5p^3$
Tellurium (Te)	52	$1s^2\ 2s^2\ 2p^6\ 3s^2 3p^6\ 4s^2\ 3d^{10}\ 4p^6 5s^2\ 4d^{10} 5p^4$
Iodine (I)	53	$1s^2\ 2s^2\ 2p^6\ 3s^2 3p^6\ 4s^2\ 3d^{10}\ 4p^6 5s^2\ 4d^{10} 5p^5$
Xenon (Xe)	54	$1s^2\ 2s^2\ 2p^6\ 3s^2 3p^6\ 4s^2\ 3d^{10}\ 4p^6 5s^2\ 4d^{10} 5p^6$

Periodic Table of the Elements



Name: Class: Date:

Chemistry Color-by-Element Type



In the puzzle above, color using the key below. You can choose which color to use!

metal = blue, nonmetal = white/light gray metalloid = black

Fun Fact: Almost all vertebrates, including fish, have hemoglobin, a molecule in their blood that binds to iron and carries oxygen. But there is one fish called the crocodile icefish that does not have any hemoglobin!

Naming Covalent Compounds Worksheet

Write the formulas for the following covalent compounds:

1) antimony tribromide _____

2) hexaboron silicide _____

3) chlorine dioxide _____

4) hydrogen iodide _____

5) iodine pentafluoride _____

6) dinitrogen trioxide _____

7) ammonia _____

8) phosphorus triiodide _____

Write the names for the following covalent compounds:

9) P_4S_5 _____

10) O_2 _____

11) SeF_6 _____

12) Si_2Br_6 _____

13) SCl_4 _____

14) CH_4 _____

15) B_2Si _____

16) NF_3 _____

Naming Molecular Compounds

How are the chemical formula and name of a molecular compound related?

Why?

When you began chemistry class this year, you probably already knew that the chemical formula for carbon dioxide was CO_2. Today you will find out why CO_2 is named that way. Naming chemical compounds correctly is of paramount importance. The slight difference between the names carbon monoxide (CO, a poisonous, deadly gas) and carbon dioxide (CO_2, a greenhouse gas that we exhale when we breathe out) can be the difference between life and death! In this activity you will learn the naming system for molecular compounds.

Model 1 – Molecular Compounds

Molecular Formula	Number of Atoms of First Element	Number of Atoms of Second Element	Name of Compound
ClF			Chlorine monofluoride
ClF_5	1	5	Chlorine pentafluoride
CO			Carbon monoxide
CO_2			Carbon dioxide
Cl_2O			Dichlorine monoxide
PCl_5			Phosphorus pentachlroride
N_2O_5			Dinitrogen pentoxide

1. Fill in the table to indicate the number of atoms of each type in the molecular formula.
2. Examine the molecular formulas given in Model 1 for various molecular compounds.
   a. How many different *elements* are present in each compound shown?

   b. Do the compounds combine metals with metals, metals with nonmetals, or nonmetals with nonmetals?

   c. Based on your answer to *b*, what type of bonding must be involved in molecular compounds?

3. Find all of the compounds in Model 1 that have chlorine and fluorine in them. Explain why the name "chlorine fluoride" is not sufficient to identify a specific compound.

4. Assuming that the name of the compound gives a clue to its molecular formula, predict how many atoms each of these prefixes indicates, and provide two examples.

   mono-

   di-

   penta-

Model 2 – Prefixes and Suffixes

Prefix	Numerical Value
mono-	
di-	
tri-	
tetra-	
penta-	
hexa-	
hepta-	
octa-	
nona-	
deca-	

Molecular Formula	Name of Compound
BCl_3	Boron trichloride
SF_6	Sulfur hexafluoride
IF_7	Iodine heptafluoride
NI_3	Nitrogen triiodide
N_2O_4	Dinitrogen tetroxide
Cl_2O	Dichlorine monoxide
P_4O_{10}	Tetraphosphorus decoxide
B_5H_9	Pentaboron nonahydride
Br_3O_8	Tribromine octoxide
ClF	Chlorine monofluoride

5. Examine the prefixes in Model 2. Fill in the numerical value that corresponds to each prefix.
6. What suffix (ending) do all the compound names in Model 2 have in common?

7. Carefully examine the names of the compounds in Model 2. When is a prefix NOT used in front of the name of an element?

8. Consider the compound NO.
   a. Which element, nitrogen or oxygen, would require a prefix in the molecule name? Explain your answer.

   b. Name the molecule NO.

9. Find two compounds in Model 2 that contain a subscript of "4" in their molecular formula.
   a. List the formulas and names for the two compounds.

   b. What is different about the spelling of the prefix meaning "four" in these two names?

10. Find two compounds in Model 2 that contain the prefix "mono-" in their names.

    a. List the formulas and names for the two compounds.

    b. What is different about the spelling of the prefix meaning "one" in these two names?

11. Identify any remaining names of compounds in Model 2 where the prefixes that do not exactly match the spelling shown in the prefix table.

12. Use your answers to Questions 9–11 to write a guideline for how and when to modify a prefix name for a molecular compound. Come to a consensus within your group.

13. Would the guideline you wrote for Question 12 give you the correct name for NI_3 as it is given in Model 2? If not, modify your guideline to include this example.

14. All of the compounds listed in Model 2 are binary molecular compounds. Compounds such as CH_3OH or PF_2Cl_3 are not binary, and compounds such as NaCl or $CaCl_2$ are not molecular. Propose a definition for "binary molecular compounds."

15. Collaborate with your group members to write a list of rules for recognizing and naming binary molecular compounds from their chemical formulas.

16. For each of the following compounds, indicate whether or not your naming rules from Question 15 will apply. If not, explain why the naming rules do not apply.

FeI_3 ICl_5 $HBrO_4$

17. Using the rules your group developed in Question 15, name each of the following molecular compounds.

Molecular Formula	**Molecule Name**
PBr_3	
SCl_4	
N_2F_2	
SO_3	
BrF	

18. Write molecular formulas for the following compounds.

Molecular Formula	**Molecule Name**
	Disulfur decafluoride
	Carbon tetrachloride
	Oxygen difluoride
	Dinitrogen trioxide
	Tetraphosphorus heptasulfide

Extension Questions

19. This activity focused on molecular (covalent) compounds, while an earlier activity addressed ionic compounds. Notice that the formulas for both types of compounds can look very similar, even though their names are quite different:

Chemical Formula	Type of Compound/Bonding	Compound Name
MgF_2	Ionic	Magnesium fluoride
CuF_2	Ionic	Copper(II) fluoride
SF_2	Molecular (covalent)	Sulfur difluoride
NaBr	Ionic	Sodium bromide
AuBr	Ionic	Gold(I) bromide
IBr	Molecular (covalent)	Iodine monobromide

Identify two differences between the names or formulas for ionic compounds versus those for binary molecular compounds. Also identify two similarities.

	Names and Formulas of Ionic Compounds	Names and Formula of Molecular (Covalent) Compounds
Differences		
Similarities		

20. Use complete sentences to explain why $AlCl_3$ is called "aluminum chloride" (no prefix required), but BCl_3 is called "boron trichloride."

21. In the table below, first identify the type of bonding present in each compounds. Then fill in the missing name or formula for each compound using the appropriate set of rules.

Chemical Formula	**Type of Compound/Bonding**	**Compound Name**
CS_2		
PbI_2		
$BaCl_2$		
Se_2S_6		
		Xenon tetrafluoride
		Sodium phosphide
		Dinitrogen pentoxide
		Cobalt(III) bromide

Name: Class: Date:

Determine the number of valence electrons of each atom by looking at your periodic table.

Valence Electron Determination

Cl	O	F	P	Al
Valence number? 1. 7	Valence number? 2.	Valence number? 3.	Valence number? 4.	Valence number? 5.

Be	B	Na	H	Mg
Valence number? 6.	Valence number? 7.	Valence number? 8.	Valence number? 9.	Valence number? 10.

K	He	Ar	C	S
Valence number? 11.	Valence number? 12.	Valence number? 13.	Valence number? 14.	Valence number? 15.

Si	Li	N	Ne	Ca
Valence number? 16.	Valence number? 17.	Valence number? 18.	Valence number? 19.	Valence number? 20.

21. When an atom reacts, its "goal" is to become more stable by filling its outer electron shell. What are three ways that an atom can fulfill this goal?

_____

_____

_____

22. If an atom, like a metal atom, has fewer valence electrons, what method(s) is it likely to use to reach its goal?

_____

23. If an atom, like a nonmetal atom, has more valence electrons, what method(s) is it likely to use to reach its goal?

_____

Name: Class: Date:

For each of the atoms below, draw the Lewis dot diagram. Then draw the diagrams for the ions below as well.

Electron Dot Diagrams: Atoms and Ions

1. Cl	2. O	3. F	4. P	5. Al	6. Be
7. B	8. Na	9. H	10. Mg	11. K	12. He
13. Ar	14. Ca	15. S	16. Si	17. Li	18. N

19. Ne

Carbon's electron dot diagram is shown below.

20. Why are two of the electrons written in a pair?

_____

_____

For each ion below, draw in the proper electron dot diagrams.

21. chloride ion, Cl^-	22. sodium ion, Na^+	23. hydride ion, H^-	24. hydrogen ion, H^+
25. aluminum ion, Al^{+3}	26. nitride ion, N^{-3}	27. oxide ion, O^{-2}	28. calcium ion, Ca^{+2}

Name: Class: Date:

For each element, rewrite it with its oxidation state and predict the binary compound that can form between the two elements.

Binary Ionic Compound Predictions

Na O	Na Cl	Ca O	Ca Cl
1a. Oxidation states	2a. Oxidation states	3a. Oxidation states	4a. Oxidation states
Na^{+} O^{-2}			
b. Predict the binary compound that can form from these two elements:	b. Predict the binary compound that can form from these two elements:	b. Predict the binary compound that can form from these two elements:	b. Predict the binary compound that can form from these two elements:
Na_2O			

Mg F	Mg O	Mg P	H O
5a. Oxidation states	6a. Oxidation states	7a. Oxidation states	8a. Oxidation states
b. Predict the binary compound that can form from these two elements:	b. Predict the binary compound that can form from these two elements:	b. Predict the binary compound that can form from these two elements:	b. Predict the binary compound that can form from these two elements:

Al O	Al P	Al Cl	Li S
9a. Oxidation states	10a. Oxidation states	11a. Oxidation states	12a. Oxidation states
b. Predict the binary compound that can form from these two elements:	b. Predict the binary compound that can form from these two elements:	b. Predict the binary compound that can form from these two elements:	b. Predict the binary compound that can form from these two elements:

Fe O	Fe O	Cu O	Cu O
13a. Oxidation states	14a. Oxidation states	15a. Oxidation states	16a. Oxidation states
Fe^{+2}	Fe^{+3}	Cu^{+}	Cu^{+2}
b. Predict the binary compound that can form from these two elements:	b. Predict the binary compound that can form from these two elements:	b. Predict the binary compound that can form from these two elements:	b. Predict the binary compound that can form from these two elements:

Name: Class: Date:

For each of the compounds below, draw the correct lewis structure. Use different color pencils to show which electrons came from different atoms.

Electron Dot Diagrams: Binary Ionic Compounds

1. sodium chloride, $NaCl$

2. calcium chloride, $CaCl_2$

3. aluminum chloride, $AlCl_3$

4. magnesium oxide, MgO

5. magnesium bromide, $MgBr_2$

6. magnesium nitride, Mg_3N_2

7. magnesium chloride, $MgCl_2$

8. sodium oxide, Na_2O

9. sodium phosphide, Na_3P

10. aluminum oxide, Al_2O_3

11. sodium nitride, Na_3N

12. beryllium phosphide, Be_3P_2

Name: Class: Date:

For each set of ions below, predict the chemical compound that will form from a combination of them and write its chemical formula in the blank.

More Compound Predictions

Na^+ HCO_3^-	Na^+ CO_3^{-2}	Na^+ PO_4^{-3}
1.	2.	3.
Mg^{+2} CN^-	Mg^{+2} SO_4^{-2}	Mg^{+2} PO_4^{-3}
4.	5.	6.
Fe^{+3} MnO_4^-	Fe^{+3} CrO_4^{-2}	Fe^{+3} PO_4^{-3}
7.	8.	9.
Pb^{+4} $C_2H_3O_2^-$	Pb^{+4} SO_4^{-2}	Pb^{+4} PO_4^{-3}
10.	11.	12.
NH_4^+ SCN^-	NH_4^+ CO_3^{-2}	NH_4^+ PO_4^{-3}
13.	14.	15.
Hg_2^{+2} NO_3^-	Hg_2^{+2} CrO_4^{-2}	Hg_2^{+2} PO_4^{-3}
16.	17.	18.

Name: Class: Date:

For each chemical formula, write the chemical's name in the blank space below. When a cation has more than one possible oxidation state, an asterisk is written in the corner of the box.

Chemical Names from Chemical Formulas (With Polyatomic Ions)

1. $NaNO_2$	2. NH_4NO_3	3. $HClO_3$	4. $AgClO_4$	5. $KClO_2$
6. $CuClO$ *	7. Rb_3PO_4	8. $LiHCO_3$	9. Li_2CO_3	10. NH_4MnO_4
11. $FeSO_4$ *	12. $Be(NO_3)_2$	13. $Ca_3(PO_3)_2$	14. $Mg(ClO_4)_2$	15. $PbSO_3$ *
16. $Zn(OH)_2$	17. $CrSO_4$ *	18. $Ba(NO_2)_2$	19. $Sn(SCN)_2$ *	20. $CdCrO_4$
21. $Cr_2(CO_3)_3$ *	22. $Al(NO_3)_3$	23. $Fe_2(SO_4)_3$ *	24. $BiPO_4$	25. $Co(OH)_3$ *
26. $Ni(NO_3)_2$ *	27. $Ni(NO_3)_3$ *	28. $Hg_2(NO_3)_2$ *	29. $Hg(NO_3)_2$ *	30. $K_2Cr_2O_7$

Name:

For each chemical name, write the chemical formula

Chemical Formulas from Chemical Names (With Polyatomic Ions)

1. lithium hydroxide	2. beryllium phosphate	3. potassium chlorate	4. magnesium sulfite	5. magnesium sulfate
6. sodium carbonate	7. sodium bicarbonate	8. magnesium permanganate	9. sodium nitrite	10. sodium nitrate
11. lead (IV) hydroxide	12. lead (II) hydroxide	13. copper (II) phosphate	14. copper (I) nitrate	15. iron (III) chlorate
16. zinc hypochlorite	17. aluminum chlorite	18. silver chlorate	19. ammonium chlorate	20. ammonium carbonate
21. potassium chromate	22. potassium dichromate	23. mercury (I) nitrite	24. mercury (II) nitrite	25. ammonium phosphate
26. nickel (II) sulfate	27. manganese (II) phosphate	28. tetraphosphorus trisulfide	29. cadmium hydroxide	30. cobalt (II) acetate

Name: Class: Date:

For each of the compounds below, follow the directions for each box.

Electron Dot Diagrams: Polyatomic Ions #1

Step 1: Calculate the number of valence electrons needed in the structure.	Step 2: Draw the molecule, making sure you draw in all of the electrons you calculated in the previous step.	Step 3: Draw the molecule, replacing the shared pair(s) with bond lines, and draw in proper ion formation.
1. ammonium ion, NH_4^+		
2. hydronium ion, H_3O^+		
3. hydroxide ion, OH^-		
4. nitrate ion, NO_3^-		
5. nitrite ion, NO_2^-		
6. cyanide ion, CN^-		

Name: Class: Date:

For each chemical formula, write the chemical's name in the blank space below. When a cation has more than one possible oxidation state, an asterisk is written in the corner of the box.

Chemical Names from Chemical Formulas

1. $NaCl$	2. $SrBr_2$	3. MgO	4. Na_3P	5. Al_2O_3
6. Li_2S	7. Be_3N_2	8. KI	9. Ca_3N_2	10. MgI_2
11. $FeBr_2$ *	12. $FeCl_3$ *	13. Cu_2O *	14. CuO *	15. PbS *
16. H_2O	17. H_2S	18. NO_2	19. CO_2	20. CO
21. CH_4	22. NH_3	23. $SiCl_4$	24. BeH_2	25. PCl_5
26. CS_2	27. NH_4^+	28. CN^-	29. H_3O^+	30. BH_3

Name:

For each chemical name, write the chemical formula

Chemical Formulas from Chemical Names

1. lithium oxide	2. beryllium phosphide	3. potassium chloride	4. calcium phosphide	5. magnesium bromide
6. sodium iodide	7. barium chloride	8. magnesium sulfide	9. sodium nitride	10. aluminum sulfide
11. lead (IV) fluoride	12. lead (II) phosphide	13. copper (II) fluoride	14. copper (I) fluoride	15. iron (III) phosphide
16. sulfur tetrafluoride	17. sulfur hexafluoride	18. nitrogen tribromide	19. xenon tetroxide	20. arsenic trichloride
21. hydrogen chloride	22. tetraphosphorus hexoxide	23. disulfur dichloride	24. chlorine dioxide	25. hydrogen fluoride
26. nitrogen trioxide	27. diphosphorus pentoxide	28. tetraphosphorus trisulfide	29. dinitrogen tetroxide	30. sulfur dioxide

Name: Class: Date:

For each of the compounds below, follow the directions for each box. Draw different atoms and their original electrons with different colored pencils. Draw bond lines in red.

Electron Dot Diagrams: Simple Covalent Molecules

Step 1: Draw each atom in the molecule separately.	Step 2: Draw the molecule, showing all paired and nonpaired electrons	Step 3: Draw the molecule, replacing the shared pair(s) with bond lines.
1. hydrogen gas, H_2		
2. fluorine gas, F_2		
3. hydrochloric acid, HCl		
4. water, H_2O		
5. methane, CH_4		
6. ammonia, NH_3		
7. silicon tetrachloride, $SiCl_4$		

Name: Class: Date:

For each of the compounds below, follow the directions for each box. Draw different atoms and their original electrons with different colored pencils. Draw bond lines in red.

Electron Dot Diagrams: Double/Triple Bonds

Step 1: Draw each atom in the molecule separately.	Step 2: Draw the molecule, showing all paired and nonpaired electrons	Step 3: Draw the molecule, replacing the shared pair(s) with bond lines.
1. oxygen gas, O_2		
2. nitrogen gas, N_2		
3. carbon dioxide, CO_2		
4. hydrogen cyanide, HCN		
5. formaldehyde, H_2CO		
6. carbon disulfide, CS_2		
7. carbon monoxide, CO		

Ch. 7 p. 214 & p. 210 Remember OH^- is hydroxide

* Skip

Name: Class: Date:

For each chemical name, write the formula for each acid or base.

Common Acids and Bases Formula Writing Practice

1. hydrochloric acid	2. carbonic acid	3. nitrous acid	4. nitric acid	5. sulfurous acid
6. sulfuric acid	7. acetic acid	8. hydrobromic acid	9. phosphoric acid	10. phosphorous acid *
11. Column 1s sodium hydroxide - p. 210 Na^+ OH^- $NaOH$	12. potassium hydroxide	13. Column 2s calcium hydroxide - p. 210 Ca^{2+} OH^- Swap charges $Ca(OH)_2$	14. lithium hydroxide	15. rubidium hydroxide
16. cesium hydroxide	17. strontium hydroxide	18. barium hydroxide	19. ammonia *	20. carbonate ion p. 210
21. bicarbonate ion p. 210	22. hydrofluoric acid	23. pyridine *	24. hydroiodic acid	25. perchloric acid
26. hydrocyanic acid *	27. formic acid *	28. hydrogen sulfate ion *	29. hydrogen sulfide	30. water