

AP Chemistry Summer Work

When solving problems **SHOW ALL WORK** and use proper sig digs.

1. Match the scientist to their contribution to the nuclear atom .

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|--|----------------------|
| _____ Greek philosopher, matter is composed of atoms | A. JJ Thompson |
| _____ Law of Constant Composition, first modern Law of atomic theory | B. Ernest Rutherford |
| _____ Discovered the nucleus of the atom, electrons in empty space | C. John Dalton |
| _____ Characteristics of an electron, plum pudding model | D. Neils Bohr |
| _____ Solar system model of the atom | E. Democritus |
| _____ Uncertainty Principle | F. Schrodinger |
| _____ Probability relationship for location of the e ⁻ | G. Heisenberg |

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

- A) $^{44.96}\text{Sc}$
- B) $^{118.7}\text{Sn}^{+2}$
- C) $^{78.96}\text{Se}^{-2}$

3. Write the correct formula for the following compounds.

- A) Magnesium sulfate
- B) Copper (II) carbonate
- C) Sulfur trioxide
- D) Silver nitride
- E) Hydrosulfuric acid
- F) Phosphoric acid

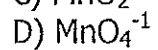
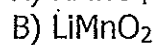
4. Write the correct name for the following compounds.

- A) $\text{Cr}(\text{NO}_3)_3$
- B) NH_4Cl
- C) $\text{Zn}(\text{OH})_2$
- D) P_2S_3
- E) HBr

F) HClO_2

5. An 8.47gram sample of a solid is placed in a 25.00mL flask. The remaining volume in the flask is filled with benzene in which the solid is insoluble. The solid and benzene together weigh 24.54grams. The density of the benzene is 0.879g/mL. What is the density of the solid?
6. How many glucose molecules ($\text{C}_6\text{H}_{12}\text{O}_6$) are in 5.23 grams?
7. A 5.325gram sample of methyl benzoate, a compound used in manufacturing of perfumes, is found to contain 3.758g of carbon, 0.316 g of hydrogen, and 1.251g of oxygen. What is the empirical formula for this compound?
8. Phosphorus has a molecular formula of P_4 and sulfur has a molecular formula of S_8 . How many grams of phosphorus contain the same number of molecules as 6.41g of sulfur?
9. A 2.00g mixture of KCl and KClO_3 is found to contain 22.4% oxygen by mass. Determine the percent of KCl in this mixture.
10. Write balanced molecular equations and balanced net ionic equations for the following.
 - A) $\text{CuCl}_{2(\text{aq})} + \text{Na}_2\text{S}_{(\text{aq})} \rightarrow$
 - B) $\text{NiSO}_{4(\text{aq})} + \text{KOH}_{(\text{aq})} \rightarrow$
 - C) $\text{Hg}_2(\text{NO}_3)_{2(\text{aq})} + \text{CaCl}_{2(\text{aq})} \rightarrow$
 - D) $\text{Cl}_{2(\text{g})} + \text{NaI}_{(\text{aq})} \rightarrow$
 - E) $\text{C}_2\text{H}_4_{(\text{g})} + \text{O}_2_{(\text{g})} \rightarrow$
11. A compound contains only carbon, hydrogen, and oxygen. Combustion of 10.68mg. of the compound yields 16.01mg of CO_2 and 4.37mg of H_2O . The molar mass of the compound is 176.1g/mol. What are the empirical and molecular formulas of the compound?
12. Mercury and bromine will react to produce mercury (II) bromide.
 - A) What mass of HgBr_2 can be produced from the reaction of 10.0g of Hg and 9.00g of Br_2 ? What mass of which reagent is left unreacted?
 - B) What mass of HgBr_2 can be produced from the reaction of 5.00mL of mercury (density=13.6g/mL) and 5.00mL bromine(density=3.10g/mL).
13. How would you prepare a 0.50M solution of $\text{NaCl}_{(\text{aq})}$?

14. Determine the oxidation number of Mn in each of the following formulas.



15. An unknown sample of mystery element T is analyzed. According to the data 7.42% of the element is ${}^6\text{T}$ and 92.58% is ${}^7\text{T}$. The true mass of ${}^6\text{T}$ is 6.02amu and 7.02amu for ${}^7\text{T}$. Calculate the average atomic mass and identify the element.

Memorize – Polyatomic Ions

Polyatomic Ions – charge particles with more than one atom in formula

- formula must show the charge on the species
- when the charge is 1 only the (+) or (-) is required

+1 Ions

NH_4^+ Ammonium ion

-1 Ions

ClO^- Hypochlorite ion

ClO_2^- Chlorite ion

ClO_3^- Chlorate ion

ClO_4^- Perchlorate ion

NO_2^- Nitrite ion

NO_3^- Nitrate ion

HSO_4^- Hydrogen Sulfate ion (bisulfate ion)

HCO_3^- Hydrogen Carbonate ion (bicarbonate)

$\text{C}_2\text{H}_3\text{O}_2^-$ Acetate ion

OH^- Hydroxide ion

MnO_4^- Permanganate ion

CN^- Cyanide ion

SCN^- Thiocyanate ion

-2 Ions

SO_3^{2-} Sulfite ion

SO_4^{2-} Sulfate ion

CrO_4^{2-} Chromate ion

$\text{Cr}_2\text{O}_7^{2-}$ Dichromate ion

$\text{C}_2\text{O}_4^{2-}$ Oxalate ion

CO_3^{2-} Carbonate ion

O_2^{2-} Peroxide ion

-3 Ions

PO_3^{3-} Phosphite ion

PO_4^{3-} Phosphate ion

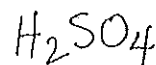
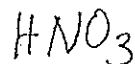
BO_3^{3-} Borate ion

Solubility: Rules for Salts in Water

1. All salts containing nitrate (NO_3^-) and chlorates (ClO_3^-) are soluble.
2. All salts containing Group 1 (alkali metals) ions are soluble.
3. All salts containing ammonium (NH_4^+) ion are soluble.
4. All acetate ($\text{C}_2\text{H}_3\text{O}_2^-$) salts are soluble except silver acetate ($\text{Ag C}_2\text{H}_3\text{O}_2$).
5. Chloride, bromide and iodide salts are soluble. Exceptions are salts containing the ions Ag^+ , Pb^{2+} , and Hg_2^{2+} .
6. Most sulfate salts are soluble. Exceptions are BaSO_4 , PbSO_4 , HgSO_4 , Hg_2SO_4 , Ag_2SO_4 and CaSO_4 .
7. Hydroxide compounds are not soluble. Group I and ammonium hydroxides are soluble. $\text{Ba}(\text{OH})_2$, $\text{Sr}(\text{OH})_2$ and $\text{Ca}(\text{OH})_2$ are slightly soluble.
8. Sulfides (S^{2-}), sulfites (SO_3^{2-}), carbonates (CO_3^{2-}), chromates (CrO_4^{2-}), oxides (O^{2-}) and phosphates (PO_4^{3-}) are not soluble. Group 1 and ammonium compounds of these ions are soluble.

$\text{Ba}(\text{OH})_2$, $\text{Sr}(\text{OH})_2$ & $\text{Ca}(\text{OH})_2$ - will be considered soluble

Strong Acids



Strong Bases

