

Name: _____ Date: _____

AP Chemistry Summer Assignment

Topics:

Topic 1: Rules and applications of significant figures (Sig Figs).

-Memorize the rules of sig figs and be able to apply them by completing page 1 practice problems.

-Once you get this down, do not forget these rules as you will be required to apply these rules to all numbers in AP Chemistry and beyond.

Topic 2: Metric System and Temperature Conversions.

-Use dimensional analysis to convert between different units of measurement. You should have done this quite a bit in Physics already, just remember to place your starting number and units first, then what you want to convert to over what you have.

-Dimensional analysis will become second nature to you in AP Chem and higher-level science classes, it is a super helpful tool to keep track of those pesky units. Practice applying the "picket fence method" (as I will refer to it) or the "factor label method" on page 2. You will also find the conversion equations for Fahrenheit, Celsius and Kelvin below.

Topic 3: Things to prepare for the first day of class.

-Memorize and make flash cards for the 20 common polyatomic ions. You are responsible for memorizing and knowing their formula, correctly spelled name, and their charge.

-Know where to find metals, transition metals, non-metals, noble gases, and metalloids on the periodic table. Please also memorize and make flash cards for the provided list of common ions and their symbols.

-I would also like you to memorize the periodic table (symbol and name) but you don't need to worry about that right now.

Note: I hope you all have a wonderful summer, I will periodically check my email (no pun intended) to see if you have questions during the summer. I am looking forward to hearing from each one of you, feel free to reach out any time with questions or just to say hi.

-Ms. Walker

Topic 1 Directions: Read the handout titled **Significant Figures** (Sig Figs) and **familiarize** yourself with the rules of sig figs. Please **memorize** these rules, the more you practice them the easier and more intuitive this will become. **If this topic sounds unfamiliar to you**, please **visit the links below** to **watch** some videos on the rules of Sig Figs **and take notes** on how they work when using measuring devices. Once you feel comfortable with the rules of significant figures **practice** using **these rules with the problems on page 1**.

Topic 1 Videos:

Rules of Significant Figures and Their Role in Measurement Explained:

<https://youtu.be/Gn97hpEkTiM?si=yNgXyJP3sobdiwDJ>



Quick Review of Significant Figures Video:

https://youtu.be/l2yuDvwYq5g?si=2UfsziELF_fOpB11



Topic 2 Directions: Metric and Temperature Conversions

Use the attached conversion factors sheet to help you convert between different SI units on the page 2 practice problems. Also please find below the equations for temperature conversions.

Equations:

$$^{\circ}\text{C} = \frac{5}{9} (^{\circ}\text{F} - 32)$$

$$^{\circ}\text{F} = \left(^{\circ}\text{C} \left(\frac{9}{5} \right) \right) + 32$$

$$\text{K} = ^{\circ}\text{C} + 273.15$$

Significant Figures

Rules for Determining Significant Figures:

Rule	Example
All non-zero digits are ALWAYS significant.	27 – 2 sig. figs.; both are significant because they are both non-zero
Zeros between significant figures are ALWAYS significant.	40.7 – 3 sig. figs.; 4 and 7 are non-zero and the zero falls between two significant figures.
Zeros at the end of a number and to the right of the decimal are ALWAYS significant.	85.00 – has four sig. figs. 8 & 5 are non-zero and the two zeros are at the end and to the right of the decimal.
All zeros that act as place holders are NOT significant.	2000 – 1 sig. fig.; the zeros at the end are place holders 0.000500 – 3 sig. figs.; zeros at the end & to the right of the decimal are significant, all other zeros are place holders.
All counting numbers and constants have an infinite number of significant digits.	5 apples – infinite number of sig. figs. ON THE OTHER HAND - 5.00 m has 3 sig. figs. Because it is measured and is indicating specificity to two places after the decimal.

Rules for Rounding with Significant Figures:

If the digit following the last digit to be retained is . . .	Then the last digit should . . .	Example (rounded to three significant figures)
greater than 5	rounded up (increased by 1)	42.68 g → 42.7 g
less than 5	stay the same	17.32 m → 17.3 m
5, followed by non-zero digit(s)	rounded up (increased by 1)	2.7851 cm → 2.79 cm
5, followed by zero AND preceded by an odd digit	rounded up (increased by 1)	4.635 kg → 4.64 kg (bc 3 is odd)
5, followed by zero AND the preceding significant digit is even	stay the same	78.65 mL → 78.6 mL (bc 6 is even)

Rules for Addition and Subtraction:

Rule	Example
1. For decimals, the sum or difference should have the same number of significant figures after the decimal point as the measurement with the fewest digits to the right of the decimal point.	25.1 g + 2.03 g = 27.1 g 3.70 mL – 0.493 mL = 3.21 mL 17 cm + 5.7 cm = 23 cm
2. For whole numbers, the final significant digit of the sum or difference should be the same as the final significant digit of the least precise measurement.	5400 g + 365 g = 5800 g 2710 mL – 1000 mL = 2000 mL

Rules for Multiplication and Division:

Rule	Example
The product or quotient should have no more significant figures than the given measurement with the fewest significant figures.	3.05 g ÷ 8.47 mL = 0.360 g/mL 3.7 m X 16.5 m = 61 m ² 18 g ÷ 2.34 cm ³ = 7.7 g/cm ³

Topic 1: Significant Figures

1. Determine the number of significant figures in each of the following:

- a. 0.7540 _____
- b. 12500 _____
- c. 1000.01 _____
- d. 1200 _____
- e. 1.04×10^3 _____
- f. 0.0080050 _____

2. Perform the following calculations and round to the appropriate number of significant figures:

- a. $34.66 + 333.0$ _____
- b. $1.23 + 9.66$ _____
- c. $455 - 1.22$ _____
- d. 18.2×1.998 _____
- e. $10.2 \div 1.34$ _____
- f.
$$\frac{100.23 + 59.4}{5.22}$$

3. Round each of the following numbers to three significant figures:

- a. 167.789 _____
- b. 0.00000445345 _____
- c. 25.0545 _____
- d. 3.1415926536 _____
- e. 8504.0435 _____
- f. 14.4355 _____

Topic 3 Directions:

Make flash cards of the 20 common poly atomic ions, note their charge, and formula on one side of the note card, and their name on the other side. Have these ready to turn in on the first day of class for a grade. Once you have these memorized tests your knowledge with the attached quiz on polyatomic ions. It is crucial that you keep these fresh in your mind all year long, as they will pop up a lot. Secondly, please make a set of flash cards and memorize the following common ions, their symbol, name, and charge, as they are exceptions to some of the rules I will teach you.

Resource for ions to know:

<https://byjus.com/chemistry/table-of-ions/>

COMMON POLYATOMIC IONS			
NH₄¹⁺	Ammonium	C₂H₃O₂¹⁻	Acetate
OH¹⁻	Hydroxide	ClO₄¹⁻	Perchlorate
CN¹⁻	Cyanide	ClO₃¹⁻	Chlorate
SO₄²⁻	Sulfate	ClO₂¹⁻	Chlorite
HSO₄¹⁻	Hydrogen sulfate	CrO₄²⁻	Chromate
SO₃²⁻	Sulfite	Cr₂O₇²⁻	Dichromate
NO₃¹⁻	Nitrate	MnO₄¹⁻	Permanganate
NO₂¹⁻	Nitrite	CO₃²⁻	Carbonate
PO₄³⁻	Phosphate	HCO₃¹⁻	Hydrogen carbonate
PO₃³⁻	Phosphite	C₂O₄²⁻	Oxalate

Element Symbol	Element Name	Charge(s)
B	Boron	3+,3-
C	Carbon	4+,4-
Si	Silicon	4+,4-
Cr	Chromium	2+,3+,6+
Mn	Manganese	2+,4+,7+
Fe	Iron	2+,3+
Cu	Copper	1+,2+
Zn	Zinc	2+
Pb	Lead	2+,4+
Ni	Nickel	2+

Name: _____ Period: _____ Date: _____

Directions: Given the following, fill in the missing information for each polyatomic ion in the chart below. Good luck!

Polyatomic Ion	Name	Charge
	Permanganate	
NO ₂		1-
	Cyanide	
	Oxalate	2-
ClO ₂		
ClO ₃		
	Perchlorate	1-
SO ₄		
	Sulfite	2-
	Phosphate	
	Acetate	
NH ₄		1+
CO ₃		
Cr ₂ O ₇		2-
PO ₃		
	Hydrogen sulfate	
	Chromate	
NO ₃		1-
	Hydroxide	
	Hydrogen carbonate	