

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

### AP Chemistry Summer Assignment 2024-2025 School Year

Hello! I am glad you have chosen to take AP Chemistry. I look forward to meeting/seeing all of you this Fall. This course will be similar in scope to a first year college Chemistry course. This means it is expected that you have taken a Chemistry course in high school before, and that you have completed most of your high school Algebra.

I have prepared an assignment for you to do during the Summer that has basic Chemistry and Math concepts we will need in order to get through this course.

This course will be focused on getting you ready for and passing the AP exam in May. We have a lot of content to cover and a lot of hard work ahead of us. You will be graded with college level expectations with an emphasis on performing in laboratory experiments and tests.

I encourage you to take your time with this Summer assignment, and complete some of it each day or week rather than waiting until the last week of Summer. Chemistry takes time to process and understand, and you will do much better if you spread out the assignment.

Have a great summer, and I look forward to seeing you in Fall.

Mr. Pease

#### The Assignment

Use print and internet resources to complete the following problems. Feel free to take extra practice quizzes or notes. **Submit this assignment by August 19, 2024** (first Monday after the first day of school). *This assignment will be worth 100 points at the start of the school year.*

*Use separate pieces of paper for your explanations and work.*

<http://media.collegeboard.com/digitalServices/pdf/ap/ap-chemistry-course-and-exam-description.pdf>

<http://www.collegeboard.com/ap/students/chemistry/index.html>

<http://www.chemmybear.com/>

<https://chemfiesta.org/>

<http://science.widener.edu/svb/tutorial/rxnbalancingcsn7.html>

<http://www.chemistry-drills.com/balance.html>

<http://www.chemteam.info/>

<https://www.youtube.com/user/tdewitt451>

<https://www.khanacademy.org/science/hs-chemistry>

(great resource, if you want to go through an entire high school chemistry course, try and do up to Unit 7)

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**Chemistry:**

1. Explain how to determine the number of Significant Figures in a value.
2. Explain the rules for determining sig figs when multiplying or dividing AND adding or subtracting.
3. How many significant figures are in the following numbers?

a. 420.0	b. 0.0000476	c. 10.
d. 7589	e. $4.30000 \times 10^{-22}$	f. 0.0000004
g. 432506.43	h. 35.17	i. 8671.50

4. Answer the following with the appropriate number of sig figs:

- a.  $49.30 - 9.5 - 0.0033 =$
- b.  $9002 + 19.113 + 356.01 =$
- c.  $9.000 \times 10^{19} / 6.02 \times 10^{23} =$
- d.  $(72)(2.013) / 7.09 =$

5. Express the following in scientific notation:

- a. 0.0000809
- b. 0.00925
- c. 49,000,000,000
- d. 519,000

6. Convert the following values:

- a. 32.09 cm into km
- b.  $9.00 \times 10^{23}$   $\mu\text{m}$  into mm
- c. 22.0 cm/s to miles/hour
- d. 19.3 g/mL into  $\text{kg}/\text{m}^3$

7. Label the following either as a physical process or chemical process.

a. Corrosion of aluminum metal	b. Digesting a candy bar	c. Sublimation of dry ice ( $\text{CO}_2$ )
d. Melting of ice	e. Explosion of nitroglycerin	f. Pulverizing an aspirin

8. Explain the main differences between solid liquid and gas phase of matter.
9. Define the words: atomic number, atomic mass, mass number, molecular formula, empirical formula, isotopes, cation, anion, polyatomic ion, metalloid, alloy, allotrope
10. Explain the differences between element, compound, mixture and solution

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11. Determine the number of protons, neutrons and electrons in the following:

- a.  ${}^7_3\text{Li}^{+1}$   
b.  ${}^{35}_{17}\text{Cl}^{-}$   
c.  ${}^{24}_{12}\text{Mg}^{+2}$

12. Explain the following trends across a period and down a column on the periodic table:

- a. Atomic radius  
b. Ionization energy  
c. electronegativity
13. Name the following (like NaCl = Sodium chloride) and indicate whether they are ionic or covalent compounds. Remember there are differences in naming ionic or covalent compounds:

a. FeS	b. N <sub>2</sub>	c. TiNO <sub>3</sub>	d. PO <sub>5</sub>	e. (NH <sub>4</sub> ) <sub>2</sub> O
f. C <sub>2</sub> H <sub>4</sub>	g. HCN	h. LiClO <sub>4</sub>	i. MgBr <sub>2</sub>	j. TiF <sub>4</sub>

14. Write the formula for the following and indicate if it is ionic or covalent.

a. Silver chloride	b. Nickel (I) hydroxide	c. Carbon monoxide	d. Cobalt (II) acetate
e. Gold (III) Fluoride	f. Ammonia	g. Calcium Carbonate	h. Dinitrogen pentoxide

15. How many atoms are in 3.85 moles of lithium?  
16. Convert 23.12 grams of Na<sub>2</sub>CO<sub>3</sub> to molecules.  
17. What is the mass of 12.0 atoms of carbon tetrafluoride?  
18. How many moles are in 3.50 grams of AlCl<sub>3</sub>?

**Math (Solve for x):**

19.  $x = \log(2.5 \times 10^{-10})$   
20.  $x = 10^{-9.9}$   
21.  $30 = \frac{x}{20}$   
22.  $3.5 = \frac{2}{x}$   
23.  $x^2 + 6x + 5 = 0$   
24.  $0.08 = \frac{x^2}{0.5 - x}$   
25. If you have 9 red marbles, 6 blue marbles, 7 green marbles, and 2 orange marbles, what percentage of red marbles do you have?

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Prefix	Abbreviation	Meaning	Amount = 1 base unit (g, L, m)
Giga	G	1 gigameter (Gm) = $1 \times 10^9$ m	1 g = $1 \times 10^{-9}$ Gg
Mega	M	1 megameter (Mm) = $1 \times 10^6$ m	1 g = $1 \times 10^{-6}$ Mg
Kilo	k	1 kilometer (km) = $1 \times 10^3$ m	1 g = $1 \times 10^{-3}$ kg
Hecto	h	1 hectometer (hm) = $1 \times 10^2$ m	1 g = $1 \times 10^{-2}$ hg
Deka	D or da	1 dekameter (Dm) = $1 \times 10^1$ m	1 g = $1 \times 10^{-1}$ dag
Base Unit (g, L, m)			1 g = $1 \times 10^0$ g
Deci	d	1 decimeter (dm) = $1 \times 10^{-1}$ m	1 g = $1 \times 10^1$ dg
Centi	c	1 centimeter (cm) = $1 \times 10^{-2}$ m	1 g = $1 \times 10^2$ cg
Milli	m	1 millimeter (mm) = $1 \times 10^{-3}$ m	1 g = $1 \times 10^3$ mg
Micro	$\mu$ (Greek letter mu)	1 micrometer ( $\mu$ m) = $1 \times 10^{-6}$ m	1 g = $1 \times 10^6$ $\mu$ g
Nano	n	1 nanometer (nm) = $1 \times 10^{-9}$ m	1 g = $1 \times 10^9$ ng
Pico	p	1 picometer (pm) = $1 \times 10^{-12}$ m	1 g = $1 \times 10^{12}$ pg

**TABLE 4.4**

**Names of Common Polyatomic Ions**

Ion	Name	Ion	Name
$\text{NH}_4^+$	ammonium	$\text{CO}_3^{2-}$	carbonate
$\text{NO}_2^-$	nitrite	$\text{HCO}_3^-$	hydrogen carbonate (bicarbonate is a widely used common name)
$\text{NO}_3^-$	nitrate	$\text{ClO}^-$	hypochlorite
$\text{SO}_3^{2-}$	sulfite	$\text{ClO}_2^-$	chlorite
$\text{SO}_4^{2-}$	sulfate	$\text{ClO}_3^-$	chlorate
$\text{HSO}_4^-$	hydrogen sulfate (bisulfate is a widely used common name)	$\text{ClO}_4^-$	perchlorate
$\text{OH}^-$	hydroxide	$\text{C}_2\text{H}_3\text{O}_2^-$	acetate
$\text{CN}^-$	cyanide	$\text{MnO}_4^-$	permanganate
$\text{PO}_3^{3-}$	phosphite	$\text{Cr}_2\text{O}_7^{2-}$	dichromate
$\text{PO}_4^{3-}$	phosphate	$\text{CrO}_4^{2-}$	chromate
$\text{HPO}_4^{2-}$	hydrogen phosphate	$\text{O}_2^{2-}$	peroxide
$\text{H}_2\text{PO}_4^-$	dihydrogen phosphate		

# PERIODIC TABLE OF ELEMENTS

## Chemical Group Block

		Atomic Number		Atomic Mass, u		Symbol		Chemical Group Block																							
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18														
1 1.0080 <b>H</b> Hydrogen Nonmetal	2 4.00260 <b>He</b> Helium Noble Gas	3 7.0 <b>Li</b> Lithium Alkali Metal	4 9.012183 <b>Be</b> Beryllium Alkaline Earth Me...	5 9.012183 <b>B</b> Boron Metalloid	6 12.011 <b>C</b> Carbon Nonmetal	7 14.007 <b>N</b> Nitrogen Nonmetal	8 15.999 <b>O</b> Oxygen Nonmetal	9 18.9984... <b>F</b> Fluorine Halogen	10 20.180 <b>Ne</b> Neon Noble Gas	11 22.989... <b>Na</b> Sodium Alkali Metal	12 24.305 <b>Mg</b> Magnesium Alkaline Earth Me...	13 26.981... <b>Al</b> Aluminum Post-Transition M...	14 28.085 <b>Si</b> Silicon Metalloid	15 30.973... <b>P</b> Phosphorus Nonmetal	16 32.07 <b>S</b> Sulfur Nonmetal	17 35.45 <b>Cl</b> Chlorine Halogen	18 39.9 <b>Ar</b> Argon Noble Gas														
19 39.0983 <b>K</b> Potassium Alkali Metal	20 40.08 <b>Ca</b> Calcium Alkaline Earth Me...	21 44.95591 <b>Sc</b> Scandium Transition Metal	22 47.867 <b>Ti</b> Titanium Transition Metal	23 50.9415 <b>V</b> Vanadium Transition Metal	24 51.996 <b>Cr</b> Chromium Transition Metal	25 54.93804 <b>Mn</b> Manganese Transition Metal	26 55.84 <b>Fe</b> Iron Transition Metal	27 58.93319 <b>Co</b> Cobalt Transition Metal	28 58.693 <b>Ni</b> Nickel Transition Metal	29 63.55 <b>Cu</b> Copper Transition Metal	30 65.4 <b>Zn</b> Zinc Transition Metal	31 69.723 <b>Ga</b> Gallium Post-Transition M...	32 72.63 <b>Ge</b> Germanium Metalloid	33 74.92159 <b>As</b> Arsenic Metalloid	34 78.97 <b>Se</b> Selenium Nonmetal	35 79.90 <b>Br</b> Bromine Halogen	36 83.80 <b>Kr</b> Krypton Noble Gas														
37 85.468 <b>Rb</b> Rubidium Alkali Metal	38 87.62 <b>Sr</b> Strontium Alkaline Earth Me...	39 88.90584 <b>Y</b> Yttrium Transition Metal	40 91.22 <b>Zr</b> Zirconium Transition Metal	41 92.90637 <b>Nb</b> Niobium Transition Metal	42 95.95 <b>Mo</b> Molybdenum Transition Metal	43 96.90636 <b>Tc</b> Technetium Transition Metal	44 101.1 <b>Ru</b> Ruthenium Transition Metal	45 102.9055 <b>Rh</b> Rhodium Transition Metal	46 106.42 <b>Pd</b> Palladium Transition Metal	47 107.868 <b>Ag</b> Silver Transition Metal	48 112.41 <b>Cd</b> Cadmium Transition Metal	49 114.818 <b>In</b> Indium Post-Transition M...	50 118.71 <b>Sn</b> Tin Post-Transition M...	51 121.760 <b>Sb</b> Antimony Metalloid	52 127.6 <b>Te</b> Tellurium Metalloid	53 126.9045 <b>I</b> Iodine Halogen	54 131.29 <b>Xe</b> Xenon Noble Gas														
55 132.90... <b>Cs</b> Cesium Alkali Metal	56 137.33 <b>Ba</b> Barium Alkaline Earth Me...	57 138.905 <b>La</b> Lanthanum Lanthanide	58 140.116 <b>Ce</b> Cerium Lanthanide	59 140.90... <b>Pr</b> Praseodymium Lanthanide	60 144.24 <b>Nd</b> Neodymium Lanthanide	61 144.91... <b>Pm</b> Promethium Lanthanide	62 150.4 <b>Sm</b> Samarium Lanthanide	63 151.964 <b>Eu</b> Europium Lanthanide	64 157.2 <b>Gd</b> Gadolinium Lanthanide	65 158.92... <b>Tb</b> Terbium Lanthanide	66 162.500 <b>Dy</b> Dysprosium Lanthanide	67 164.93... <b>Ho</b> Holmium Lanthanide	68 167.26 <b>Tm</b> Thulium Lanthanide	69 168.93... <b>Yb</b> Ytterbium Lanthanide	70 173.05 <b>Lu</b> Lutetium Lanthanide	71 174.9668 <b>Yt</b> Yttrium Transition Metal	72 178.49 <b>Hf</b> Hafnium Transition Metal	73 180.9479 <b>Ta</b> Tantalum Transition Metal	74 183.84 <b>W</b> Tungsten Transition Metal	75 186.207 <b>Re</b> Rhenium Transition Metal	76 190.2 <b>Os</b> Osmium Transition Metal	77 192.22 <b>Ir</b> Iridium Transition Metal	78 195.08 <b>Pt</b> Platinum Transition Metal	79 196.96... <b>Au</b> Gold Transition Metal	80 200.59 <b>Hg</b> Mercury Transition Metal	81 204.383 <b>Tl</b> Thallium Post-Transition M...	82 207 <b>Pb</b> Lead Post-Transition M...	83 208.98... <b>Bi</b> Bismuth Post-Transition M...	84 208.98... <b>Po</b> Polonium Metalloid	85 209.98... <b>At</b> Astatine Halogen	86 222.01... <b>Rn</b> Radon Noble Gas
87 223.01... <b>Fr</b> Francium Alkali Metal	88 226.02... <b>Ra</b> Radium Alkaline Earth Me...	89 227.02... <b>Ac</b> Actinium Actinide	90 232.038 <b>Th</b> Thorium Actinide	91 231.03... <b>Pa</b> Protactinium Actinide	92 238.0289 <b>U</b> Uranium Actinide	93 237.04... <b>Np</b> Neptunium Actinide	94 244.06... <b>Pu</b> Plutonium Actinide	95 243.06... <b>Am</b> Americium Actinide	96 247.07... <b>Cm</b> Curium Actinide	97 247.07... <b>Bk</b> Berkelium Actinide	98 251.07... <b>Cf</b> Californium Actinide	99 252.0830 <b>Es</b> Einsteinium Actinide	100 257.0... <b>Fm</b> Fermium Actinide	101 258.0... <b>Md</b> Mendelevium Actinide	102 259.1... <b>No</b> Nobelium Actinide	103 266.1... <b>Lr</b> Lawrencium Actinide	104 269.10... <b>Rf</b> Rutherfordium Transition Metal	105 270.1... <b>Db</b> Dubnium Transition Metal	106 270.1... <b>Sg</b> Seaborgium Transition Metal	107 270.1... <b>Bh</b> Bohrium Transition Metal	108 269.1... <b>Hs</b> Hassium Transition Metal	109 277.1... <b>Mt</b> Meitnerium Transition Metal	110 282.1... <b>Ds</b> Darmstadtium Transition Metal	111 282.1... <b>Rg</b> Roentgenium Transition Metal	112 286.1... <b>Cn</b> Copernicium Transition Metal	113 286.1... <b>Nh</b> Nihonium Post-Transition M...	114 290.1... <b>Fl</b> Flerovium Post-Transition M...	115 290.1... <b>Mc</b> Moscovium Post-Transition M...	116 293.2... <b>Lv</b> Livermorium Post-Transition M...	117 294.2... <b>Ts</b> Tennessine Halogen	118 295.2... <b>Og</b> Oganesson Noble Gas

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