

## AP Chemistry Summer Homework

([link if you want to type your work](#))

Welcome to the awesome and challenging world of a college level chemistry course. I am excited to meet you in August and get us started with our first FIRE and BRIMSTONE lab. This summer homework is a way to review chemistry concepts students should have seen in their first chemistry course. This summer homework is due by Friday of the first week of school and will be your first AP chemistry process grade- graded on completion. You will be able to use this homework on your first Chemistry Foundation Quiz.

**This will be a graded assignment with a significant amount of process points; it is MANDATORY.**

**This assignment is due the Friday of the first week back.**

On **Friday August 23rd, Chemistry Foundation Quiz** based on this homework will be given. It is an open note quiz which means this summer start your AP chemistry notes with key information and examples.

### Vocabulary Review from 1st Year Chemistry

Vocabulary Word	Definition	Drawing, Picture, Example
atom		
nucleus		
electrons		
protons		
neutrons		
ion		
polyatomic ion		
cation		
anion		
isotope		
electron configuration		
valence electrons		
lewis dot structure		
periodic trends		
atomic radius		
electronegativity		

<b>ionization energy</b>		
<b>ionic bond</b>		
<b>covalent bond</b>		
<b>compound</b>		
<b>molecule</b>		
<b>diatomic molecule</b>		
<b>mixture</b>		
<b>significant figures</b>		
<b>balanced equation</b>		
<b>combustion reaction</b>		
<b>double replacement reaction</b>		
<b>precipitation reaction</b>		
<b>aqueous</b>		
<b>solubility</b>		
<b>molar mass</b>		
<b>mole</b>		
<b>avogadro's number</b>		
<b>molarity</b>		
<b>limiting reagent</b>		
<b>ideal gas law</b>		
<b>gas constant</b>		
<b>temperature</b>		
<b>Kelvin</b>		

## Significant Figures

On the FRQ portion of the AP exam, sig figs will be graded for some of the mathematical answers. Since we don't know which answers will be graded for sig figs, it is important to have the correct number of sig figs for EVERY answer.

### Significant Figures Rules:

- All non-zero digits **DO** count.
  - 24 = 2
  - 3.56 = 3
- Leading zeros **DON'T** count.
  - (zeros in front of numbers)
  - 0.0025 = 2
- Captive Zeros **DO** count.
  - (zeros between non-zero numbers)
  - 1502 = 4      1.008 = 4
- Trailing Zeros **DO** count **IF** the number contains a **DECIMAL**.
  - (zeros at the end of numbers)
  - 100 = 1      2306.0 = 5      1.00 x 10<sup>3</sup> = 3

### Significant Figures in Calculations

<b>MULTIPLICATION</b>	<b>DIVISION</b>
<u>123.1</u> × <u>23</u> = <u>2800</u>	<u>123.1</u> / <u>23</u> = <u>5.4</u>
4 s.f.   2 s.f.   2 s.f.	4 s.f.   2 s.f.   2 s.f.

<b>ADDITION</b>	<b>SUBTRACTION</b>
<u>123.1</u> + 23 = 146	<u>123.1</u> - 23 = 100.
1 d.p.   0 d.p.   0 d.p.	1 d.p.   0 d.p.   0 d.p.

note: s.f. stands for "significant figures"  
d.p. stands for "digits to the right of the decimal point"

**Practice identifying the number of sig figs in each number and perform the calculations:**

200 → _____ sig figs 6,897 → _____ sig figs 9,273,507,235 → _____ sig figs 409.00 → _____ sig figs 0.0295 → _____ sig figs	560.0 → _____ sig figs 0.4096 → _____ sig figs 56 → _____ sig figs 0.000004 → _____ sig figs 87,098 → _____ sig figs
--	--

1.05 x 2.258 = \_\_\_\_\_

1000 / 2.51 = \_\_\_\_\_

20.0 x 14.5 = \_\_\_\_\_

400.1 / 10.0 = \_\_\_\_\_

134.56 + 1.234 = \_\_\_\_\_

100.0 + 109 = \_\_\_\_\_

10,950 + 12,000.1 = \_\_\_\_\_

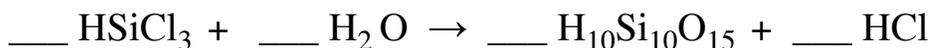
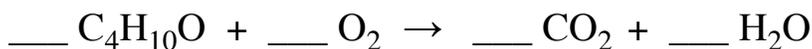
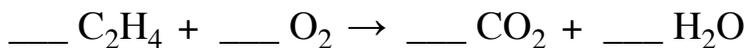
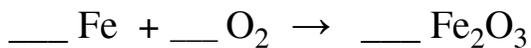
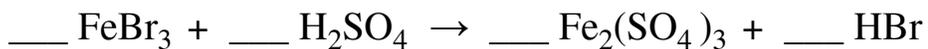
200. + 310 = \_\_\_\_\_

### Writing Formulas and Ionic vs Covalent (Molecular Compounds)

Name	Formula	Ionic OR Covalent??	
Magnesium nitrate			In summary, 1) Using the periodic table how do you know if a compound is ionic or covalent?  2) Using the name how do you know if a compound is ionic or covalent?
Phosphorus mononitride			
Magnesium chloride			
Dinitrogen trisulfide			
Nitrogen trichloride			
Barium nitride			
Carbon disulfide			
Sodium sulfate			

### Balancing Equations

**Directions:** write coefficients (the numbers in front of the compounds and elements) to balance all atoms in the reaction.



### Stoichiometry

1) When solid iron is exposed to oxygen ( $\text{O}_2$ ) gas in the air it forms rust, iron (III) oxide. Write the balanced equation for this reaction (using the smallest whole-number coefficients).

2) Aqueous solutions of copper (II) nitrate and sodium hydroxide are mixed. Determine the products for this double replacement reaction and write the balanced equation for this reaction (using the smallest whole-number coefficients).

3) During an electroplating process, 5.8625 moles of silver is deposited on a steel bar. How many grams of silver is this?

$$\underline{\hspace{10em}} =$$

4) A helium filled balloon has a total volume of 136,500 moles. How many Liters of helium are in the balloon? (22.4 Liters He = 1 mole of He)

		=
--	--	---

5) In a chemical reaction, 0.397 grams of chloroethane ( $C_2H_5Cl$ ) is produced. What is the moles of this amount of  $C_2H_5Cl$ ?

		=
--	--	---

6) In the reaction:  $Al_2S_3(s) + 6HCl(aq) \rightarrow 2AlCl_3(aq) + 3H_2S(g)$ , how many moles of HCl are used for 14 moles of  $AlCl_3$  formed?

		=
--	--	---

7) In the reaction  $Cu(s) + 2AgNO_3(aq) \rightarrow 2Ag(s) + Cu(NO_3)_2(aq)$ , what number of grams of copper are needed to produce 49.1 g of silver?

				=
--	--	--	--	---

8) If chlorine ( $\text{Cl}_2$ ) gas is bubbled through a potassium iodide solution, elemental iodine ( $\text{I}_2$ ) and potassium chloride is produced. Calculate the mass of  $\text{I}_2$  produced when 11.0 grams of potassium iodide gas is used.

Step 1: Write the balanced equation

Step 2: Determine grams of  $\text{I}_2$ .

				=
--	--	--	--	---

9) 10 grams of calcium hydroxide reacts with 12 grams of hydrobromic acid (hydrogen bromide). Determine the limiting reactant in this reaction.

Step 1: Write the balanced equation

Step 2: From 10 grams of  $\text{Ca}(\text{OH})_2$  determine how many grams of  $\text{H}_2\text{O}$  is produced..

				=
--	--	--	--	---

Step 3: From 12 grams of  $\text{HBr}$  determine how many grams of  $\text{H}_2\text{O}$  is produced..

				=
--	--	--	--	---

Step 4: Identify the limiting reactant.

## Ideal Gas Law Problem

From the ideal gas law equation  $PV = nRT$  calculate  $R$  and its units at standard temperature and pressure which means 1 atm, 22.4 L, 1 mole, and  $0^\circ\text{C}$ .

## Heat Problem

Heat energy is represented by the variable  $q$  with the unit Joules in the equation

$$q = mc\Delta T$$

$m$  = mass in grams

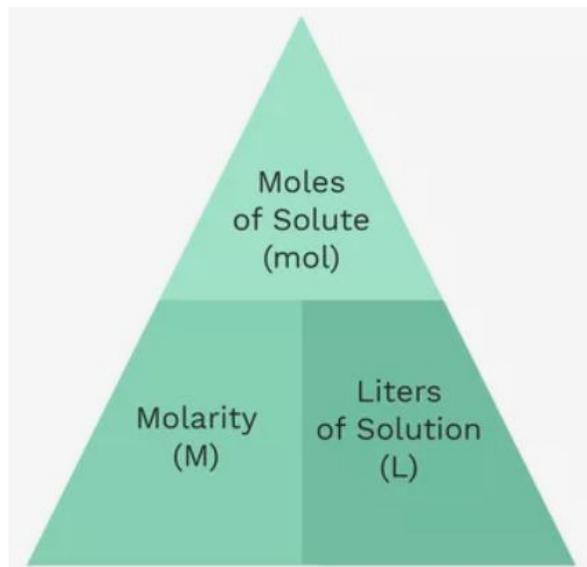
$c$  = specific heat in  $\text{J/g } ^\circ\text{C}$

$\Delta T = T_{\text{Final}} - T_{\text{initial}}$  in celsius

A 6.75 g sample of gold (specific heat capacity =  $0.130 \text{ J/g } ^\circ\text{C}$ ) is heated using 50.6 J of energy. If the original temperature of the gold is  $10.0^\circ\text{C}$ , what is its final temperature?

## Molarity

Molarity and unit conversions from mL to Liters is EVERYWHERE on the AP Chemistry Exam. Here is a [link](#) to a molarity tutorial.



### KING HENRY DIED DRINKING CHOCOLATE MILK

Mnemonic	King	Henry	Died	Base Unit	Drinking	Chocolate	Milk
Length: Abbreviation:	Kilometer km	Hectometer hm	Decameter dam	Meter m	Decimeter dm	Centimeter cm	Millimeter mm
Weight: Abbreviation:	Kilogram kg	Hectogram hg	Decagram dag	Gram g	Decigram dg	Centigram cg	Milligram mg
Volume: Abbreviation:	Kiloliter kL	Hectoliter hL	Decaliter daL	Liter L	Deciliter dL	Centiliter cL	Milliliter mL
How many are in 1 meter/gram/liter	.001	.01	.1	1	10	100	1000
How many meters/grams/liters are in this unit?	1000	100	10	1	.1	.01	.001
	← BIGGER				SMALLER →		

1. What is the molarity of a solution that contains 1.724 moles of  $\text{H}_2\text{SO}_4$  in 2.50 L of solution?
2. What is the molarity of a solution prepared by dissolving 25.0 g of HCl (g) in enough water to make 150.0 mL of solution?