

AP Chemistry Summer Assignment

AP Chemistry Student,

Welcome to AP Chemistry. I am eagerly anticipating a great year of Chemistry. In order to ensure the best start for everyone next fall, I have prepared a summer assignment that reviews basic chemistry concepts.

Please refer to my school website, summer assignment, for screencasts that will assist you with the theory needed to complete the questions found within this packet.

It will be important for everyone to come to class the first day prepared. While I review, extensive remediation is not an option as we work towards our goal of being 100% prepared for the AP Exam in early May.

I recommend that you spread out the summer assignment. Please do not try to complete it all in the final week of the summer. Chemistry takes time to process and grasp at a level necessary for success in AP Chemistry. Remember, AP Chemistry is an equivalent course to Introductory Chemistry in college. Taking a college level course in high school is difficult, requires dedication, and is a great investment in your education so prepare yourself and arrive ready to learn.

Lastly, if you put in the time and effort you will do just fine in the course. If you are going to try to cut corners or don't plan on doing the work, this course isn't going to be a good fit.

You will need the following for the first day of class

- 3-ring binder.
- Graphing Calculator
- A folder that has 3 clasps to hold your labs

If you have **ANY** questions or concerns email me any day @: rcolascione@csh.k12.ny.us
I will respond as soon as possible.

Have a great summer and enjoy the chemistry.

Dr. C

P.S.

I will share a google drive link to your school email address, so you can access helpful screencasts. Also, Use the summer assignment tidbits

Name _____

Please Complete the following questions... This assignment is due the first day of school.
Late assignments cannot be accepted.

Please provide the formulas for the following Polyatomic ions:
remember the charge MUST be correct

Name	Formula	Name	Formula
a) Acetate	_____	b) Ammonium	_____
c) Carbonate	_____	d) Chlorate	_____
e) Chlorite	_____	f) Chromate	_____
g) Cyanide	_____	h) Dichromate	_____
i) Dihydrogen Phosphite	_____	j) Dihydrogen Phosphate	_____
k) Hydrogen Carbonate	_____	l) Hydrogen Sulfate	_____
m) Hydrogen Sulfite	_____	n) Hypochlorite	_____
o) Hydroxide	_____	p) Nitrate	_____
q) Nitrite	_____	r) Oxalate	_____
s) Perchlorate	_____	t) Permanganate	_____
u) Peroxide	_____	v) Phosphate	_____
w) Sulfate	_____	x) Sulfite	_____

Which of the following compounds are soluble in water? (Sol / Insol)

- | | |
|-------------------------------|-------------------------------|
| a. Calcium carbonate _____ | b. Ammonium phosphate _____ |
| c. Sodium chloride _____ | d. Aluminum carbonate _____ |
| e. Calcium sulfate _____ | f. Zinc nitrite _____ |
| g. Magnesium acetate _____ | h. Potassium cyanide _____ |
| i. Cobalt (II) nitrate _____ | j. Iron (III) phosphate _____ |
| k. Nickel (II) chloride _____ | l. Copper I Oxide _____ |

Significant figures (digits) and Scientific notation

1..How many significant figures are in each of the following?

- | | | |
|----------------------------|---------------------------------|---------------------------------------|
| a. 1.92 mm _____ | b. 0.030100 kJ _____ | c. 6.022×10^{23} atoms _____ |
| d. 460.00 L _____ | e. 0.00036 cm^3 _____ | f. 100 beakers _____ |
| g. 1001 thermometers _____ | h. 0.001 g _____ | i. 0.0101 moles _____ |

2.. Record the following in correct scientific notation...use provide proper units and sig figs

- a. 350,000,000 cal _____
- b. 0.0000721 mol _____
- c. 0.0000000809 Å _____
- d. 765,400,000,000 atoms _____

3.. In the following calculations report your answers with proper units and sig figs

- a. $1.27 \text{ g} / 5.296 \text{ cm}^3$ _____
- b. $12.235 \text{ g} / 1.01 \text{ L}$ _____
- c. $12.2 \text{ g} + 0.38 \text{ g}$ _____
- d. $17.3 \text{ g} + 2.785 \text{ g}$ _____
- e. $2.1 \text{ cm} \times 3.21 \text{ cm}$ _____

Mole conversions..... All work using dimensional analysis must be shown
Formula mass must always be calculated to the 100ths place
Report all math calculations in proper sig figs

$$1 \text{ mole} = 6.02 \times 10^{23} \text{ molecules/atoms/particles} = \frac{\text{Molar Mass}}{\text{Gram formula mass (g)}} = 22.4 \text{ L of gas @ STP}$$

All dimensional analysis must be shown for credit.

1. Ibuprofen, the active ingredient in Advil, is classified as a nonsteroidal anti-inflammatory drug. It reduces pain by decreasing inflammation (swelling). The chemical formula for ibuprofen is $\text{C}_{13}\text{H}_{18}\text{O}_2$.

- a.. Calculate the molar mass of ibuprofen.
 - b.. How many molecules of ibuprofen would be present in 35 g of ibuprofen?
 - c.. How many hydrogen atoms would be present in 100. g of ibuprofen?
2. What mass of sodium carbonate would contain 7.1×10^{24} particles?
3. How many carbon atoms are present in 75 grams of octane, C_8H_{18} ?
4. The density of aluminum is 2.70 g/cm^3 . How many aluminum atoms are in a sheet of aluminum foil measuring 18 cm x 25 cm x 0.20 cm?

Writing Formulas and Naming Compounds:

Name each of the following compounds

NaCl		AlI ₃		BaSO ₃	
Rb ₂ O		Al ₂ O ₃		KMnO ₄	
FeBr ₃		ZnCl ₂		Sr ₃ P ₂	
Cr ₂ O ₃		Li ₃ N		Ca ₃ (PO ₄) ₂	
CaBr ₂		Ag ₂ S		Pb(NO ₃) ₂	
CsF		KClO ₄		NaNO ₂	
CaS		Al ₂ (SO ₄) ₃		K ₂ Cr ₂ O ₇	

Name each of the following molecules (prefix method)

NI ₃		ICl ₃	
PCl ₃		SF ₂	
SO ₂		N ₂ F ₄	
N ₂ O ₄		P ₂ S ₅	

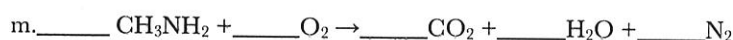
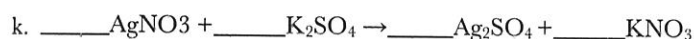
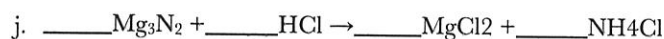
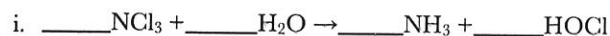
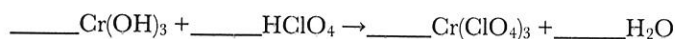
Name the following acids

HCl		HC ₂ H ₃ O ₂	
H ₃ PO ₄		H ₂ SO ₄	
H ₂ SO ₃		HF	

Write the formula for each of the following compounds/molecules/and acids

Cesium bromide		Chromium (III) carbonate	
Barium sulfate		Tin (II) fluoride	
Chlorine trifluoride		Lead (IV) sulfide	
Ammonium chloride		Copper (I) chloride	
Beryllium oxide		Cadmium selenide	
Chlorine monoxide		Zinc sulfide	
Magnesium fluoride		Ammonium hydrogen phosphate	
Sodium oxide		Ammonium acetate	
Sodium peroxide		Ammonium hydrogen sulfate	
Potassium cyanide		Cobalt (III) nitrate	
Copper (II) nitrate		Copper (I) sulfide	
Silicon tetrafluoride		Potassium chlorate	
Lead (II) sulfide		Lithium oxalate	
Sulfur difluoride		Hydrobromic acid	
Sulfur hexafluoride		Hypobromous acid	
Sodium dihydrogen phosphate		Perchloric acid	
Silicon tetrachloride		Silicon dioxide	
Lithium nitride		Sodium sulfate	

Balance the following reactions

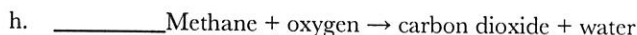
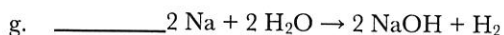
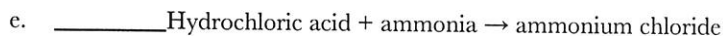
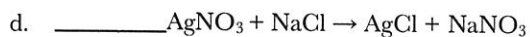
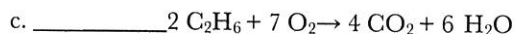
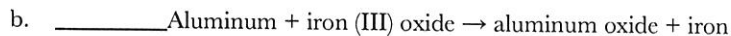


Write balanced chemical equations to correspond to each of the following descriptions.

- When solid potassium chlorate is heated it decomposes to form solid potassium chloride and oxygen.
- Solid zinc metal reacts with sulfuric acid to form hydrogen gas and an aqueous solution of zinc sulfate.
- When liquid phosphorous trichloride is added to water, it reacts to form aqueous phosphorous acid, and hydrochloric acid.
- When hydrogen sulfide gas is passed over solid hot iron (III) hydroxide, the resultant reaction produces solid iron (III) sulfide and water vapor.

Indicate what type of reaction is represented in the following equations.

A. Synthesis B. Decomposition C. Single replacement D. Double replacement E. Combustion



Report all answers with proper units when necessary and with proper sig figs

1. White gold is an alloy that typically contains 45.0% by mass gold and the remainder is platinum. If 154 g of gold are available, how many grams of platinum are required to combine with the gold to form this alloy?

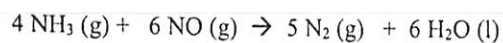
2. What is the empirical formula of a compound that contains 53.73% Fe and 46.27% of S ?

3. In an experiment, a student gently heated a hydrated copper compound to remove the water of hydration. The following data was recorded:
 1. Mass of crucible, cover, and contents before heating.....23.4 g.
 2. Mass of empty crucible and cove.....18.82 g.
 3. Mass of crucible, cover, and contents after heating to constant mass...20.94 g.Calculate the experimental percent of water in the compound.

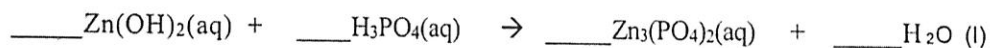
Stoichiometry: Report all answer with proper units and sig figs

All work must be presented using dimensional analysis for credit.

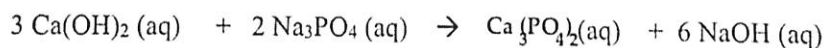
- a.. One way to remove Nitrogen Oxide (NO) from smokestack emissions is to react it with ammonia:
How many moles of water can be produced when 3.1 moles of NH_3 (g) reacts?



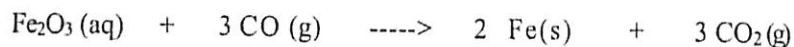
- b.. Based on the following equation, how many moles of each product are produced when 5.9 moles of $\text{Zn}(\text{OH})_2$ are reacted with excess H_3PO_4 ? (*You need to balance the equation.*)



- c.. How many grams of calcium hydroxide will be needed to completely react with 29.5 g of sodium phosphate?



- d.. Based on the following equation, what would be the minimum amount of carbon monoxide used if you need to produce 18.7 g of Fe?

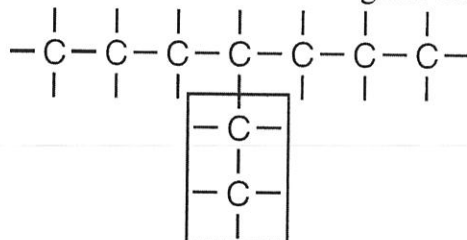


Organic Chemistry

1. What is the chemical name for the compound $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_3$?

- A) butane B) butene
C) decane D) decene

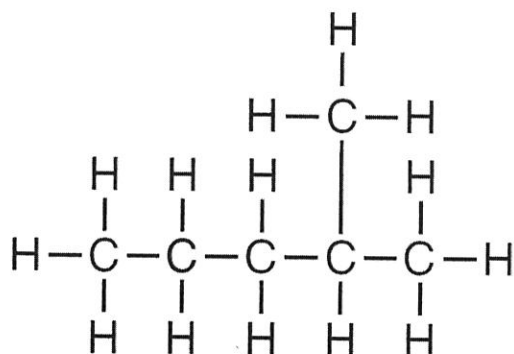
2. Given the formula for an organic compound:



What is the name given to the group in the box?

- A) butyl B) ethyl
C) methyl D) propyl

3. What is the IUPAC name of the organic compound that has the formula shown below?



- A) 1,1-dimethylbutane B) 2-methylpentane
C) hexane D) 4-methylpentane

4. Which formula represents an unsaturated hydrocarbon?

- A) $\begin{array}{c} \text{H} \quad \text{H} \\ | \quad | \\ \text{H}-\text{C}-\text{C}-\text{H} \\ | \quad | \\ \text{H} \quad \text{H} \end{array}$ B) $\begin{array}{c} \text{H} \quad \quad \text{H} \\ \diagdown \quad \diagup \\ \text{C}=\text{C} \\ \diagup \quad \diagdown \\ \text{H} \quad \quad \text{H} \end{array}$
C) $\begin{array}{c} \text{H} \quad \text{H} \\ | \quad | \\ \text{H}-\text{C}-\text{C}-\text{H} \\ | \quad | \\ \text{H} \quad \text{Cl} \end{array}$ D) $\begin{array}{c} \text{H} \quad \quad \text{H} \\ \diagdown \quad \diagup \\ \text{C}=\text{C} \\ \diagup \quad \diagdown \\ \text{H} \quad \quad \text{Cl} \end{array}$

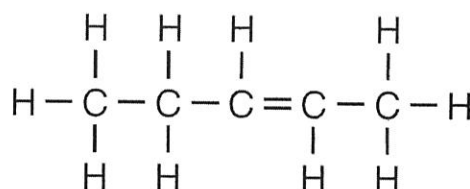
5. Natural gas is mostly comprised of

- A) butane B) ethane
C) methane D) propane

6. The compound C_4H_{10} belongs to the series of hydrocarbons with the general formula

- A) C_nH_{2n} B) $\text{C}_n\text{H}_{2n+2}$
C) $\text{C}_n\text{H}_{2n-2}$ D) $\text{C}_n\text{H}_{2n-6}$

7. Given the formula representing a compound:



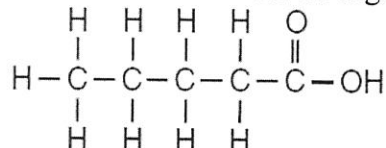
What is a chemical name of this compound?

- A) 2-pentene B) 2-pentyne
C) 3-pentene D) 3-pentyne

8. Which structural formula represents propene?

- A) $\begin{array}{c} \text{H} \quad \text{H} \quad \text{H} \\ | \quad | \quad | \\ \text{H}-\text{C}=\text{C}-\text{C}-\text{H} \\ | \\ \text{H} \end{array}$ B) $\begin{array}{c} \text{H} \\ | \\ \text{H}-\text{C}\equiv\text{C}-\text{C}-\text{H} \\ | \\ \text{H} \end{array}$
C) $\begin{array}{c} \text{H} \quad \quad \text{H} \\ | \quad \quad | \\ \text{H}-\text{C}=\text{C}=\text{C}-\text{H} \end{array}$ D) $\begin{array}{c} \text{H} \quad \text{H} \quad \text{H} \\ | \quad | \quad | \\ \text{H}-\text{C}-\text{C}-\text{C}-\text{H} \\ | \quad | \quad | \\ \text{H} \quad \text{H} \quad \text{H} \end{array}$

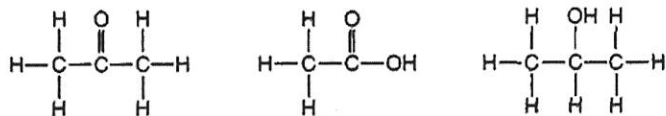
9. Given the formula for an organic compound:



This compound is classified as an

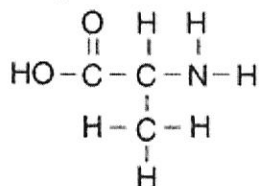
- A) aldehyde B) amine
C) ester D) organic acid

10. Given the three organic structural formulas shown below:

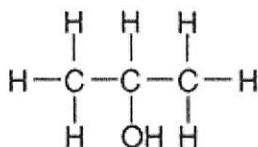


Which organic compound classes are represented by these structural formulas, as shown from left to right?

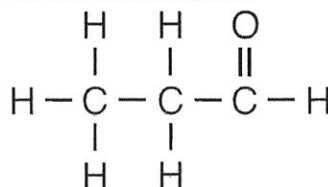
- A) ester, organic acid, ketone
 B) ester, aldehyde, organic acid
 C) ketone, aldehyde, alcohol
 D) ketone, organic acid, alcohol
11. The molecule below belongs to which class of compounds?



- A) alcohol
 B) ester
 C) aldehyde
 D) amino acid
12. The formula of methanoic acid is
- A) HCHO
 B) HCOOH
 C) CH₃OH
 D) HCOOCH₃
13. Which type of organic compound is represented by the structural formula shown below?

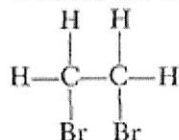


14. Given the formula:

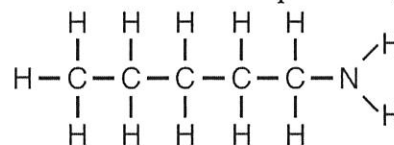


What is the chemical name of this compound?

- A) propane
 B) propanal
 C) propanol
 D) propanone
15. What is the IUPAC name for the compound below?



- A) dibromoethyne
 B) dibromoethane
 C) 1, 2-dibromoethyne
 D) 1, 2-dibromoethane
16. Given the formula representing a molecule:

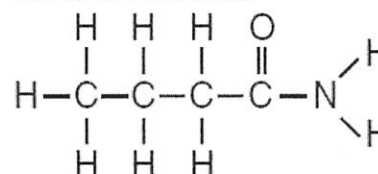


A chemical name for this compound is

- A) pentanone
 B) 1-pentanol
 C) 1-pentanamine
 D) pentanamide
17. Which class of organic compounds contains nitrogen?

- A) aldehyde
 B) alcohol
 C) amine
 D) ether

18. Given the formula:



This compound is classified as

- A) an aldehyde
 B) an amide
 C) an amine
 D) a ketone

19. Which formula represents an ether?

- A) $\text{CH}_3-\overset{\text{O}}{\parallel}{\text{C}}-\text{O}-\text{CH}_3$ B) $\text{CH}_3-\overset{\text{O}}{\parallel}{\text{C}}-\text{OH}$
C) $\text{CH}_3-\text{O}-\text{CH}_3$ D) CH_3-OH

20. Which structural formula represents diethyl ether?

- A) $\begin{array}{ccccccc} \text{H} & \text{H} & & \text{H} & \text{H} \\ | & | & & | & | \\ \text{H}-\text{C}-\text{C}-\text{O}-\text{C}-\text{C}-\text{H} \\ | & | & & | & | \\ \text{H} & \text{H} & & \text{H} & \text{H} \end{array}$ B) $\begin{array}{ccccccc} \text{H} & \text{H} & \text{OH} & \text{H} \\ | & | & | & | \\ \text{H}-\text{C}-\text{C}-\text{C}-\text{C}-\text{H} \\ | & | & | & | \\ \text{H} & \text{H} & \text{H} & \text{H} \end{array}$
C) $\begin{array}{ccc} \text{OH} & \text{OH} \\ | & | \\ \text{H}-\text{C}-\text{C}-\text{H} \\ | & | \\ \text{H} & \text{H} \end{array}$ D) $\begin{array}{ccc} \text{H} & & \text{H} \\ | & & | \\ \text{H}-\text{C}-\text{O}-\text{C}-\text{H} \\ | & & | \\ \text{H} & & \text{H} \end{array}$

You did it!!!!!! Go to the pool, stay up all night, sleep in, go on vacation..... because when we meet again we will only have 155 days to prepare for the AP CHEM TEST! –

“Perseverance is the hard work you do after you get tired of doing the hard work you already did!