

Final Exam Review, Fall

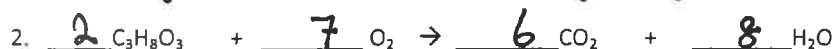
Your final exam is cumulative and covers all topics from this semester. The more you prepare now for your final exam the better you will do. *Copying the work and answers from a friend will not help you prepare for your final exam.* Your final is 20% of your grade.

Ch 11: Chemical Equations- Interpreting, Balancing, Identifying

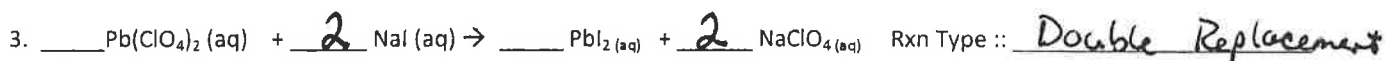
Identify the type of reaction and balance all reactions.



Interpret: Lithium reacts with water to produce Lithium hydroxide and hydrogen gas.



Reaction Type: Combustion



Interpret: aqueous lead (II) perchlorate reacts with aqueous sodium iodide to produce aqueous lead (II) iodide & aq. sodium perchlorate



Rxn Type:: Synthesis/combination



Rxn Type:: Decomposition



Rxn Type:: Neutralization/DR

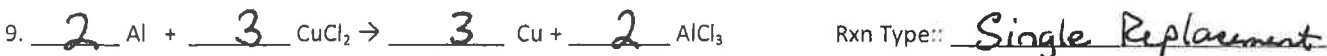


Rxn Type:: Synthesis/Form. a Base



Rxn Type:: Synthesis/Form. an Acid

Interpret: Sulfur trioxide reacts with water to form sulfuric acid.



10. A metallic oxide reacts with water to produce a base. A nonmetallic oxide reacts with water to produce an acid. An acid and a base react to produce water and a salt.

11. C₄H₁₀ could be classified as a hydrocarbon. In a combustion reaction the hydrocarbon reacts with what in the air? oxygen. A combustion reaction will always produce what two products? CO₂ + H₂O

12. Classify Br₂ as either an ionic compound, molecule or acid. M

Key

Ch 5: Electrons in Atoms, Electron Configuration

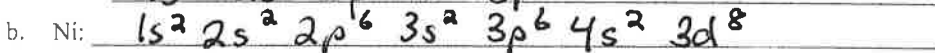
*Be able to describe the Thomson, Rutherford, Bohr, and Quantum Mechanical model of an atom.

- Oppositely charged particles attract.
- The region around the nucleus where the electron is likely to be moving is called a/an Energy Level. What orbitals are found there? s, p, d, f
- The probability of finding an electron within a certain volume of space surrounding the nucleus can be portrayed as a fuzzy cloud.
- Which scientist developed the quantum mechanical model of the atom? Schrodinger
- How many orbitals are in the following sublevels?
a. 3d sublevel 5 b. 2p sublevel 3
- How many unpaired electrons are there in a phosphorus atom? 3
- How many paired electrons are there in a Oxygen atom? 2 pairs
- What does the coefficient, subscript and letter mean for $4p^5$?
4 - Energy Level, p - 3 orbitals, 5 - electrons
- What is the maximum number of electrons allowed in one atomic orbital? 2

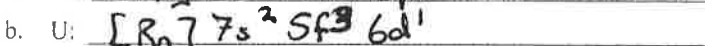
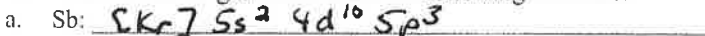
10. Draw the orbital diagrams for the following elements:



11. Write the complete electron configuration for the following elements:



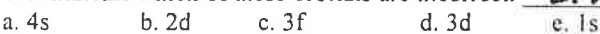
12. Write the noble gas notation for the following elements:



13. How many electrons are in the highest occupied energy level of these atoms?



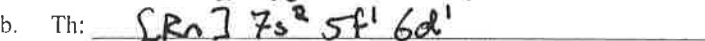
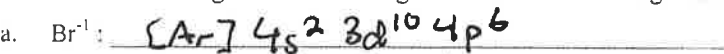
14. Indicate which of these orbitals are incorrect. b. 2d, c. 3f, e. 4s



15. What is the maximum number of electrons that can go into each of the following sublevels?



16. Write the noble gas electron configuration for the following elements:

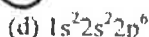
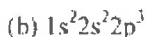
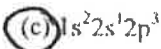
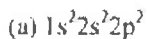


17. How many orbitals are found in f? 7

18. Draw the orbital diagram for $3d^7$.



19. Which electron configuration represents a neutral atom of carbon in an excited state?



Section 5.3

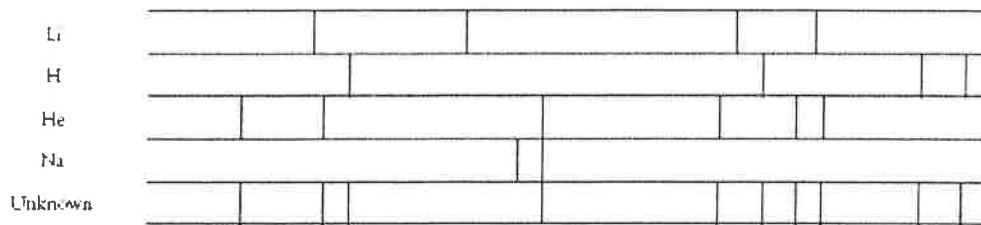
ROYGBIV

- What color of visible light has the lowest frequency? red
- What color of visible light has the shortest wavelength? violet
- When an electron moves from a lower to a higher energy level, the electron _____.
 - always doubles its energy
 - absorbs a continuously variable amount of energy
 - absorbs a quantum of energy
 - moves closer to the nucleus
- How does the speed of visible light compare with the speed of gamma rays, when both speeds are measured in a vacuum?
 - The speed of visible light is greater.
 - The speed of gamma rays is greater.
 - The speeds are the same.
 - No answer can be determined from the information given.
- Which of the following electromagnetic waves have the highest frequencies? *high ν = high energy = low λ*
 - ultraviolet light waves
 - X-rays
 - gamma rays
 - microwaves
- Which type of electromagnetic radiation includes the wavelength 10^{-7} m?
 - gamma ray
 - microwave
 - radio wave
 - visible light
- The light given off by an electric discharge through sodium vapor is _____.
 - a continuous spectrum
 - an emission spectrum
 - of a single wavelength
 - white light
- Which variable is directly proportional to frequency? *$\nu = \frac{c}{\lambda}$*
 - wavelength
 - velocity
 - position
 - energy
- How are the frequency and wavelength of light related?
 - They are inversely proportional to each other.
 - Frequency equals wavelength divided by the speed of light.
 - Wavelength is determined by dividing frequency by the speed of light.
 - They are directly proportional to each other.
- According to the Heisenberg uncertainty principle, if the position of a moving particle is known, what other quantity CANNOT be known?
 - mass
 - charge
 - spin
 - velocity

- When looking at an element will you see bands of color/discrete lines or a continuous spectrum? bands of color
- When looking at white light what will you see, bands of color/discrete lines or a continuous spectrum? continuous
- Give an example of white light. sun or incandescent
- Explain how a bright-line spectrum is produced, in terms of excited state, ground state, energy gain, energy released and radiation.

the electron gains energy and jumps from the ground state to the excited state then the electron will lose the energy and fall to the ground state and release energy in the form of radiation, visible light

15. Below are diagrams for the bright line spectra of four elements and the spectrum of a mixture of unknown gases.



- Which element(s) are not present in the Unknown?
Na, Li
- Which element(s) are in the Unknown?
He, H

Ch 6: Periodic Trends

1. For the elements whose outermost electron configurations are given below, tell the period and group to which each belongs:

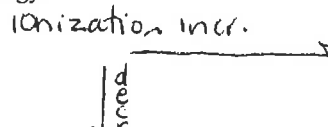
	Symbol	Element Name	Period	Group #
a.	$6s^1$	<u>Cs</u>	<u>Cesium</u>	<u>6</u>
b.	$5s^25p^4$	<u>Te</u>	<u>Tellurium</u>	<u>5</u>
c.	$3s^23p^2$	<u>Si</u>	<u>silicon</u>	<u>3</u>

2. How many valence electrons are found in each:

- a. Ar 8
 b. Ca 2

3. Arrange the following elements in order of **decreasing** ionization energy.

- a. Ca, Ba, Be, Sr Be, Ca, Sr, Ba
 b. Cl, Si, P, Ar Ar, Cl, P, Si
 c. Cs, Li, K Li, K, Cs



4. Tell whether each of the following elements is an inner transition metal, noble gas, alkali metal, alkaline earth metal, halogen, or transition metal.

- a. K alkali metal
 b. Cl halogen
 c. Gd inner transition

5. Circle the element of the following pairs that has the higher electronegativity:

- a. Na, Mg b. Rb, I c. Cl, Br

6. Circle the element of the following pairs that has the larger atomic radius?

- a. Cl, Cl
 b. Mg, Mg^{2+}

7. Explain why fluorine has a smaller atomic radius than both oxygen and chlorine.

Fluorine has more e^- and more p^+ so more attraction between the e^- and p^+

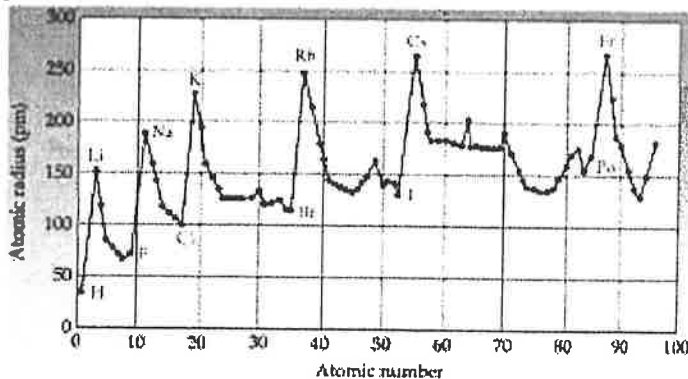
8. Explain why fluorine has more ionization energy than both oxygen and chlorine.

Fluorine wants to gain e^- not lose e^- so more e^- and more p^+ than O and Cl so more attraction and harder to lose an e^-

9. Using the graph, which group of elements has the largest atomic radius?

- a. alkali metals c. halogens
 b. alkali earth metals d. noble gases

Group 1A

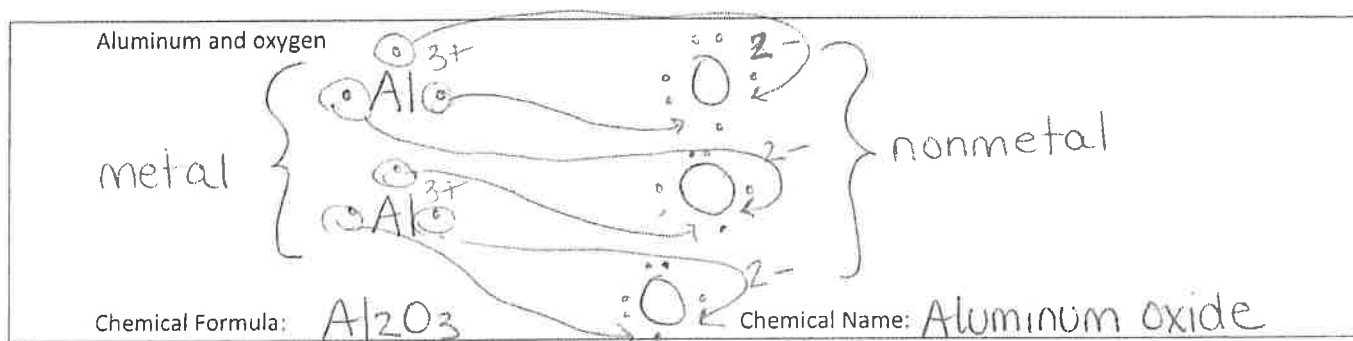


Ch 7-8: Ionic and Covalent Bonding

1. Complete the following table:

	Dot Structure of atom	Dot Structure of ion	Formula of ion	Type of ion (cation or anion)
F	:F·	:F:⁻	F⁻	anion
Sr	·Sr·	:Sr:²⁺	Sr²⁺	cation

2. Draw the formation of the ionic compound for the following. Include (a) electron dot structure for both elements, (b) arrows illustrating the loss or gain of electron(s), (c) the charge of both elements, (d) label reactants as metal or nonmetal, and (e) write the formula for the compound and the name.



3. Explain how ionic compounds conduct electricity when melted and when in aqueous solutions. Refer to your textbook or notes.

Ionic compounds are composed of ions. Ions break apart when dissolved in water. The movement of ions allows electricity to flow between electrodes through an external wire, therefore conducting electricity.

4. Molecular compounds are held together by intermolecular forces and ionic compounds are held together by electrostatic forces. Ionic compounds transfer electrons and molecular compounds share electrons.

5. Is PH_3 a polar or nonpolar compound? polar Water is a polar compound, so will PH_3 dissolve in water? yes Explain why. negative end of molecule will be attracted

6. Which of the following compound(s) will conduct electricity when dissolved in water?

- a. sucrose
- b. magnesium sulfate
- c. butter
- d. graphite

to the positive end of the water molecule.

Ch 9: Naming

Formula	Type of Compound (Formula unit, Molecular or Acidic)	Chemical Name
AlI_3	formula unit	Aluminum Iodide
$ZnBr_2$	formula unit	Zinc Bromide
Cl_2O_6	molecular	Dichlorine hexoxide
$Cr(MnO_4)_2$	formula unit	Chromium(II) Permanganate
HF	acidic	hydrofluoric acid
HNO_3	acidic	nitric acid
$BaSO_3$	formula unit	Barium Sulfite
PO_9	molecular	Phosphorous nonoxide
SnS_2	formula unit	Tin(IV) sulfide

Chemical name	Type of Compound (Formula unit, Molecular or Acidic)	Chemical Formula
Bromine	molecular	Br_2
Lithium Hydrogen Sulfate	formula unit	$LiHSO_4$
Silver phosphate	formula unit	Ag_3PO_4
Sulfurous acid	acidic	H_2SO_3
Cobalt (III) oxalate	formula unit	$Co_2(C_2O_4)_3$
Oxalic acid	acidic	$H_2C_2O_4$
Carbon monoxide	molecular	CO
Nickel silicate	formula unit	$NiSiO_3$
Gold (III) phosphide	formula unit	AuP

Ion	# of electrons lost or gained	Name of the ion	Noble gas
Se^{2-}	gained $2e^-$	selenide	Kr
Al^{3+}	lost $3e^-$	aluminum ion	Ne

Ch 4, & 25: Atoms, Isotopes, and Radioactivity

Directions: Complete the tables below.

Define :: Atomic number	NUMBER OF PROTONS
Define :: Mass number	NUMBER OF PROTONS + NEUTRONS
What 3 things determine the value of the <i>average atomic mass (amu)</i> of an element?	PROTONS, NEUTRONS, ISOTOPES
Define :: Isotope	DIFFERENT # NEUTRONS GIVEN SAME ELEMENT

Determine the atomic mass for the following isotopes :: (Show your work)	Chlorine - 35, whose mass is 34.969 @ 75% Chlorine - 37, whose mass is 36.966 @ 25% $\left. \begin{array}{l} 34.969 \times 0.75 = 26.22675 \\ 36.966 \times 0.25 = 9.2415 \end{array} \right\} 35.47 \text{ amu}$
	Boron - 10, whose mass is 10.013amu @ 19.8% Boron - 11, whose mass is 11.009amu @ 80.2% $\left. \begin{array}{l} 10.013 \times 0.198 = 1.982514 \\ 11.009 \times 0.802 = 8.829218 \end{array} \right\} 10.81 \text{ amu}$

Element Or Ion	Atomic Number	Mass Number	Charge	Protons p ⁺	Neutrons n ⁰	Electrons e ⁻
⁸¹ ₃₅ Br ⁻¹	35	81	1-	35	81-35 = 46	35 - (-1) = 36
³⁹ ₁₉ K	19	39	1+	19	39-19 = 20	19
¹ ₁ H	1	1	1+	1	1-1 = 0	1
²⁴ ₁₂ Mg ²⁺	12	24	2+	12	24-12 = 12	10
¹⁰⁸ ₄₇ Ag	47	108	1+	47	108-47 = 61	47
³² ₁₆ S ²⁻	16	32	2-	16	32-16 = 16	18

Who discovered the following particles/parts of an atom?	Proton ::	GOLDSTEIN	Nucleus :: RUTHERFORD
	Neutron ::	CHADWICK	
	Electron ::	THOMPSON	

Write the nuclear equation for the following reactions ::

1. Radium-226 undergoes alpha decay ::	${}_{88}^{226}\text{Ra} \longrightarrow {}_2^4\text{He} + {}_{86}^{222}\text{Rn}$
2. Carbon-14 undergoes beta decay ::	${}_6^{14}\text{C} \longrightarrow {}_{-1}^0\text{e} + {}_7^{14}\text{N}$
3. Uranium-238 undergoes alpha and gamma decay ::	${}_{92}^{238}\text{U} \longrightarrow {}_2^4\text{He} + {}_{90}^{234}\text{Th}$

Ch 8: Covalent Compounds

I. Complete the following table below.

- The drawing must show the correct geometry. Label the electronegativity of each atom. Draw arrows on each bond. Identify the overall polarity and forces present.

Molecule	Structural Formula	Geometry	Polar or Nonpolar Molecule	Intermolecular Forces
HCN	$ \begin{array}{c} 2.1 \quad 2.5 \quad 3.0 \\ \text{H} - \text{C} \equiv \text{N} : \\ \leftarrow \quad \leftarrow \quad \leftarrow \end{array} $	LINEAR	P	DISPERSION DIPOLE
CS ₂	$ \begin{array}{c} 2.5 \quad 2.5 \\ \text{:S} = \text{C} = \text{S:} \end{array} $	LINEAR	NP	DISPERSION
NH ₂ Br	$ \begin{array}{c} 3.0 \\ \text{H} - \text{N} - \text{Br} \\ \quad \diagdown \\ \text{H} \quad \text{Br} \\ 2.1 \quad 2.8 \end{array} $	TRIGONAL PYRAMIDAL	P	DISPERSION DIPOLE H-BOND
SiCl ₄	$ \begin{array}{c} \text{:Cl:} \\ \\ 3.0 \quad 1.8 \\ \text{:Cl} - \text{Si} - \text{Cl} \\ \quad \\ \text{:Cl:} \quad \text{:Cl:} \end{array} $	TETRA.	NP	DISPERSION
C ₂ H ₂ F ₂	$ \begin{array}{c} 2.1 \quad 2.5 \quad 4.0 \\ \text{H} \quad \text{C} = \text{C} \quad \text{H} \\ \diagdown \quad \diagup \\ \text{F} \quad \text{F} \end{array} $	TRIGONAL PLANAR	P	DISPERSION DIPOLE
NIO	$ \begin{array}{c} 2.5 \quad 3.0 \quad 3.5 \\ \text{:I} - \text{N} = \text{O:} \\ \leftarrow \quad \leftarrow \end{array} $	BENT	P	DISPERSION DIPOLE

2. Which of the following molecules above have a low volatility? ABILITY OF A SUBSTANCE TO EVAPORATE
3. A molecule that has low volatility will have STRONG intermolecular forces so the molecule will evaporate SLOWER.
4. Which of the following molecules above have a high volatility? CS₂, SiCl₄
5. A molecule that has a high volatility will have WEAK intermolecular forces so the molecule will evaporate FASTER.
6. Which intermolecular force is the strongest? H-BONDS Which intermolecular force is the weakest? DISPERSION

Note: This is a cumulative final; therefore you are responsible for all content that has been taught since the first day of school. Remember this is just a review guide.