AP Chemistry Summer Assignment
2024 - 2025
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Welcome to AP Chemistry. I hope you are ready for a challenging year as we prepare for your AP Chemistry exam on May 8th, 2025. This year you will be exploring some old and new topics in chemistry such as Kinetics, Equilibrium, Thermodynamics, Electrochemistry, and more. You should have a solid understanding of Chemistry 1 topics. Your summer assignment is focused on the information you learned in chemistry 1. To complete your assignment please make sure you have 40 notecards and a scientific calculator to do any calculations.

Please bring your completed summer assignments with you on the first day of school, Thursday September 5, 2024.
You will have a test on chapter 1-2 on Friday September 13, 2024

PLEASE USE THIS LINK FOR YOUR TEXTBOOK
https://sites.lps.org/sputnam/LHS_IB/IBChemistry/Chemistry_Brown_12th.pdf

TRY THIS LINK IF THE WEBSITE WON'T WORK:
https://drive.google.com/file/d/1X0xZGZDnbtWqYNxa7CaFWu0v9jnygRk6/view?usp=sharing

Create a HAND WRITTEN note-card for each of the following terms and concepts: These terms can be found in the first two chapters of the AP Chemistry textbook.

Matter	Element	Atom	Molecule	Gas	Liquid	Solid
Pure Substance	Compound	Mixture	Law of Definite Proportions	Physical Property	Chemical Property	Intensive property
Extensive property	Physical change	Chemical change	Filtration	Distillation	Chromatography	Decanting
S.I Units	Volume	Density	Significant Figures	Conversion factor	Dimensional Analysis	Subatomic Particles
Isotope	Atomic Mass	Molecular Formula	Empirical Formula	Cation	Anion	Chemical equation
Scientific Notation	Ionic Compound					

Chapter 1 Concepts and Questions

1. Make a list of the S.I units

2. Make a list of all the prefixes, their abbreviations, and values.

3. Identify each of the following as measurements of length, area, volume, mass, density, time, or temperature:

   (a) 25 ps **(d)** 100,000 km^2 **(g)** -78 °C

   (b) 374.2 mg **(e)** 1.06 μm (**h**) 2.56 g/cm^3

   (c) 77 K **(f)**16 nm^2 (**i**) 28 cm^3

4. Explain when zeros in numbers are significant and when they are not significant.

5. Identify the significant figures in each of these measurements:

   5.060 _____ 0.00715 _____ 16,000 _____ 50,001 _____ 7.89×10^{10} _____

6. Describe how to round your answer appropriately to the correct significant figures/decimal places when adding/Subtracting, and Multiplying/Dividing

7. Carry out the following operations, and express the answers with the appropriate number of significant figures.
   (a) 14.3505 + 2.65 **(b)** 952.7 – 140.7389 **(c)** (3.29 * 104)(0.2501)

   (d) 0.0588/0.677 **(e)** (0.0045 * 20,000.0) + (2813 * 12)

8. Using your knowledge of metric units, English units, and the information on the back inside cove , write down the conversion factors needed to convert

(a) mm to nm,

(b) mg to kg,

(c) km to ft,

(d) $in.^3$ to cm^3.

9. Use dimensional analysis to perform the following conversions:

(a) 5.00 days to s

(b) 0.0550 mi to m

(c) $1.89/gal to dollars per liter

(d) 0.510 in./ms to km/hr

(e) 22.50 gal/min to L/s

(f) 0.02500 ft^3 to cm^3.

10. Classify each of the following as a pure substance or a mixture. If a mixture, indicate whether it is homogeneous or heterogeneous:

(a) rice pudding

(b) seawater

(c) magnesium

(d) crushed ice

(e) air

(f) tomato juice

(g) iodine crystals

(h) sand

11. Explain in your own words how combustion analysis can determine the empirical formula of a hydrocarbon.

Chapter 2 Concepts and Questions

1. Determinewhethereachofthefollowingstatementsistrueor false. If false, correct the statement to make it true:

   (a) The nucleus has most of the mass and comprises most of the volume of an atom.

   (b) Every atom of a given element has the same number of protons.

   (c) The number of electrons in an atom equals the number of neutrons in the atom.

   (d) The protons in the nucleus of the helium atom are held together by a force called the strong nuclear force.

2. **(a)** Which two of the following are isotopes of the same element: ${}^{31}_{16}X$; ${}^{31}_{15}X$; ${}^{32}_{16}$X ?

   (b) What is the identity of the element

3. How many protons, neutrons, and electrons are in the following atoms:

   (a) ^{40}Ar p= n= e=

   (b) ^{65}Zn p= n= e=

   (c) ^{70}Ga p= n= e=

   (d) ^{80}Br p= n= e=

   (e) ^{184}W p= n= e=

   (f) ^{243}Am p= n= e=

4. Each of the following isotopes is used in medicine. Indicate the number of protons and neutrons in each isotope:

   (a) phosphorus-32 p= n= e=

   (b) chromium-51 p= n= e=

   (c) cobalt-60 p= n= e=

   (d) technetium- 99 p= n= e=

   (e) iodine-131 p= n= e=

   (f) thallium-201 p= n= e=

5. Rubidium has two naturally occurring isotopes, rubidium-85 (atomic mass = 84.9118 amu; abundance = 72.15%) and rubidium-87 (atomic mass = 86.9092 amu; abundance = 27.85%). Calculate the atomic weight of rubidium.

6. Write the empirical formula corresponding to each of the fol- lowing molecular formulas:

(a) Al_2Br_6

(b) C_8H_{10}

(c) $C_4H_8O_2$

(d) P_4O_{10}

(e) $C_6H_4Cl_2$

(f) $B_3N_3H_6$

7. Predict the chemical formula for the ionic compound formed by

(a) Ca^{2+} and Br^{-}

(b) K^{+} and $CO3^{2-}$

(c) Al^{3+} and $CH3COO^{-}$

(d) NH^{4+} and $SO4^{2-}$

(e) Mg^{2+} and $PO4^{3-}$

8. Fill in the gaps on the following table

Symbol	Protons	Neutrons	Electrons	Net Charge
$^{31}P^{3-}$				
	34	45		2-
	50	69	46	
		118	76	3+
$^{59}Co^{3+}$				
	34	46	36	
	76	116		2+
	80	120	78	

9. Which of the following substances are Ionic (I) or Covalent (C)

(a) B_2H_6

(b) CH_3OH

(c) $LiNO_3$

(d) Sc_2O_3

(e) CsBr

(f) NOCl

(g) NF_3

(h) Ag_2SO_4

(i) PF_5

(j) NaI

(k) SCl_2

(l) $Ca(NO_3)_2$

(m) $FeCl_3$

(n) LaP

(o) $CoCO_3$

(p) N_2O_4

10. Identify the cation and anions with their charges in these chemical compounds:

Ionic Compound	Cation Formula w/charge	Anion Formula w/charge
(a) CaO		
(b) Na_2SO_4		
(c) $KClO_4$		
(d) $Fe(NO_3)_2$		
(e) $Cr(OH)_3$		
(f) CuS		
(g) Ag_2SO_4		
(h) $Al(ClO_3)_3$		
(i) $Co(OH)_2$		
(j) $PbCO_3$		

11. Name the following ionic compounds:

(a) Li_2O

(b) $FeCl_3$

(c) $NaClO$

(d) $CaSO_3$

(e) $Cu(OH)_2$

(f) $Fe(NO_3)_2$

(g) $Ca(CH_3COO)_2$

(h) $Cr_2(CO_3)_3$

(i) K_2CrO_4

(j) $(NH_4)_2SO_4$

12. Name the following ionic compounds:

(a) KCN

(b) $NaBrO_2$

(c) $Sr(OH)_2$

(d) CoS

(e) $Fe_2(CO_3)_3$

(f) $Cr(NO_3)_3$

(g) $(NH_4)_2SO_3$

(h) NaH_2PO_4

(i) $KMnO_4$

(j) $Ag_2Cr_2O_7$

13. Write the balanced chemical formulas for the following compounds

(a) sodium phosphate

(b) zinc nitrate

(c) barium bromate

(d) iron(II) perchlorate

(e) cobalt(II) hydrogen carbonate

(f) chromium(III) acetate

(g) potassium dichromate.

(h) aluminum hydroxide

(i) potassium sulfate

(j) copper(I) oxide

(k) zinc nitrate

(l) mercury(II) bromide

(m) iron(III) carbonate

(n) sodium hypobromite

14. Name or write the formulas for the following acidic compounds

(a) $HBrO_3$

(b) HBr

(c) H_3PO_4

(d) hypochlorous acid

(e) iodic acid

(f) sulfurous acid

(g) hydroiodic acid

(h) chloric acid

(i) nitrous acid

(j) H_2CO_3

(k) $HClO_4$

(l) CH_3COOH

15. Name each of the following molecular compounds or write their formulas

(a) SF_6

(b) IF_5

(c) XeO_3

(d) dinitrogen tetroxide

(e) hydrogen cyanide

(f) tetraphosphorus hexasulfide.