AP/IB Chemistry 2018 Summer Assignment

Mrs. Kilpatrick
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Welcome to AP/IB chemistry. I look forward to having you as part of my IB chemistry class this year. IB 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!! My website is kilpatrickscience.com You will need a username and password to enter the website.
The username is :ibchem and the password is chemystry This summer assignment is designed for you to review the basics of what is needed to move forward in the course. 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 @apib201

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

Thank you,
Ms KIlpatrick

Name	Symbol	Charge
ammonium	NH_4	+1
acetate	$C_2H_3O_2$	-1
bromate	BrO_3	-1
chlorate	ClO_3	-1
chlorite	ClO_2	-1
cyanide	CN	-1
dihydrogen phosphate	H_2PO_4	-1
hypochlorite	ClO	-1
hydrogencarbonate(bicarbonate)	HCO_3	-1
hydrogen sulfate (bisulfate)	HSO_4	-1
hydrogen sulfite (bisulfite)	HSO_3	-1
hydroxide	OH	-1
iodate	IO_3	-1
nitrate	NO_3	-1
nitrite	NO_2	-1
perchlorate	ClO_4	-1
permanganate	MnO_4	-1
thiocyanate	SCN	-1
carbonate	CO_3	-2
chromate	CrO_4	-2
dichromate	Cr_2O_7	-2
oxalate	C_2O_4	-2
peroxide	O_2	-2
selenate	SeO_4	-2
silicate	SiO_3	-2
sulfate	SO_4	-2
sulfite	SO_3	-2
thiosulfate	S_2O_3	-2
borate	BO_3	-3
borite	BO_2	-3

1- charge		2- charge		3- charge		1+ charge	
Formula	Name	Formula	Name	Formula	Name	Formula	Name
$H_2PO_4^-$	Dihydrogen phosphate	HPO_4^{2-}	Hydrogen phosphate	PO_3^{3-}	Phosphite	NH_4^+	Ammonium
$C_2H_3O_2^-$	Acetate	$C_2O_4^{2-}$	Oxalate	PO_4^{3-}	Phosphate		
HSO_3^-	Hydrogen sulfite	SO_3^{2-}	Sulfite				
HSO_4^-	Hydrogen sulfate	SO_4^{2-}	Sulfate				
HCO_3^-	Hydrogen carbonate	CO_3^{2-}	Carbonate				
NO_2^-	Nitrite	CrO_4^{2-}	Chromate				
NO_3^-	Nitrate	$Cr_2O_7^{2-}$	Dichromate				
CN^-	Cyanide	SiO_3^{2-}	Silicate				
OH^-	Hydroxide						
MnO_4^-	Permanganate						
ClO^-	Hypochlorite						
ClO_2^-	Chlorite						
ClO_3^-	Chlorate						
ClO_4^-	Perchlorate						

Common Metal Ions with More than One Ionic Charge

Formula	Stock Name	Classical Name
Cu^{1+}	Copper(I) ion	Cuprous ion
Cu^{2+}	Copper(II) ion	Cupric ion
Fe^{2+}	Iron(II) ion	Ferrous ion
Fe^{3+}	Iron(III) ion	Ferric ion
Hg_2^{2+}	Mercury(I) ion	Mercurous ion
Hg^{2+}	Mercury(II) ion	Mercuric ion
Pb^{2+}	Lead(II) ion	Plumbous ion
Pb^{4+}	Lead(IV) ion	Plumbic ion
Sn^{2+}	Tin(II) ion	Stannous ion
Sn^{4+}	Tin(IV) ion	Stannic ion
Cr^{2+}	Chromium(II) ion	Chromous ion
Cr^{3+}	Chromium(III) ion	Chromic ion
Mn^{2+}	Manganese(II) ion	Manganous ion
Mn^{3+}	Manganese(III) ion	Manganic ion
Co^{2+}	Cobalt(II) ion	Cobaltous ion
Co^{3+}	Cobalt(III) ion	Cobaltic ion

Activity Series of Metals	Activity Series of Nonmetals
Lithium	Fluorine
Potassium	Chlorine
Calcium	Bromine
Sodium	Iodine
Magnesium	
Aluminum	
Zinc	
Chromium	
Iron	
Nickel	
Lead	
Hydrogen	
Tin	
Copper	
Mercury	
Silver	
Platinum	
Gold	

Metals from aluminum to lead can replace hydrogen from acids only.

Solubility in Water

Compounds containing these ions are **Soluble**

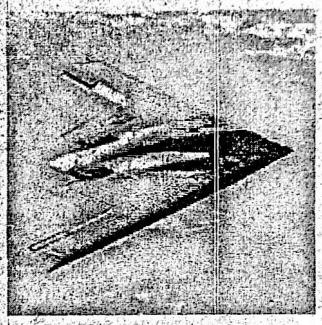
NO_3^{1-}	
$C_2H_3O_2^{1-}$	
NH_4^+	
H^+, Li^+, Na^+, K^+, Rb^+, Cs^+, Fr^+ (Group I elements)	
Cl^{1-}, Br^{1-}, I^{1-}	Except with Ag^+, Hg_2^{2+}, Pb^{2+}, Cu^+, Tl^+

Compounds containing these ions are **Insoluble**

CO_3^{2-}, PO_4^{3-}, SO_3^{2-}	Except with NH_4^+ and Group I elements (H^+, Li^+, Na^+, K^+, Rb^+, Cs^+, Fr^+)
OH^{1-}	Except with Ba^{2+}, Sr^{2+}, Ra^{2+}, Ti^+, NH_4^+ and Group I elements (H^+, Li^+, Na^+, K^+, Rb^+, Cs^+, Fr^+)

The Stealth Bomber

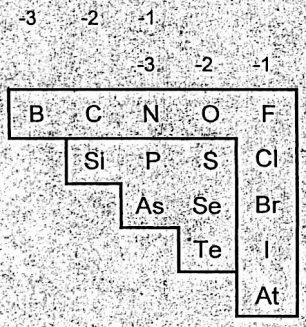
"Polyatomic Anions"

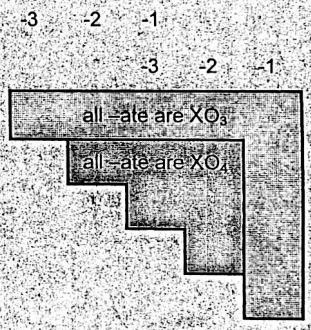


The elements B, C, N, O, F, Cl, Br, F, I, and At make the wings.
They all have an –ate ending with 3 oxygens.

The elements Si, P, S, As, Se, and Te make up the cabin.
They all have an –ate ending with 4 oxygens.

The charges on the ions are also shown below. The only exception is nitrogen, which has a -1 charge. All others in that column have -3 charge.





-ate	home base
-ite	one less oxygen than home base
hypo__ite	two less oxygens than home base
per__ate	one more oxygen than home base

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.

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

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

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	
21. Rubidium oxide	
22. Strontium nitride	
23. Cesium phosphide	
24. Magnesium carbonate	
25. Beryllium sulfate	

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	
69. H_2SO_3	
70. H_2CO_3	
71. AlN	
72. AlH_3	
73. Li_3AsO_4	
74. $NaCN$	
75. Na_2O_2	

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

(h) Nitrous acid

(i) Perchloric acid

(j) Hydrofluoric acid

(k) Perbromic acid

(l) Sulfuric acid

(m) Bromic acid

(n) Hypoiodous 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) $HC_2H_3O_2$

(h) HBr

(i) H_3PO_3

(j) HClO

(k) H_2CO_3

(l) H_2SO_4

(m) $HBrO_2$

(n) HNO_2

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

   (a) Ice melting

   (b) Gasoline burning

   (c) Evaporation of perfume from an open bottle

2. Mercury is a liquid metal that has a density of 13.58 g/mL. Calculate the volume of mercury that must be poured out in order to obtain 0.5000 g of Mercury. (2)

3. 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

4. Give an example of a natural law (other than the law of conservation of mass). (1)

5. Convert these numbers to scientific notation. (2)

   (a) 35800000000000

   (b) 0.00000000821

6. 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

7. Perform the following conversions. (5)

(a) 0.75 kg to milligrams

(b) 1500 millimeters to km

(c) 2390 g to kg

(d) 0.52 km to meters

(e) 65 kg to g

8. Complete the following table of temperatures, performing the appropriate conversions. (18)

Kelvin	Fahrenheit	Celsius
200.		
23.0		
0.000		
	180.	
		45.0
500.		
	350.	
		97.0
		30.

9. An experiment is performed in which the molar mass of a gas is found to be 48.45 g mol^{-1}. The published (actual) value is 52.98 g mol^{-1}. Calculate the percentage error. (2)

10. Distinguish carefully between precision and accuracy. (2)

11. In the table below, match the scientist with the experiment. (2)

Scientist	Experiment
Crookes	Oil Drop
Millikan	Cathode Ray
Rutherford	Gold Foil

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

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

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

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

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

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

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

14. Distinguish ions, isotopes, & atoms in terms of mass, charge & electrons