

AP Chemistry Pre-AP Assignment

This is a list of your pre-AP assignments for AP Chemistry next year. vAP Chemistry is an extremely fast paced course and it is necessary that you come to this course ready to work from Day 1. It will be very important for you to **read each and every chapter** several times in order to get the maximum benefit out of this course. We will begin by reviewing what you have done in Chemistry I. This is basically the first three chapters of the book. We will have a test over these three chapters the second week of school. I will ask that you thoroughly read and take notes on the first two chapters prior to the first day of class, so that you are well prepared to take on even more challenges as the days and weeks go on. Note-cards can be a valuable tool as you begin to get into college level work. These cards should contain important notes and explanations on one side, with key words on the other. It is important that you be able to explain processes as well as solve problems. In addition, you may want to review your Chemistry I notes pertaining to each section and place these on note cards as well (I strongly encourage you to do this, since it will be expected that you remember details that were covered in Chem. I).

The following assignment will be reviewed in class beginning on the first day of school. I will take questions on any problems you may have had from this assignment on the first few days of class. Therefore, you need to have your material with you on the first day. Please come prepared.

Please take join the AP Chemistry Remind by texting @ap-chem-hc to the number 81010 or down load the remind app and search with class code ap-chem-hc. If you have any questions, please email me at charlena.raines@henry.k12.ga.us or send questions through the AP chemistry remind. Do not wait until the last minute to do these assignment as it will take a while to complete. You will not be able to do all of this the week before school starts.

II: Nomenclature

1. Name these binary compounds of two nonmetals.

IF₇ _____ N₂O₅ _____ XeF₂ _____ PCl₃ _____
N₂O₄ _____ As₄O₁₀ _____ SF₆ _____ S₂Cl₂ _____

2. Name these binary compounds with a fixed charge metal.

AlCl₃ _____ MgO _____ BaI₂ _____ CaF₂ _____
KI _____ SrBr₂ _____ Na₂S _____ Al₂O₃ _____

3. Name these binary compounds of cations with variable charge.

CuCl₂ _____ Fe₂O₃ _____ SnO _____ AuI₃ _____
PbCl₄ _____ Cu₂S _____ HgS _____ CoP _____

4. Name these compounds with polyatomic ions.

Fe(NO₃)₃ _____ NaOH _____ Cu₂SO₄ _____ NH₄NO₂ _____
Ca(ClO₃)₂ _____ KNO₂ _____ NaHCO₃ _____ Cu₂Cr₂O₇ _____

5. Name these binary acids

HCl _____ HI _____ HBr _____

6. Name these acids with polyatomic ions.

HClO₄ _____ H₂SO₄ _____ HC₂H₃O₂ _____ H₂C₂O₄ _____
H₃PO₄ _____ HNO₂ _____ H₂CrO₄ _____ H₂CO₃ _____

7. Name these compounds appropriately.

CO _____ NH₄CN _____ HIO₃ _____ NI₃ _____
AlP _____ OF₂ _____ LiMnO₄ _____ HClO _____
HF _____ SO₂ _____ CuCr₂O₇ _____ K₂O _____
FeF₃ _____ KC₂H₃O₂ _____ MnS _____

8. Write the formulas.

Tin (IV) phosphide _____ copper (II) cyanide _____ Magnesium hydroxide _____
sodium peroxide _____ Sulfurous acid _____ lithium silicate _____
Potassium nitride _____ chromium (III) carbonate _____ Gallium arsenide _____
cobalt (II) chromate _____ Zinc fluoride _____ dichromic acid _____

II. Use factor labeling method to convert the following: Must show your work

- | | |
|------------------------------|-----------------------------------|
| 1. 515 m = _____ miles. | 5. 10 kilometers into meters |
| 2. 200 in = _____ meters | 6. 15,050 milligrams into grams |
| 3. 325 days = _____ seconds. | 7. 3,264 milliliters into liters |
| 4. 20 gallons = _____ ml | 9. 9,674,444 grams into kilograms |

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

- | | |
|---------------------------------|-----------|
| 1) 1.92 mm | 6) 100 |
| 2) 0.030100 kJ | 7) 1001 |
| 3) 6.022×10^{23} atoms | 8) 0.001 |
| 4) 460.00 L | 9) 0.0101 |
| 5) 0.00036 cm^3 | |

Calculate the following to the correct number of significant figures.

- | | |
|--|----------------------------------|
| 1) $1.27 \text{ g} / 5.296 \text{ cm}^3$ | 5) 2.1×3.21 |
| 2) $12.235 \text{ g} / 1.01 \text{ L}$ | 6) 200.1×120 |
| 3) $12.2 \text{ g} + 0.38 \text{ g}$ | 7) $17.6 + 2.838 + 2.3 + 110.77$ |
| 4) $17.3 \text{ g} + 2.785 \text{ g}$ | |

IV. Record the following in correct scientific notation:

- | | |
|--------------------|-------------------------------|
| 1) 350,000,000 cal | 3) 0.0000000809 \AA |
| 2) 0.0000721 mol | 4) 765,400,000,000 atoms |

V. Reactions

In each of the equations below, the reactants are written correctly. You must write the correct products and then balance the equation. Identify the type of chemical reaction before writing the products.

- | | |
|---|---|
| 1. $\text{CaCO}_3 \rightarrow$ | 17. $(\text{NH}_4)_3\text{PO}_4 + \text{Ba}(\text{OH})_2 \rightarrow$ |
| 2. $\text{Al} + \text{O}_2 \rightarrow$ | 18. $\text{Ca}(\text{OH})_2 + \text{HNO}_3 \rightarrow$ |
| 3. $\text{Fe} + \text{CuSO}_4 \rightarrow$ | 19. $\text{C}_3\text{H}_8 + \text{O}_2 \rightarrow$ |
| 4. $\text{C}_6\text{H}_{12} + \text{O}_2 \rightarrow$ | 20. $\text{Li} + \text{S} \rightarrow$ |
| 5. $\text{Zn} + \text{H}_2\text{SO}_4 \rightarrow$ | 21. Solid sodium bicarbonate is mixed with copper (II) nitrate. |
| 6. $\text{Cl}_2 + \text{MgI}_2 \rightarrow$ | 22. Magnesium oxide is heated. |
| 7. $\text{NaOH} \rightarrow$ | 23. Acetic acid is added to a solution of ammonia. |
| 8. $\text{Fe} + \text{HCl} \rightarrow$ | 24. Iron (III) chloride is mixed with silver sulfite. |
| 9. $\text{NaOH} + \text{H}_3\text{PO}_4 \rightarrow$ | 25. A solid piece of aluminum is put into a solution of nickel (II) chloride. |
| 10. $(\text{NH}_4)_2\text{SO}_4 + \text{Ca}(\text{OH})_2 \rightarrow$ | 26. A solution of lithium chloride is added to a solution of lead (IV) nitrite. |
| 11. $\text{AgNO}_3 + \text{K}_2\text{SO}_4 \rightarrow$ | 27. Sulfuric acid is added to a solution of aluminum hydroxide. |
| 12. $\text{Mg}(\text{OH})_2 + \text{H}_3\text{PO}_4 \rightarrow$ | 28. Cadmium nitrate is added to sodium sulfide. |
| 13. $\text{Na} + \text{H}_2\text{O} \rightarrow$ | 29. Chromium (III) sulfate is added to ammonium carbonate. |
| 14. $\text{KClO}_3 \rightarrow$ | 30. Methane combusts in air. |
| 15. $\text{Al}_2(\text{SO}_4)_3 + \text{Ca}_3(\text{PO}_4)_2 \rightarrow$ | |
| 16. $\text{SO}_2 + \text{H}_2\text{O} \rightarrow$ | |

VI. Electron Structure and Periodicity

1. Draw the orbital (arrow) notation for nickel.
2. How many unpaired electrons are in arsenic?
3. Write the electron configuration for palladium.
4. How many valence electrons are in mercury?
5. Write the noble gas electron configuration for uranium.
6. Write the noble gas electron configuration for lead.
7. Which is more electronegative, sulfur or chlorine, and why?
8. Which has a larger atomic radius, potassium or bromine, and why?
9. Which has the smaller ionization energy, nitrogen or phosphorus, and why?
10. Write the noble gas electron configuration for copper.
11. Given the data below determine the average atomic mass

Isotope	% Abundance	Isotopic Mass
Sb-121	57.25%	120.9038 amu
Sb-123	42.75%	122.0041 amu

VII. Mole Concept Sample Problems

1. Convert each of the following to moles.
 - a. 12.64 g NaOH
 - b. 3.00×10^{24} atoms Au
 - c. 40.0 L of Ne gas

b. 800. g CaBr_2 d. 3.011×10^{22} molecules H_2O f. 6.78 L of Ar gas

2. Given 0.250 moles of Sulfur trioxide determine

a. the mass

b. the number of atoms

c. the volume at STP

VIII. Stoichiometry

- 30.5 g of sodium metal reacts with a solution of excess lithium bromide. How many grams of lithium metal are produced?
- How many molecules are in 100 L of Carbon dioxide at STP?
- Propane, C_3H_8 , undergoes combustion. How many grams of propane are needed to produce 45.9 g of water?
- How many moles are in 3.02×10^{26} molecules of water?
- Find the empirical and molecular formulas for a compound containing 11.66 g iron and 5.01 g oxygen if the molar mass of the compound is 320 g/mol.
- A solution of 3.50 g of sodium phosphate is mixed with a solution containing 6.40 g of barium nitrate. How many grams of barium phosphate can be formed?
- Find the empirical and molecular formulas for a compound containing 5.28 g of tin and 3.37 g of fluorine if the molar mass of the compound is 584.1 g/mol.
- Octane, C_8H_{18} , undergoes combustion. How many grams of oxygen are needed to burn 10.0 g of octane?
- Sodium azide, NaN_3 , decomposes into its elements. How many grams of sodium azide are required to form 34.8 g of nitrogen gas?
- Ammonia reacts with oxygen gas to form nitrogen monoxide and water. How many grams of nitrogen monoxide are formed when 1.50 g of ammonia react with 2.75 g of oxygen gas?

Items to Memorize:

Name	Formula	Name	Formula	Name	Formula	Strong Acids
acetate	$\text{C}_2\text{H}_3\text{O}_2^-$	ferric	Fe^{3+}	oxalate	$\text{C}_2\text{O}_4^{2-}$	HCl
aluminum	Al^{3+}	ferrous	Fe^{2+}	perbromate	BrO_4^-	HBr
ammonium	NH_4^+	hydronium	H_3O^+	perchlorate	ClO_4^-	HI
bicarbonate	HCO_3^-	hydroxide	OH^-	periodate	IO_4^-	H_2SO_4
bisulfate	HSO_4^-	hypobromite	BrO^-	permanganate	MnO_4^-	HNO_3
bisulfide	HS^-	hypochlorite	ClO^-	peroxide	O_2^{2-}	HClO_3
bisulfite	HSO_3^-	hypoiodite	IO^-	phosphate	PO_4^{3-}	HClO_4
bromate	BrO_3^-	iodate	IO_3^-	phosphite	PO_3^{3-}	Strong Bases
bromite	BrO_2^-	iodite	IO_2^-	phosphide	P^{3-}	LiOH
carbonate	CO_3^{2-}	lead	Pb^{2+}	silver	Ag^+	NaOH
chlorate	ClO_3^-	manganese	Mn^{2+}	stannic	Sn^{4+}	KOH
chlorite	ClO_2^-	mercuric	Hg^{2+}	stannous	Sn^{2+}	RbOH
chromate	CrO_4^{2-}	mercurous	Hg_2^{2+}	strontium	Sr^{2+}	CsOH
chromium	Cr^{3+}	nickel	Ni^{2+}	sulfate	SO_4^{2-}	$\text{Ca}(\text{OH})_2$
cupric	Cu^{2+}	nitrate	NO_3^-	sulfite	SO_3^{2-}	$\text{Sr}(\text{OH})_2$
cuprous	Cu^+	nitride	N^{3-}	sulfide	S^{2-}	$\text{Ba}(\text{OH})_2$
cyanide	CN^-			thiocyanate	SCN^-	
dichromate	$\text{Cr}_2\text{O}_7^{2-}$			Zinc	Zn^{2+}	

Name and charges for elements in the following groups.

Group 1 or 1a all +1 charge

Group 2 or 2a all +2 charge

Group 17 or 7a all -1 charge, and name ends in -ide [example: Chloride is Cl^{-1}]

Solubility Rules

Always soluble: alkali metal ions (Li^+ , Na^+ , K^+ , Rb^+ , Cs^+), NH_4^+ , NO_3^- , ClO_3^- , ClO_4^- , $\text{C}_2\text{H}_3\text{O}_2^-$, HCO_3^- ,

Generally soluble: Cl^- , Br^- , I^- excepts [are insoluble] Ag^+ , Pb^{2+} , Hg_2^{2+}
 F^- except [are insoluble] Ca^{2+} , Sr^{2+} , Ba^{2+} , Pb^{2+} , Mg^{2+}
 SO_4^{2-} except [are insoluble] Ca^{2+} , Sr^{2+} , Ba^{2+} , Pb^{2+}

Generally insoluble:

O^{2-} , OH^- Insoluble except alkali metal ions and NH_4^+

Ca^{2+} , Sr^{2+} , Ba^{2+} somewhat soluble

CO_3^{2-} , PO_4^{3-} , S^{2-} , SO_3^{2-} , $\text{C}_2\text{O}_4^{2-}$, CrO_4^{2-} Insoluble except with alkali metals and NH_4^+