

Welcome to AP Chemistry!

Reasons to take AP Chemistry

- You have a strong interest in chemistry and science
- You have interest in problem solving and developing higher level thinking skills
- You have strong *math skills*
- You complete assignments on time
- You are willing to ask questions and take advantage of study sessions outside of class
- You have the time to commit DAILY to the course work

Reasons *not* to take AP Chemistry

- CP Chemistry or Honors Chemistry was EASY and you expect AP Chemistry to be easy too
- You take this class just for a GPA booster
- You're not able to meet the necessary time commitment (approx. 45-60 minutes per day)
- You are taking multiple AP courses that you have a greater interest in
- You want to take the same class as your friends
- You are frequently absent due to sports or other commitments

Differences between AP Chemistry and CP Chemistry/Honors Chemistry

- Equivalent to that of a one-year general chemistry college course (not a college prep course)
- Greater range and depth of concepts
- Greater emphasis on chemical calculations and problem solving
- Greater time and effort requirements
- Tests count for a higher percentage of your overall grade (approx. 50%)
- Strong emphasis on AP Test preparation

AP Chemistry Exam Testing Standards

- The AP Chemistry Exam consists of 60 questions multiple-choice (90 minutes, no calculator allowed) and 7 free-response questions (multi-step problems, 105 minutes, calculator allowed)
- Approximate scoring guide:
 - 5 for 75% or above
 - 4 for 65% or above
 - 3 for 45% or above

I will be on maternity leave for the first month and a half of school next year, so you will cover much of this information with the sub. I will be available via remind (code: @83gafk) or email (ahicks@turlock.k12.ca.us). Please join the google classroom as well (code: qlphswz), I will post some helpful resources for the summer assignment.

You will have a test during the first week of school. To prepare for this test, complete the following assignments. Practice tests and Textbook problems are due the first day of school.

1. **MEMORIZE NAMES AND SYMBOLS OF ELEMENTS.** The AP chemistry periodic table does not include any names of elements. Therefore, you must memorize the most common ones. You DO NOT have to memorize any numbers. Memorize the symbol and names of these elements:

- Elements 1-38 (H to Sr)
- Elements 47-56 (Ag to Ba)
- Pt, Au, Hg, and Pb

In addition:

- Know which elements are metalloids (B, Si, Ge, As, Sb, Te, At)
- Be able to identify if an element is a metal, non-metal, transition metal, alkali metal (group 1A), alkaline earth metal (group 2A), halogen (Group 7A), or noble gas (group 8A)

2. **MEMORIZE NAMES, FORMULAS, AND CHARGES OF COMMON IONS.** You must know the names, symbols, and formulas for the common ions, as listed on the attached sheet

3. **TEXT BOOK PROBLEMS.** You must complete the problems below. The problems are at the end of the chapter. Answers for selected problems are in the back of the book. If you are stuck, read the section in the textbook! There are several helpful practice problems. This homework will be collected the first day of school.

- Chapter 1 (pg 35-41)

1.1, 1.2, 1.8, 1.11, 1.13, 1.19, 1.21, 1.35, 1.49, 1.52, 1.58, 1.61

- Chapter 2 (pg 75-81)

2.3, 2.4, 2.6, 2.21, 2.25, 2.29, 2.39, 2.45, 2.52, 2.57, 2.59

- Chapter 3 (pg 111-118)

3.1, 3.7, 3.11, 3.25, 3.35, 3.45, 3.57, 3.67, 3.68, 3.71, 3.77

- Chapter 6 (pg 248-255: Sections 6.1, 6.2, 6.7, 6.8, 6.9)

6.11, 6.20, 6.25, 6.71, 6.74, 6.77, 6.76

4. **PRACTICE TESTS.** You must complete the attached practice tests. These will also be collected the first day of school.

For all assignments, YOU MUST SHOW WORK TO RECEIVE CREDIT. NO WORK, NO CREDIT.

IONS TO MEMORIZE

For representative elements (Groups 1-2, 13-18), predict the charge of the ion by its position on the periodic table:

Group 1 ions (alkali metals)	X^{1+}	(These elements lose 1 electron to form an ion)
Group 2 ions (alkaline earth metals)	X^{2+}	(These elements lose 2 electrons to form an ion)
Group 13 ions (B, Al, Ga)	X^{3+}	(These elements lose 3 electrons to form an ion)
Group 15 ions (N, P, As, Sb)	X^{3-}	(These elements gain 3 electrons to form an ion)
Group 16 ions (O, S, Se, Te)	X^{2-}	(These elements gain 2 electrons to form an ion)
Group 17 ions (halogens, F, Cl, Br, I)	X^{1-}	(These elements gain 1 electron to form an ion)

*Negative monatomic atoms' names end in "-ide" Ex. Cl⁻ is chloride, O²⁻ is oxide

* In Group 14, only Pb and Sn form ions – see below.

* Noble gases (group 18) do not form ions.

Transition Metals and Pb and Sn (but not Zn, Cd, Ag) have multiple charges.

The charge of the ion is indicated by the Roman numeral (i.e., iron (III) Fe³⁺)

Memorize these ions (name, formula, and charge):

cadmium	Cd ²⁺	hypochlorite	ClO ⁻
silver	Ag ⁺	chlorite	ClO ₂ ⁻
zinc	Zn ²⁺	chlorate	ClO ₃ ⁻
		perchlorate	ClO ₄ ⁻
acetate	C ₂ H ₃ O ₂ or CH ₃ COO ⁻	chromate	CrO ₄ ²⁻
ammonium	NH ₄ ⁺	dichromate	Cr ₂ O ₇ ²⁻
hydroxide	OH ⁻		
hydronium	H ₃ O ⁺	cyanide	CN ⁻
peroxide	O ₂ ²⁻	thiocyanate	SCN ⁻
carbonate	CO ₃ ²⁻	nitrite	NO ₂ ⁻
bicarbonate	HCO ₃ ⁻	nitrate	NO ₃ ⁻
permanganate	MnO ₄ ⁻	phosphite	PO ₃ ³⁻
		phosphate	PO ₄ ³⁻
		sulfite	SO ₃ ²⁻
		sulfate	SO ₄ ²⁻

Memorization tips:

- "Bi-" (e.g., bicarbonate), add H⁺ ion and adjust the charge.
- "Thio-" (e.g., thiocyanate), add a sulfur.

Prefix	Suffix	Example	Name
Per- (more than)	-ate (largest # of O's)	ClO ₄ ⁻	perchlorate
	-ate (large # of O's)	ClO ₃ ⁻	chlorate
	-ite (smaller # of O's)	ClO ₂ ⁻	chlorite
Hypo- (less than)	-ite (smallest # of O's)	ClO ⁻	hypochlorite

- To remember the formulas and charges of the common "-ate" ions:

Nick the Camel ate Clam Supper in Phoenix

Nick: N with 3 consonants (oxygens) and 1 vowel (charge) therefore NO₃⁻

Camel: C with 3 consonants (oxygens) and 2 vowels (charge), therefore CO₃²⁻

Clam: Cl with 3 consonants (oxygens) and 1 vowel (charge), therefore ClO₃⁻

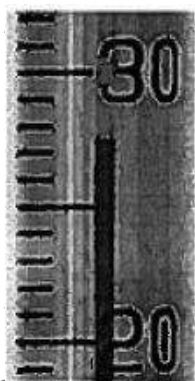
Supper: S with 4 consonants (oxygens) and 2 vowels (charge), therefore SO₄²⁻

Phoenix: P with 4 consonants (oxygens) and 3 vowels (charge), therefore PO₄³⁻

1 • Matter and Measurement

PRACTICE TEST

1. How many significant digits are present in the temperature read from the thermometer illustrated to the right?

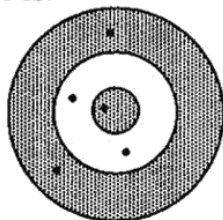


- a) 1 b) 2 c) 3 d) 4
2. The dimensions of a rectangular solid are 8.00 cm long, 4.00 cm wide, and 2.00 cm high. If the density of the solid is 10.0 g/cm^3 , what is its mass?
- a) 10/64 grams d) 320 grams
b) 10.0 grams e) 640. grams
c) 64.0 grams
3. A metal sample weighing 30.9232 grams was added to a graduated cylinder containing 23.26 mL of water. The volume of water plus the sample was 24.85 mL. Which setup will result in the density of this metal?
- a) $30.9232 \times (24.85 - 23.26)$
b) $\frac{30.9232}{24.85 - 23.26}$
c) $\frac{24.85 - 23.26}{30.9232}$
d) $30.9232 \times \frac{24.85}{23.26}$
e) $\frac{30.9232}{24.85 + 23.26}$
4. The number of significant digits in 0.30500 is
- a) 1 d) 4
b) 2 e) 5
c) 3
5. A box measures 3.50 cm x 2.915 cm. The product of these numbers = 10.2025 cm^2 . What is the proper way to report the area of the box?
- a) 10.20 cm^2 c) 10 cm^2
b) 10.2 cm^2 d) $10. \text{ cm}^2$
6. The result of $2.350 \times (4.0 + 6.311)$ is,
- a) 24 c) 24.21
b) 24.2 d) 24.205
7. A student does a calculation using her calculator and the number 280.27163 is shown on the display. If there are actually three significant figures, how should she show the final answer?
- a) 280 d) 2.80×10^{-2}
b) 280.3 e) 2.80×10^2
c) 280.27
8. The term that refers to the reproducibility of a laboratory measurement is
- a) precision c) accuracy
b) repeatability d) exactness
9. Which measurement below is NOT written with three significant digits?
- a) 2.00 cm c) 0.003 L
b) 550. grams d) 12.7 mm

10. The number 6.33×10^2 equals,
a) 6.33 c) 633
b) 0.633 d) 0.0633
11. All the following are characteristic properties of phosphorus. Which one is a chemical property?
a) Both red phosphorus and white phosphorus exist in solid allotropic forms.
b) The red form melts at about 600°C and the white form melts at 44°C .
c) The white form is soluble in liquid carbon disulfide, but is insoluble in water.
d) When exposed to air, white phosphorus will burn spontaneously, but red phosphorus will not.
12. Classify each observation as a physical or a chemical property and tally them.
Observation 1: Bubbles form on a piece of metal when it is dropped into acid.
Observation 2: The color of a crystalline substance is yellow.
Observation 3: A shiny metal melts at 650°C .
Observation 4: The density of a solution is 1.84 g/cm^3
a) 2 chemical properties and 2 physical properties
b) 3 chemical properties and 1 physical properties.
c) 1 chemical properties and 3 physical properties
d) 4 chemical properties
e) 4 physical properties
13. Chromatography is a good way to separate the
a) elements in a compound
b) the components in a mixture
c) the atoms in an element
d) the phases of a pure substance
14. When a pure solid substance was heated, a student obtained another solid and a gas, each of which was a pure substance. From this information which of the following statements is ALWAYS a correct conclusion?
a) The original solid is not an element.
b) Both products are elements.
c) The original solid is a compound and the gas is an element.
d) The original solid is an element and the gas is a compound.
e) Both products are compounds.
15. 2.5 mL is equivalent to how many liters?
a) 2.5 L d) 25 L
b) 0.0025 L e) 0.25 L
c) 0.025 L
16. A solution of sugar water may be defined as a
a) heterogeneous mixture
b) homogeneous mixture
c) heterogeneous compound
d) homogeneous compound
e) homogeneous element

17. "Wafting" is the proper technique for
- neutralizing a spilled acid.
 - putting out burning clothing.
 - washing chemicals from the eye.
 - smelling a chemical substance.
 - observing the color of a chemical.
18. You measure the density of a slab of lead as 11.10 g/mL. The accepted value is 11.34 g/mL. The percent error for your measurement is
- 2.1 %
 - 2.4 %
 - 3.7 %
 - 5.1 %
19. Which one of the following elements is correctly matched with its symbol?
- Ag, gold
 - Ni, nickel
 - Fl, fluorine
 - Mg, manganese
 - H, helium

20. The marks on the following target represent someone who is:



- accurate, but not precise.
- precise, but not accurate.
- both accurate and precise.
- neither accurate nor precise.

Answers: (Please use CAPITAL letters)

1.		11.	
2.		12.	
3.		13.	
4.		14.	
5.		15.	
6.		16.	
7.		17.	
8.		18.	
9.		19.	
10.		20.	

Formulas:

Percent error =

$$\frac{|\text{experimental value} - \text{actual value}|}{\text{actual value}} \times 100$$

Answers:
 1.C 2.E 3.B
 4.E 5.B 6.B
 7.E 8.A 9.C
 10.C 11.D
 12.C 13.B
 14.A 15.B
 16.B 17.D
 18.A 19.B
 20.D

2 & 3 • Molecules and Compounds, Stoichiometry**PRACTICE TEST**

- What is the formula of the ionic compound formed between Mg and Br?
 - MgBr
 - Mg₂Br
 - MgBr₂
 - Mg₂Br₂
 - Mg₂Br₃
- What is the formula of the ionic compound formed between Ca and P?
 - Ca₂P₃
 - CaP
 - Ca₅P₁₀
 - Ca₂P
 - Ca₃P₂
- What is the name of the SO₃²⁻ ion?
 - sulfate
 - nitrate
 - sulfite
 - sulfur trioxide
 - hydrogen sulfate
- What is the correct formula and charge for the chromate ion?
 - CrO₄²⁻
 - CrO₄
 - Cr₂O₇²⁻
 - Cr₂O₇
 - Cr³⁺
- Which one of the following elements forms ions with two different charges?
 - calcium
 - arsenic
 - iron
 - fluorine
- The correct name for CCl₄ is
 - carbon(I) chloride
 - carbon chloride
 - carbon tetrachloride
 - monocarbon chloride(IV)
 - carbochlorinate
- The correct formula for hydrogen telluride is
 - HTe
 - H₂Te
 - H₃Te
 - HTe₂
- The correct formula for dinitrogen tetroxide is
 - NO₂
 - N₂O₄
 - N₂O₅
 - NO₃⁻
 - (N₂O)₄
- The correct name for S₂Cl₂ is
 - sulfur dichloride
 - sulfur(I) chloride
 - sulfur(II) chloride
 - disulfur dichloride
 - sulfur chloride
- The correct name for NO₂ is
 - nitrogen dioxide
 - nitrite
 - nitrogen oxide
 - nitrogen(II) oxide
 - nitrate
- The molar mass of (NH₄)₂S is closest to:
 - 50 g/mol
 - 82 g/mol
 - 68 g/mol
 - 100 g/mol

6 • Electrons in the Atom

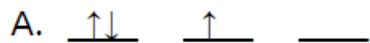
PRACTICE TEST

- How many orbitals make up the **4d** subshell?
a) 0 b) 1 c) 3 d) 5 e) 7
- The correct electron configuration for nitrogen is
a) $1s^2 2s^2 2p^6 3s^2 3p^2$
b) $1s^2 2s^2 2p^6 2d^4$
c) $1s^2 2s^2 2p^3$
d) $1s^2 2s^2 3s^2 4s^1$
e) $1s^2 1p^5$
- The electron configuration of the indicated atom in the ground state is correctly written for which atom?
a) Ga $[\text{Ar}] 3d^{12} 4s^2$
b) Ni $[\text{Ar}] 3d^{10}$
c) Ni $[\text{Ar}] 3s^2 3p^8$
d) Cu $[\text{Ar}] 3d^{10} 4s^1$
- In what section of the periodic table is the **4f** subshell being filled?
a) period 4
b) transition elements Y to Cd
c) noble gases
d) group IA
e) lanthanides
- Which one of the following elements has 3 electrons in a **p** subshell?
a) Sb b) Na c) Sc d) V e) Nd
- Which of the following distributions of electrons is correct for three electrons in p-subshell?
a) $\begin{array}{|c|c|c|} \hline \uparrow & \uparrow & \uparrow \\ \hline \end{array}$
b) $\begin{array}{|c|c|c|} \hline \uparrow\downarrow & \uparrow & \underline{\hspace{1cm}} \\ \hline \end{array}$
c) $\begin{array}{|c|c|c|} \hline \uparrow & \uparrow & \downarrow \\ \hline \end{array}$
d) $\begin{array}{|c|c|c|} \hline \uparrow & \uparrow\downarrow & \underline{\hspace{1cm}} \\ \hline \end{array}$
e) $\begin{array}{|c|c|c|} \hline \uparrow\uparrow & \uparrow & \underline{\hspace{1cm}} \\ \hline \end{array}$
- At constant speed, as the wavelength of light increases, the frequency...
A. increases
B. decreases
C. remains the same
D. not enough information
- All of the energy levels listed are allowed EXCEPT
a. 4f
b. 2d
c. 5p
d. 7s
- Which is the correct order of filling subshells in an atom?
a. 3s, 3p, 3d
b. 3d, 4s, 4p
c. 3p, 4s, 3d
d. 4p, 4d, 4f
- What is the ground state electron configuration of a Cobalt (Co) atom?
a. $1s^2 2s^2 2p^6 3s^2 3p^6 3d^7$
b. $1s^2 2s^2 2p^6 3s^2 3p^6 3d^9$
c. $1s^2 2s^2 2p^6 3s^2 3p^6 3d^7 4s^2$
d. $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^7$

11. Which element has an outer electron configuration of s^2p^4 ?

- a. Se
- b. Cr
- c. Ge
- d. Ca

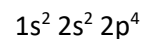
12. Which of the following does **NOT** represent a possible arrangement of electrons in the p subshell in any atom?



13. What is the **total** number of p electrons in a single phosphorus atom?

- a. 3
- b. 5
- c. 9
- d. 15

14. An oxygen atom has the electron configuration



How many **orbitals** are occupied by at least one electron?

- a. 2
- b. 3
- c. 5
- d. 8

15. Which atom has exactly three unpaired electrons?

- a. Co
- b. Fe
- c. Sc
- d. Se

D	C	D	E	A	A	B	B	C	D	A	A	C	C
1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.