AP/IB Chemistry Summer Assignment

Mrs. Kilpatrick
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Welcome to AP/IB Chemistry-2. I look forward to having you as part of my AP chemistry class this year. AP chemistry is a fast paced course and can be challenging. As difficult as IB chemistry can be, it is a wise choice to take the class now instead of waiting until your freshmen year of college. This class will put you ahead of your soon to be college peers and keep you on track. Remember that I am here to help you, and anytime you feel lost seek help!!
This summer assignment is designed for you to review the basics of what is needed to move forward in the course. You will have a quiz on this material upon your return next school year. On the website there are videos for you to review these concepts such as dimensional analysis, significant figures, nomenclature, and atomic structure. Please use these videos as needed to work through the packet. Please also make sure to sign up for my remind by texting 81010 and put this into the message @dg6gbc You need to sign up to the remind to gain access to my website kilpatrickscience.com.

Please feel free to email me over the summer if you have any questions.

Thank you,
Ms Kilpatrick

Significant Figures

AP WORKSHEET 00a: Significant Figures

1. Determine the number of significant figures in each of the following. (6)

   (a) 0.7680

   (b) 1230.00

   (c) 1000.01

   (d) 120.0

   (e) 1.09×10^4

   (f) 0.0080060

2. Use a calculator to find the results of the following and then round the answer to the correct number of significant figures. (6)

   (a) 34.66 + 333.0

   (b) 1.23 + 9.66

   (c) 445 - 1.22

   (d) 18.2 + 1.998

   (e) 10.2 – 1.34

   (f) 100 - 23

3. State the significant figure rule that is associated with "captive zeros". (1)

4. State the significant figure rule that is associated with "leading zeros". (1)

5. State the significant figure rule that is associated with "trailing zeros". (1)

6. State the significant figure rule that is associated with addition and subtraction operations. (1)

7. State the significant figure rule that is associated with multiplication and division operations. (1)

8. Use a calculator to find the results of the following calculations and then round the answer to the correct number of significant figures. (6)

   (a) 12 x 11.45

   (b) $(1.23 \times 10^3) \times (6.4 \times 10^2)$

   (c) 5.233 x 6.324

   (d) 34 / 22

   (e) $(1.8 \times 10^5) / 14$

   (f) 100.23 / 5.22

9. Round each of the following to three significant figures. (6)

   (a) 167.789

   (b) 0.0000456922

   (c) 23.00567

   (d) 3.4569

   (e) 7903.0005

   (f) 11.044

10. How many significant figures in each of the following? (6)

    (a) 654.001 nm

    (b) 6.02×10^{23} particles

    (c) 1.0079 g

    (d) 13 neutrons

    (e) 11.22201 mg

    (f) 0.004504 g

Unit Conversions

AP WORKSHEET 00b: Unit Conversions

This worksheet utilizes the conversions given at this web site http://www.onlineconversion.com

1. Perform the following conversions. In each case show the full, dimensional analysis. Source any conversion factors from the web site above. An example is given below. (6)

   Question: 3.00 cm to mm.

   Answer: $\left(\frac{3.00\ \cancel{cm}}{}\right)\left(\frac{10\ mm}{1\ \cancel{cm}}\right) = 30\ mm$

   (a) 120 J to MJ

   (b) 3 m to cm

   (c) 400 miles to km

   (d) 25 hectares to acres

   (e) 34 inches to ft

   (f) 289 s to hrs

2. Perform the following conversions. In each case you do NOT need to show the full, dimensional analysis. Source any conversion factors from the web site above. (6)

   (a) 120000 J to kJ

   (b) 13 kg to lbs

   (c) 83.2 K to ^{o}C

   (d) 48 mins to ms

   (e) 34 ^{o}F to ^{o}C

   (f) 13.2 kg to lbs

3. Perform the following *sequences* of conversions. In each case show the full, dimensional analysis. Source any conversion factors from the web site above. An example is given below. (6)

Question: 3.00 cm to m VIA mm.

Answer: $\left(\frac{3.00\ \cancel{cm}}{}\right)\left(\frac{10\ \cancel{mm}}{1\ \cancel{cm}}\right)\left(\frac{0.001\ m}{1\ \cancel{mm}}\right) = 0.03\ m$

(a) 679 nm to cm VIA m

(b) 23 miles to m VIA km

(c) 567 feet to m VIA yd

(d) 12 L to UK gal VIA mL

(e) 8 MJ to J VIA kJ

(f) 418 s to hrs VIA min

Dimensional Analysis Practice-Derived Units

Conversion Factors

1.0 m=1.094 yd, 1.000 mile =1760 yd, 1.000 kg=2.205 lbs

1 m=10^9 nm 1 m=10^6 micrometers 1 in=2.54 cm

1.Perform each of the following conversions.

a) 8.43 cm to mm

b) 2.41 x 10^2 cm to m

c) 294.5 nm to cm

d) 1.445 x 10^4 m to km

e) 903.3 nm to micrometers

Density Conversions

Remember d=m/v also density can be used as a conversion factor between volume and mass

So a density of 4.0 g/ml is the same thing as saying 4.0g=1 mL

Conversions including cubed units

If you were to convert in^3 into cm^3 you can use the conversion factor 1 in=2.54 cm, but you must cube it first, so it would be 1 in^3 = 16.38 cm^3

2. A material will float on the surface of a liquid if the material has a density less than that liquid. Given that the density of water is approximately 1.0 g/mL, will a block of material having a volume of 1.2 x 10^4 in^3 and weighing 350 lb float or sink when placed in a reservoir of water?

3. Diamonds are measured in carats, and 1 carat=0.200 g. The density of a diamond is 3.51 g/cm^3

A) what is the volume of a 5.0-carat diamond?
B) what is the mass in carats of a diamond measuring 2.8 mL?

4. The density of pure silver is 10.5 g/cm^3. If 5.25 g of pure silver is added to a graduated cylinder containing 11.2 mL of water. What volume level will the water in the cylinder rise?

5.Use the following exact conversion factors to perform the stated calculations
5.5 yards=1 rod
40 rods=1 furlong
8 furlongs= 1 mile

a) The Kentucky Derby race is 1.25 miles. How long is the race in rods, furlongs, and kilometers?
b) A marathon is 26 miles and 385 yards. What is this distance in rods, furlongs, meters, and kilometers

6. You are driving 16.5 mi/hr and take your eyes off the road for just one second. What distance do you travel in feet in one second. Remember if you doing a conversion using a speed, do not start with that conversion factor.

7. Calculate the density of an object in g/ml, if the mass is 2.0 kg and the volume is 4.0 m^3

8. What is the mass in pounds of an object that has a density of 3.2 g/ml and has a volume of 3.0 in^3

Polyatomic ions:

Positive ions					
1+ ion:	Ammonium	NH_4^{1+}	Hydronium	H_3O^+	
Negative ions					
1- ions		2- ions		3- ions	
Acetate	$C_2H_3O_2^{1-}$	Carbonate	CO_3^{2-}	Phosphate	PO_4^{3-}
Chlorate	ClO_3^{1-}	Chromate	CrO_4^{2-}		
Chlorite	ClO_2^{1-}	Dichromate	$Cr_2O_7^{2-}$		
Cyanide	CN^{1-}	Hydrogen Phosphate	HPO_4^{2-}		
Dihydrogen Phosphate	$H_2PO_4^{1-}$	Peroxide	O_2^{2-}		
Hydrogen Carbonate	HCO_3^{1-}	Sulfate	SO_4^{2-}		
Hydrogen Sulfate	HSO_4^{1-}	Sulfite	SO_3^{2-}		
Hydroxide	OH^{1-}	Thiosulfate	$S_2O_3^{2-}$		
Hypochlorite	ClO^{1-}				
Nitrate	NO_3^{1-}				
Nitrite	NO_2^{1-}				
Perchlorate	ClO_4^{1-}				
Permanganate	MnO_4^{1-}				
Thiocyanate	SCN^{1-}				

AP WORKSHEET 00e: Inorganic Nomenclature I

1. The following compounds are all binary compounds. Give the name of each one. (6)

   (a) SrO

   (b) K_2O

   (c) Na_2S

   (d) Cs_3P

   (e) $AlCl_3$

   (f) Mg_3N_2

2. *Some* of the following name and formula combinations are incorrect. Identify the correct combinations. For the others, suggest corrected combinations. (13)

   (a) barium hydroxide, $BaOH_2$

   (b) sodium oxide, SoO_2

   (c) barium chloride, BCl_3

   (d) strontium oxide SrO_2

   (e) boron trifluoride, $BoFl_6$

   (f) vanadium (III) chloride, VCl_3

   (g) magnesium oxide, MgO_4

3. Write the name of the following compounds. Use Roman numerals in the names. (7)

   (a) FeI_3

   (b) $MnCl_2$

   (c) HgO

   (d) Cu_2S

   (e) CuS

   (f) SnI_4

   (g) $MnBr_2$

4. Write the name of each of the following. To help get the correct name, use the periodic table to determine which elements are metals, which are non-metals and which compounds should include Roman numerals in their names. (16)

(a) N_2Br_5

(b) P_2S_5

(c) Ge_2O_3

(d) N_2O_5

(e) SiO_2

(f) AlH_3

(g) FeO

(h) $CuCl_2$

(i) OCl_2

(j) XeF_6

(k) $RaCl_2$

(l) $SeCl_2$

(m) PCl_5

(n) Na_3P

(o) CuF

(p) V_2O_5

Add either a name or a formula to complete each table. (100)

1. Potassium dichromate	
2. Lithium sulfide	
3. Potassium bromide	
4. Cesium iodide	
5. Calcium phosphide	
6. Sodium fluoride	
7. Strontium oxide	
8. Beryllium sulfide	
9. Magnesium bromide	
10. Lithium oxide	
11. Strontium chloride	
12. Barium bromide	
13. Magnesium sulfide	
14. Magnesium iodide	
15. Hydrogen fluoride (Hydrogen monofluoride)	
16. Barium phosphide	
17. Sodium hydrogen phosphate	
18. Potassium chloride	
19. Lithium nitride	
20. Calcium sulfide	

26. Dinitrogen Tetraoxide	
27. Carbon dioxide	
28. Mercury(I) chloride	
29. Hydroiodic acid	
30. Iodic acid	
31. Perbromic acid	
32. Hypobromous acid	
33. Phosphorus pentachloride	
34. Iodine monochloride	
35. Antimony(III) fluoride	
36. Bromine monofluoride	
37. Bromine dioxide	
38. Dinitrogen pentoxide	
39. Carbon monosulfide	
40. Tellurium dioxide	
41. Phosphorus tribromide	
42. Carbon tetraiodide	
43. Vanadium(V) chromate	
44. Zinc carbonate	
45. Silver hydroxide	
46. Vanadium(III) chromate	

51. $ScCl_3$	
52. HCl	
53. PtO_2	
54. $Sb(ClO_3)_5$	
55. GeS_2	
56. ZnO	
57. VSO_4	
58. $CuCl_2$	
59. TiO_2	
60. NiN	
61. $Ni_3(PO_4)_2$	
62. CoF_3	
63. Au_2O_3	
64. Zn_3P_2	
65. $Cr(NO_3)_6$	
66. $NaIO_2$	
67. $NaIO_3$	
68. NaI	

76. Li_3PO_3	
77. $KHCO_3$	
78. HF	
79. AuI_2	
80. $KMnO_4$	
81. $Na_2Cr_2O_7$	
82. Ag_2CrO_4	
83. AgCl	
84. $NaCH_3COO$	
85. RaF_2	
86. KSCN	
87. FeS	
88. $Fe_2(SO_3)_3$	
89. $FeSO_4$	
90. MgS	
91. $Na_2S_2O_3$	
92. RbCl	
93. $Cu(OH)_2$	
94. Mg_3N_2	
95. Cu_3N	
96. LiH	
97. K_2O	

AP WORKSHEET 00g: Inorganic Nomenclature III (Acids)

1. Write the formula of each of the following acids. (14)

   (a) Nitric acid

   (b) Chloric acid

   (c) Hydrochloric acid

   (d) Sulfurous acid

   (e) Chlorous acid

   (f) Hydrobromic acid

   (g) Phosphoric acid

2. Name the following acids. (14)

   (a) $HClO_3$

   (b) H_3PO_4

   (c) HI

   (d) H_2SO_3

   (e) HNO_3

   (f) HF

   (g) $HC_2H_3O_2$

Chemistry Basics

Classify the following as either **chemical** or **physical** changes. (3)

(a) Ice melting

(b) Gasoline burning

(c) Evaporation of perfume from an open bottle

Classify the following as either **quantitative** or **qualitative** observations. (4)

(a) My eyes are brown

(b) My neck size is 17 inches

(c) My average grade last year was 79%

(d) Physics is a difficult subject

Convert these numbers to scientific notation. (2)

(a) 35800000000000

(b) 0.00000000821

. Round the following numbers to four figures. (6)

(a) 2.16347×10^5

(b) 4.000574×10^6

(c) 3.682417

(d) 7.2518

(e) 375.6523

(f) 21.860051

(Typo the top number should be the bigger number)

Consider the following pairs; does either pair represent a pair of isotopes? Explain. (4)

(a) $^{11}Na_{23}$ and $^{11}Na_{24}$

(b) $^{11}Na_{24}$ and $^{12}Mg_{24}$

Determine the number of protons, electrons and neutrons in each of the following isotopes. (3)

(a) $^{79}Au_{171}$

(b) $^{79}Au_{182}$

(c) $^{35}Br^{-}_{79}$