

Name: \_\_\_\_\_

Period: \_\_\_\_\_

# PREAP CHEMISTRY: FALL SEMESTER EXAM REVIEW

References: Your class work, notes & textbook

- Unit 1a: Safety & Equipment  
Lab Safety Rules  
Lab equipment, name, purpose, proper use
- Unit 1b: Measurement  
SI Units  
Dimensional analysis  
Graphing  
Density  
Scientific Notation  
Significant Figures
- Unit 2 : Matter  
Physical & Chemical Properties  
Physical & Chemical Changes  
States of matter  
Law of Conservation of Mass  
Mixtures - homogeneous & heterogeneous  
Solutions, Colloids, Suspensions  
Separating mixtures (filtration, distillation)  
Pure Substances; Elements/Compounds
- Unit 3a: The Atom  
History  
Models (scientists & experiments)  
Atomic calculations; atomic number, mass number  
Ion/isotope/neutral atom  
Electrons/protons/neutrons
- Unit 3b: Electronic Structure  
Waves; frequency, amplitude, wavelength & calculations  
Quantization  
Bohr  
Quantum numbers  
Heisenberg Uncertainty Principle  
Pauli Exclusion Principle, Aufbau Principle, Hund's Rule  
Electron configuration  
Orbital notation  
Lewis dot  
Valence electrons
- Unit 4a: Periodic Table  
Periodic law, Law of Octaves  
Periods, groups & families  
Metals/nonmetals/metalloids  
Oxidation numbers; transition metals, spdf blocks  
Trends; radius, ionization energy, electronegativity, reactivity

Unit 4b: Nomenclature  
Ionic and Covalent compounds: bonding, naming & formula writing  
Anion/cation  
Lewis dot for ionic compounds and covalent molecules  
Properties of ionic compounds & covalent molecules  
IM forces  
Naming acids  
Bond & molecular polarity  
VSEPR geometry  
Metallic bonds - sea of electrons

Unit 5a: Chemical Reactions  
Recognizing Chemical Changes  
Balancing  
Types of reactions  
Predicting Products (using activity series & solubility chart)

Unit 5b: The Mole  
Molar Mass  
Mole Conversions  
Percent Composition  
Empirical and Molecular Formulas

Things you should have memorized:

SI units/prefixes (T, G, M, k, d, c, m,  $\mu$ , n, p)

Greek prefixes (mono, di, tri, tetra, penta, hexa, hepta, octa, nona, deca)

Acid naming rules (hydro - ic acid; ate  $\rightarrow$  -ic acid; ite  $\rightarrow$  -ous acid)

Polyatomic ions

Diatomic molecules

Avogadro's number ( $6.02 \times 10^{23}$ )

Formula for density ( $d=m/V$ )

Oxidation numbers from the periodic table

Significant digit rules (mult/div = least number total sig figs; add/sub = least number after decimal)

Some skills you should have:

Use scientific notation

Name compounds

Write formulas for compounds

Dimensional analysis

Mole conversions/calculations

Orbital notation

Electron Configuration

Draw Lewis dot structures

Predict polarity of a molecule

Predict molecular geometry

Apply the periodic table trends

Some study suggestions:

Make flash cards

Rewrite things you're supposed to memorize

Review notes

Rewrite notes

Make outlines

Turn notes into tables

Turn tables into notes

Make diagrams

Explain diagrams

Read the chapters in the textbook

Quiz each other

Work the practice problems

PRE-AP CHEMISTRY PRACTICE PROBLEMS

- Classify each of the following as element, compound, homogeneous mixture, heterogeneous mixture, or ion: carbonate, helium, brass, iron, carbon dioxide, air, dirt.
- List the evidences of a chemical change.
- Identify each of the following as a chemical or physical property; melting point, density, color, reactivity, ability to tarnish, flammable, solid.
- How many significant figures are in each of these numbers: a) 0.010 b) 625,000 c) 250.?
- 0.340 m = \_\_\_\_\_ mm = \_\_\_\_\_ cm = \_\_\_\_\_ km = \_\_\_\_\_ nm
- 8.567 L of ethanol = \_\_\_\_\_ g of ethanol (density = 0.789g/mL)
- What volume will be occupied by a 425 g block of metal with density = 3.50 g/mL?
- How do the masses of a proton, neutron, and electron compare?
- Ions of the same element differ in the number of \_\_\_\_\_.
- Isotopes of the same element differ in the number of \_\_\_\_\_.
- Use significant figure rules:  $3.60 \times 10^{18} / 1.2 \times 10^{-23} =$

12. Fill in the table below by writing the number of each sub-atomic particle. Leave blank any box with XX.

atom, ion or isotope	mass number	atomic number	protons	neutrons	electrons	charge	valence electrons
fluorine - 20						zero	
fluorine - 21						zero	
F <sup>-1</sup>				10			
Fe <sup>+3</sup>	56						XX
	120	50				zero	XX
			16	17		-2	

- Briefly describe Rutherford's experiment. What was his important conclusion from the experiment? Do the same for Thomson's experiment.
- Identify the oxidation number for each of the following elements: oxygen, sodium, nitrogen, zinc, bromine, argon, calcium, aluminum, hydrogen
- Write the symbol with the charge for each of the following ions:
 

a) magnesium	d) sulfate	g) carbide
b) acetate	e) sulfite	h) carbon
c) sulfide	f) lead (II)	
- Identify each compound as ionic, covalent or acid, then write the chemical formula.
 

a) diphosphorus pentoxide	d) chromium (VI) oxide
b) copper (II) chlorate	e) aluminum sulfide
c) nitric acid	f) sulfuric acid

17. Identify each compound as ionic, covalent or acid, then name the compound.

- |                    |                 |
|--------------------|-----------------|
| a) $N_2O$          | e) $AlPO_4$     |
| b) $H_2CO_{3(aq)}$ | f) $CaO$        |
| c) $Fe_2O_3$       | g) $Sn(NO_3)_2$ |
| d) $HClO_{4(aq)}$  | h) $P_3O_2$     |

18. Name the following acids:

- |                  |                    |
|------------------|--------------------|
| a) $HF_{(aq)}$   | c) $H_3PO_{4(aq)}$ |
| b) $HNO_{2(aq)}$ | d) $H_2SO_{3(aq)}$ |

19. Determine the molar mass of the following substances.

- |                |                         |
|----------------|-------------------------|
| a) iron        | c) copper(II) hydroxide |
| b) acetic acid | d) nitrogen             |

20. List the diatomic elements.

21. Determine the number of molecules in

- a) 2.50 moles of carbon dioxide
- b) 50.0 g of nitrogen gas

22. Determine the mass of 0.128 moles of mercury (II) cyanide.

23. Calculate the percent by mass of sulfur in potassium sulfate.

24. What is the energy of a photon of light with a wavelength of 512 nm?

25. Classify these reactions: a)  $C_6H_{12}O_6 \rightarrow 6C + 6H_2O$     b)  $C_6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + 6H_2O$ ?

26. Write complete, balanced equations for the following reactions; identify the type of each reaction:

- a) iron (III) nitrate is added to lithium hydroxide
- b) tricarbon octahydride is burned in oxygen
- c) calcium metal reacts with oxygen gas
- d) zinc metal is added to iron (II) chloride

27. Briefly describe the contributions of Dmitri Mendeleev.

28. Draw the s & p orbitals.

29. What is the maximum number of electrons that are found in each orbital?

30. Identify the types of orbitals found in these energy levels; 1 = \_\_\_\_\_, 2 = \_\_\_\_\_, 3 = \_\_\_\_\_, 4 = \_\_\_\_\_.

31. Identify the number of electrons found in these levels; 1 = \_\_\_\_\_, 2 = \_\_\_\_\_, 3 = \_\_\_\_\_, 4 = \_\_\_\_\_.

32. Periodic Trends: Put the following elements in order to indicate increasing...

a) atomic radius (Kr, Ar, Xe, Ne)

c) first ionization energy (Br, Cl, I, F)

b) electronegativity (Mg, Ar, Cl, P)

d) reactivity (Fr, Cs, Li, Na)

33. Circle the best choice in each italicized pair: A *cation/anion* has gained electrons to become *negative/postive*.  
A *cation/anion* has lost electrons to become *negative/postive*.

34. Identify the following properties as ionic or covalent; brittle; solid at room temperature; low boiling point; high melting point; conductive in solution; bonds by sharing electrons

35. Fill in the table below.

Formula	Draw the Lewis Dot Structure	Name the Molecular Geometry	Polarity of the <i>molecule</i>	Type of IM Force
SiF <sub>4</sub>				
H <sub>2</sub> S				
PI <sub>3</sub>				
O <sub>2</sub>				

36. A (*sigma/pi*) bond (circle one) forms when parallel orbitals overlap to share electrons. Identify a molecule from the previous table that has this type of bond.

37. A (*sigma/pi*) bond (circle one) is a single covalent bond forming when an electron pair is shared by the direct overlap of bonding orbitals. Identify a molecule from the previous table that has this type of bond.

38. Fill in the table below. Pay attention to the relationships among these values.

Element	Family Name	Atomic Number	Number of Valence Electrons	Oxidation Number	Lewis Dot Structure	Noble Gas Configuration
Li						
Mg						
O						
Cl						

39. Draw models of the atom representing the view of the following scientists; Thomson, Rutherford & Bohr. Label the main parts. Which is the plum pudding model? Which is the planetary model?

40. Distinguish between a solid, liquid & gas.

41. Distinguish between a metal, nonmetal and metalloid.

42. Of these substances (H<sub>2</sub>O, CO<sub>2</sub>, NaCl, NH<sub>3</sub>), which would boil first and why? Which would boil last and why?

43. Know how to identify a gas in the lab as O<sub>2</sub>, CO<sub>2</sub>, or H<sub>2</sub>.