AP Chemistry 2018-2019

Congratulations! You have enrolled in A.P. Chemistry. As you probably know, the course is extremely challenging and demanding. It is a tremendous commitment, which demands excellent study habits, exemplary attendance and time dedications beyond the time constraints of regular class session.

In order to decrease the load for next semester, I have outlined several summer requirements. The main goal is to take your time (all summer) with a tedious task such as 'memorization'. Then, we can focus our class time on learning real chemistry. If you complete all the tasks outlined, you will be well-prepared to begin the course.

The assignment must be completed by the first day of the Fall semester. Do not wait until the last week of vacation. Trust me, it is not enough time. You will be much better off if you dedicate several days at the beginning of summer for memorization. I suggest making flash cards and starting slow (maybe 10). Each day, add about 5. Before you know it, you will be familiar with all of the terms. Then, spend the remainder of the summer reviewing, reviewing & reviewing.

I will be trying to use Google classroom this coming school year. Please join the AP Chemistry class. Code: n80yrt2

Additionally, please email me at kje2566@lausd.net with your email contact information for the summer. Thank you.

WARNING: You will be evaluated within the 1st few days of school, in order to determine proficiency in the summer assignment.

Good luck with your assignment. Have an enjoyable summer. I'm looking forward to a challenging, and fun year with you.

Karen Evens

There are THREE parts to the AP Chemistry Summer Assignment. Part 1 deals with the memorization of common ions and acids used in the course. Part 2 provides information and practice on the use of significant figure rules in calculations. Part 3 is to purchase an A.P. Chemistry Study guide and begin reading it.

PART 1: COMMON IONS AND ACIDS

This part of the summer assignment for AP Chemistry is quite simple (but not easy). You need to master the formulas, charges, and names of the common ions. On the first few days of the school year, you will be given a quiz on these ions. You will be asked to:

- write the names of these ions when given the formula and charge
- write the formula and charge when given the names

PART 2: SIGNIFICANT FIGURES IN CALCULATIONS

I have attached a page with explanations of the rules. There is also a page of problems for you to complete. This page is due at the beginning of class on the first day of next school year.

PART 3: AP CHEMISTRY STUDY GUIDE

Your AP Chemistry study guide must be aligned with the 2016 format for the AP Chemistry exam. The 2016 Princeton Review is recommended, but others will suffice as well. Begin reading the first section of the book.

Tips for Learning the Ions

"From the Periodic Table"

These are ions can be organized into two groups.

1. Their place on the table suggests the charge on the ion, since the neutral atom gains or loses a predictable number of electrons in order to obtain a noble gas configuration.
    2. All Group 1 Elements (alkali metals) lose one electron to form an ion with a 1+ charge
    3. All Group 2 Elements (alkaline earth metals) lose two electrons to form an ion with a 2+ charge
    4. Group 13 metals like aluminum lose three electrons to form an ion with a 3+ charge
    5. All Group 17 Elements (halogens) gain one electron to form an ion with a 1- charge
    6. All Group 16 nonmetals gain two electrons to form an ion with a 2- charge
    7. All Group 15 nonmetals gain three electrons to form an ion with a 3- charge

    Notice that cations keep their name (sodium ion, calcium ion) while anions get an "-ide" ending (chloride ion, oxide ion).
2. Metals that can form more than one ion will have their positive charge denoted by a roman numeral in parenthesis immediately next to the name of the
3. You can print and label the periodic table attached to try to learn this information.

Polyatomic Ions

Most of the work on memorization occurs with these ions.

1. "ate" anions have one more oxygen then the "ite" ion, but the same charge. If you memorize the "ate" ions, then you should be able to derive the formula for the "ite" ion and vice-versa.
2. If you know that a sulfate ion is SO_4^{2-}, then to get the formula for hydrogen sulfate ion, you add a hydrogen ion to the front of the formula. Since a hydrogen ion has a 1+ charge, the net charge on the new ion is less negative by one.
3. Learn the hypochlorite →chlorite→ chlorate→ perchlorate series, and you also know the series containing iodite/iodate as well as bromite/bromate.
    1. The relationship between the "ite" and "ate" ion is predictable, as always. Learn one and you know the other.
    2. The prefix "hypo" means "under" or "too little" (think "hypodermic", "hypothermic" or "hypoglycemia")

i. Hypochlorite is "under" chlorite, meaning it has one less oxygen c. The prefix "hyper" means "above" or "too much"

i. the prefix "per" is derived from "hyper" so perchlorate (hyperchlorate) has one more oxygen.

1. Memorize the following polyatomic ions. Suggestion: Make flash cards with the 'name' on one side & the 'ion' on the other side (Do not forget the charge! It is superscripted. And the number of each atom is subscripted.). You should learn these to the extent at which they can be immediately recalled.

1) Acetate CH_3COO^- or $C_2H_3O_2^-$
2) Ammonium NH_4^+
3) Carbonate CO_3^{2-}
4) Chlorate ClO_3^-
5) Chlorite ClO_2^-
6) Chromate CrO_4^{2-}
7) Cyanide CN^-
8) Dichromate $Cr_2O_7^{2-}$
9) Dihydrogen phosphate $H_2PO_4^-$
10) Hydrogen carbonate (bicarbonate) HCO_3^-
11) Hydrogen phosphate HPO_4^{2-}
12) Hydrogen sulfate or bisulfate HSO_4^-
13) Hydrogen sulfite or bisulfite HSO_3^-
14) Hydroxide OH^-
14) Hypochlorite ClO^-
15) Nitrate NO_3^-
16) Nitrite NO_2-
17) Oxalate $C_2O_4^{2-}$
18) Permanganate MnO_4^-
19) Perchlorate ClO_4^-
20) Peroxide O_2^{2-}
21) Phosphate PO_4^{3-}
22) Sulfate SO_4^{2-}
23) Sulfite SO_3^{2-}
24) Thiocyanate SCN^-

2. Memorize the following acid names. Flashcards are recommended.

(Hydro---ic) ACIDS (has no oxygen)

1) HCl hydrochloric acid
2) HF hydrofluoric acid
3) HBr hydrobromic acid
4) HI hydroiodic acid
5) HCN hydrocyanic acid
6) H2S hydrosulfuric acid

(--ic) ACIDS

7) H_2CO_3 carbonic acid
8) HNO_3 nitric acid
9) H_2SO_4 sulfuric acid
10) $HClO_3$ chloric acid
11) H_3PO_4 phosphoric acid
12) HIO_3 iodic acid

(per---ic) ACIDS (add 1 oxygen to –ic acid)

13) $HClO_4$ perchloric acid
14) HNO_4 pernitric acid
15) HIO_4 periodic acid

(---ous) ACIDS (subtract 1 oxygen from –ic acid)

16) H_2CO_2 carbonous acid
17) HNO_2 nitrous acid
18) H_2SO_3 sulfurous acid
19) $HClO_2$ chlorous acid
20) H_3PO_3 phosphorous acid

(hypo---ous) ACIDS (subtract 2 oxygens from –ic acid)

21) H_2CO hypocarbonous acid
22) HNO hyponitrous acid
23) H_2SO_2 hyposulfurous acid
24) HClO hypochlorous acid

3. Memorize the following list of STRONG ACIDS

1) HCl hydrochloric acid
2) HBr hydrobromic acid
3) HI hydroiodic acid
4) HNO_3 nitric acid
5) $HClO_4$ perchloric acid
6) H_2SO_4 sulfuric acid

Significant Figures in Measurement and Calculations

A successful chemistry student habitually labels all numbers, because the unit is important. Also of great importance is the number itself. Any number used in a calculation should contain only figures that are considered reliable. Figures that are considered reliable are called *significant figures*. Chemical calculations involve numbers representing actual measurements. In a measurement, significant figures in a number consist of: Figures (digits) definitely known + One estimated figure (digit)

Rules for Zeros

- **Zero Within a Number**. In reading the measurement 9.04 cm, the zero represents a measured quantity, just as 9 and 4, and is, therefore, a significant number. A zero between any of the other digits in a number is a significant figure.
- **Zero at the Front of a Number**. In reading the measurement 0.46 cm, the zero does not represent a measured quantity, but merely locates the decimal point. It is not a significant figure. Also, in the measurement 0.07 kg, the zeros are used merely to locate the decimal point and are, therefore, not significant. Zeros at the first (left) of a number are not significant figures.
- **Zero at the End of a Number**. In reading the measurement 11.30 cm, the zero is an estimate and represents a measured quantity. It is therefore significant. Another way to look at this: The zero is not needed as a placeholder, and yet it was included by the person recording the measurement. It must have been recorded as a part of the measurement, making it significant. Zeros to the right of the decimal point, and at the end of the number, are significant figures.
- **Zeros at the End of a Whole Number**. Zeros at the end of a whole number may or may not be significant. If a distance is reported as 1600 feet, one assumes two sig figs. Reporting measurements in scientific notation removes all doubt, since all numbers written in scientific notation are considered significant.

Rounding Off Numbers

In reporting a numerical answer, one needs to know how to "round off" a number to include the correct number of significant figures. Even in a series of operations leading to the final answer, one must "round off" numbers. The rules :

1. If the figure to be dropped is less than 5, simply eliminate it.
2. If the figure to be dropped is 5 or greater, eliminate it and raise the preceding figure by 1.

Multiplication and Division

In multiplying or dividing two numbers, when you wish to determine the number of significant figures you should have in your answer, you should inspect the numbers multiplied or divided and find which has the least number of significant figures. This is the number of significant figures you should have in your answer. Thus the answer to 0.024 x 1244 would be rounded off to contain two significant figures since the factor with the lesser number of significant figures (0.024) has only *two* such figures.

Addition and Subtraction

In adding (or subtracting), set down the numbers, being sure to keep like decimal places under each other, and add (or subtract). Next, note which column contains the first estimated figure. This column determines the last decimal place of the answer. After the answer is obtained, it should be rounded off in this column. In other words, round to the least number of decimal places in you data.

Name_____

Give the number of significant figures in each of the following:

____ 402 m ____ 0.00420 g ____ 5.1×10^4 kg ____ 78 323.01 g

____ 34.20 lbs ____ 3 200 liters ____ 0.48 m ____ 1.10 torr

____ 0.03 sec ____ 0.0300 ft. ____ 1 400.0 m ____ 760 mm Hg

Multiply each of the following, observing significant figure rules:

17 m x 324 m = _____ 0.005 in x 8 888 in = _____

0.424 in x .090 in = _____ 1.7 mm x 4 294 mm = _____

0.050 m x 102 m = _____ 324 000 cm x 12.00 cm = _____

Divide each of the following, observing significant figure rules:

23.4 m ÷ 0.50 sec = _____ 12 miles ÷ 3.20 hours = _____

0.960 g ÷ 1.51 moles = _____ 1200 m ÷ 12.12 sec = _____

Add each of the following, observing significant figure rules:

3.40 m +0.022 m + 0.5 m = _____

102.45 g + 2.44 g + 1.9999g =_____

102. cm + 3.14 cm + 5.9 cm = _____

Subtract each of the following, observing signigicant figure rules:

42.306 m -1.22 m =_____ 14.33 g- 3.468 g =_____

INFORMATION IN THE TABLE BELOW AND IN THE TABLES ON PAGES 3-5 MAY BE USEFUL IN ANSWERING THE QUESTIONS IN THIS SECTION OF THE EXAMINATION.

DO NOT DETACH FROM BOOK.

PERIODIC TABLE OF THE ELEMENTS

1 H 1.0079																	2 He 4.0026
3 Li 6.941	4 Be 9.012											5 B 10.811	6 C 12.011	7 N 14.007	8 O 16.00	9 F 19.00	10 Ne 20.179
11 Na 22.99	12 Mg 24.30											13 Al 26.98	14 Si 28.09	15 P 30.974	16 S 32.06	17 Cl 35.453	18 Ar 39.948
19 K 39.10	20 Ca 40.08	21 Sc 44.96	22 Ti 47.90	23 V 50.94	24 Cr 52.00	25 Mn 54.938	26 Fe 55.85	27 Co 58.93	28 Ni 58.69	29 Cu 63.55	30 Zn 65.39	31 Ga 69.72	32 Ge 72.59	33 As 74.92	34 Se 78.96	35 Br 79.90	36 Kr 83.80
37 Rb 85.47	38 Sr 87.62	39 Y 88.91	40 Zr 91.22	41 Nb 92.91	42 Mo 95.94	43 Tc (98)	44 Ru 101.1	45 Rh 102.91	46 Pd 106.42	47 Ag 107.87	48 Cd 112.41	49 In 114.82	50 Sn 118.71	51 Sb 121.75	52 Te 127.60	53 I 126.91	54 Xe 131.29
55 Cs 132.91	56 Ba 137.33	57 *La 138.91	72 Hf 178.49	73 Ta 180.95	74 W 183.85	75 Re 186.21	76 Os 190.2	77 Ir 192.2	78 Pt 195.08	79 Au 196.97	80 Hg 200.59	81 Tl 204.38	82 Pb 207.2	83 Bi 208.98	84 Po (209)	85 At (210)	86 Rn (222)
87 Fr (223)	88 Ra 226.02	89 †Ac 227.03	104 Rf (261)	105 Db (262)	106 Sg (263)	107 Bh (262)	108 Hs (265)	109 Mt (266)	110 § (269)	111 § (272)	112 § (277)						

§Not yet named

*Lanthanide Series	58 Ce 140.12	59 Pr 140.91	60 Nd 144.24	61 Pm (145)	62 Sm 150.4	63 Eu 151.97	64 Gd 157.25	65 Tb 158.93	66 Dy 162.50	67 Ho 164.93	68 Er 167.26	69 Tm 168.93	70 Yb 173.04	71 Lu 174.97
†Actinide Series	90 Th 232.04	91 Pa 231.04	92 U 238.03	93 Np 237.05	94 Pu (244)	95 Am (243)	96 Cm (247)	97 Bk (247)	98 Cf (251)	99 Es (252)	100 Fm (257)	101 Md (258)	102 No (259)	103 Lr (260)

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