

AP Chemistry Summer Assignment 2026-2027

Welcome to AP Chemistry! We will be building off the content that you learned in first year chemistry as we embark on the new adventure that is AP Chemistry. In order to finish our content in time to allow review before the big exam, I need you to be able to complete the background information from regular chemistry that is normally found in the first three chapters of AP Chemistry. Here are some topics that I need you to be familiar with:

1. Element names and Polyatomic Ions- your periodic table will not have them printed on it!
2. Significant Figures (in calculations as well as reading instruments)
3. Dimensional Analysis
4. Isotopes and Average Atomic Mass
5. Naming and Formula Writing
6. Balancing Chemical Reactions
7. The Mole
8. Empirical/Molecular Formulas (including combustion)
9. Percent Composition
10. Stoichiometry and Limiting Reactants
11. Electron Configurations and Orbital Diagrams

I know that some of you have not taken Chemistry in over a year (or at all). I am going to provide you with some practice on each of these topics that needs to be completed before you return to school in August. Each topic also has a linked video that you may watch to get extra help.

I will be hosting a couple of workshops this summer to help review the topics in this packet and answer questions. If you need help beyond the linked refresher videos, please feel free to join us. Please bring a calculator and a periodic table with you.

Wednesday June 24th (10:00am-11:30am) - Significant Figures, Measurement, Dimensional Analysis, Isotopes, and Average Atomic Mass.

Wednesday, July 8th (10:00am-11:30am) - Naming, Balancing, Electron Configurations, and the Mole

Wednesday, July 22nd (10:00am-11:30am) - Stoichiometry, Limiting Reactants, Percent Composition, and Empirical/Molecular Formulas

This packet is due on the first day of school. We will have a test over these topics at the end of the second week of school. Have a wonderful summer!

Significant Figures/Measurement

Need a refresher? Check out this video: <https://expl.ai/TRGFJAQ>

How many significant figures are in the following numbers?

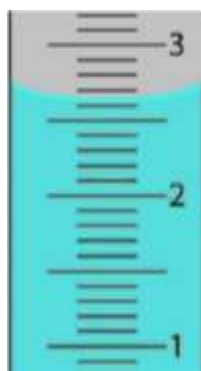
1. 100 _____
2. 205 _____
3. 360500 _____
4. 0.002368 _____
5. 0.00203680 _____
6. 300. _____
7. 6.20×10^8 _____
8. 70.00 _____

Complete the following calculations. Write your answer with an appropriate number of significant figures.

1. $2.56 + 3.2 =$ _____
2. $26.305 - 2.4 =$ _____
3. $250 \times 306 =$ _____
4. $5.2 \times 3.84 =$ _____
5. $3060 / 2.300 =$ _____

Read the following instruments and record the measurement to the correct number of significant figures.

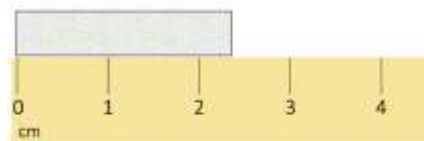
Graduated Cylinder



Buret



Ruler



Dimensional Analysis/Density

Need a refresher? Check out this video: <https://expl.ai/DUSNVBE>

You should show your work in one complete problem with a similar set-up to stoichiometry.

1 hr = 60 min	1 min = 60 sec	1 ton = 2000 lbs	7 days = 1 week
24 hrs = 1 day	1 kg = 2.2 lbs	1 gal = 3.79 L	264.2 gal = 1 cubic meter
1 mi = 5,280 ft	1 kg = 1000 g	1 lb = 16 oz	20 drops = 1 mL
365 days = 1 yr	52 weeks = 1 yr	2.54 cm = 1 in	1 L = 1000 mL
0.621 mi = 1.00 km	1 yd = 36 inches	1 cc is 1 cm ³	1 mL = 1 cm ³

1. The moon is 250,000 miles away. How many feet is it from earth?
2. A speed of 60.0 miles/hour is how many ft/sec?
3. A liquid has a density of 0.729 g/mL. What is the volume of 1.45 tons of this liquid?

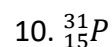
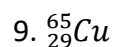
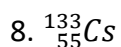
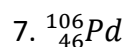
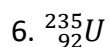
Isotopes and Average Atomic Mass

Need a refresher? Check out this video: <https://expl.ai/EFPPZGH>

Use the periodic table to find the following information:

Element	Symbol	Atomic Number	Mass Number	Number of Protons	Number of Electrons	Number of Neutrons
1. hydrogen						
2. hydrogen-3						
3. manganese						
4. potassium-45						
5. chlorine-50						

Determine the number of electrons, protons, and neutrons for each of the following:



11. Neon is 90.9% ${}^{20}\text{Ne}$, 0.257% ${}^{21}\text{Ne}$, and 8.82% ${}^{22}\text{Ne}$. Calculate the average atomic mass of neon.

12. Bromine-79 has a mass of 78.92 amu and is 50.69% abundant. Using the atomic mass reported on the periodic table, determine the mass of bromine-81, the other isotope of Bromine.

13. There are 2 isotopes of copper that occur naturally; ${}^{63}\text{Cu}$ and ${}^{65}\text{Cu}$. The ${}^{63}\text{Cu}$ atoms have a mass of 62.93 amu and the ${}^{65}\text{Cu}$ atoms have a mass of 64.93 amu. What is the percent natural abundance for each isotope?

Naming and Formula Writing

Need a refresher? Check out this video: <https://expl.ai/CPSDASM>

Write the following formulas.

1. magnesium dichromate

2. phosphorus pentabromide

3. hydroselenic acid

4. dichlorine octoxide

5. sulfuric acid

6. bromous acid

7. sodium oxide

8. copper (II) nitrite

9. copper (I) oxide

10. aluminum hydroxide

Write the following chemical names.

1. P_2O_5

2. $\text{Ca}(\text{C}_2\text{H}_3\text{O}_2)_2$

3. $\text{Sn}_3(\text{PO}_4)_4$

4. OF_2

5. $(\text{NH}_4)_3\text{N}$

6. HBr

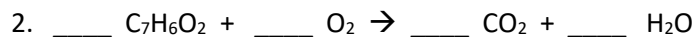
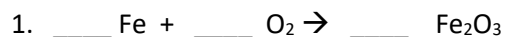
7. H_2S

8. HNO_2

9. H_2CO_3

Balancing Chemical Reactions

Need a refresher? Check out this video: <https://expl.ai/RHFFVJD>



4. Write and balance the following chemical reaction. Solid Iron reacts with aqueous Copper (II) Nitrate to produce solid copper and aqueous Iron (III) Nitrate.

The Mole

You must show ALL work to receive credit.

Need a refresher? Check out this video: <https://expl.ai/JRLFEEJ>

1. Determine the number of grams of MgI₂ in 4.81 x 10²² particles of MgI₂.
2. What is the mass in grams of 3.500 mols of Ca(OH)₂?
3. How many molecules are present in 10.7 grams of carbon dioxide, CO₂?
4. Determine the number of moles in 471.6 g of Ba(OH)₂.
5. Determine the number of O atoms in 6.25×10⁻³ mol Al(NO₃)₃.

Percent Composition and Empirical/Molecular Formula

You must show ALL work to receive credit.

Need a refresher? Check out this video: <https://expl.ai/DJHFFYM>

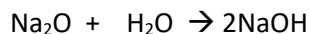
1. Determine the percent composition of each element in magnesium nitrate, which has the formula $\text{Mg}(\text{NO}_3)_2$.
2. The compound borazine consists of 40.29% boron, 7.51% hydrogen, and 52.20% nitrogen, and its molar mass is 80.50 g/mol. Calculate the empirical and molecular formula for borazine.
3. Calculate the empirical formula for a compound whose analysis is 74.97% aluminum and 25.03% carbon.
4. Valproic acid, used to treat seizures and bipolar disorder, is composed of C, H, and O. A 0.165-g sample is combusted to produce 0.166 g of water and 0.403 g of carbon dioxide. What is the empirical formula of this species?

Stoichiometry and Limiting Reactant

You must show ALL work to receive credit.

Need a refresher? Check out this video: <https://expl.ai/PKJQLXC>

1. Given the equation below, what mass of water would be needed to react with 0.521mol of sodium oxide?



2.
$$4\text{NH}_3 + 5\text{O}_2 \rightarrow 4\text{NO} + 6\text{H}_2\text{O}$$

What mass of water will be produced when 100.0g of ammonia is reacted with excess oxygen?

3. If the reaction in #2 is done with 25.0g of each reactant, which would be the limiting reactant?

4.
$$\text{Na}_2\text{S} + 2\text{AgNO}_3 \rightarrow \text{Ag}_2\text{S} + 2\text{NaNO}_3$$

If the above reaction is carried out with 50.0g of sodium sulfide and 35.0g of silver nitrate, which is the limiting factor? What mass of the excess reactant remains? What mass of silver sulfide would precipitate?

Electron Configurations and Orbital Diagrams

Need an electron configuration refresher? Check out this video: <https://expl.ai/AJQJNRL>

Need an orbital diagram refresher? Check out this video: <https://expl.ai/QVWZZGE>

Write the full electron configuration for the following elements and ions.

1. C _____
2. S _____
3. Cr _____
4. Ni _____
5. V^{2+} _____
6. Cl^- _____

Write the noble gas electron configuration for the following elements.

1. Tc _____
2. Pt _____
3. Mg _____

Draw the orbital diagram for the following elements.

1. C
2. S
3. Sc