Welcome to AP Chemistry!

Students enrolled in AP chemistry will be asked to reinforce skills and knowledge accumulated in the first year chemistry class (Honors Chemistry) during the summer before the beginning of the AP course. This will allow us to focus our attention on the advanced chemistry topics and 16 suggested labs that will be tested on the AP exam in May 2018.

Your summer assignment consists of the following:

1. **Review the objectives** taught in Chemistry Honors for the Atomic Structure & Periodicity, Stoichiometry and Chemical Reactions units. **A diagnostic exam to test your readiness for AP Chemistry will be given the second day the class meets.**

2. Review the Solubility Rules, Polyatomic Ions, Strong Acids and Bases, and General Rules for Completing Chemical Equations (all attached). All these will be tested in the diagnostic test.

3. **Lab preparation.** Go to the website below and read all the Glassware and Techniques. This is important as some questions on the AP test require knowledge of these. Your knowledge of these glassware and techniques will be also tested in the diagnostic test.
   https://www.michigan.gov/documents/deq/wrd-ot-lab-glassware_445272_7.ppt

4. *Optional, yet **strongly** recommended*: Purchase "5 Steps to a 5: AP Chemistry" 2019, 1st Edition by John Moore (will release on August 13th) ISBN-13: 978-1260122701 / ISBN-10: 1260122700
   https://www.amazon.com/Steps-AP-Chemistry-2019/dp/1260122700

   Take the diagnostic exam without much review or looking up answers – see how you would perform before taking the course.

5. Answer ALL questions on the assignment included in this document (pages 5 through 11) in the space provided. Assignment is **due on the first day of school.**

Please take the assignment seriously and start in early August—there's a lot to do and you won't be able to complete it all on the night before it's due!

If at any time you would like to ask me a question, please email me at agarciaminsal@dadeschools.net. Have a great summer. I look forward to beginning our journey together in August.

Mrs. Minsal ☺

Polyatomic Ion Names

Must be memorized by the first day of school!

1+

ammonium, NH_4^+

hydronium, H_3O^+

1-

acetate, $C_2H_3O_2^-$, or CH_3COO^-

perchlorate, ClO_4^-

chlorate, ClO_3^-

chlorite, ClO_2^-

hypochlorite, ClO^-

cyanide, CN^-

hydrogen carbonate, HCO_3^- (also called bicarbonate)

hydrogen sulfate, HSO_4^-

hydroxide, OH^-

nitrate, NO_3^-

nitrite, NO_2^-

permanganate, MnO_4^-

thiocyanate, SCN^-

2-

carbonate, CO_3^{2-}

chromate, CrO_4^{2-}

dichromate, $Cr_2O_7^{2-}$

oxalate, $C_2O_4^{2-}$

peroxide, O_2^{2-}

sulfate, SO_4^{2-}

sulfite, SO_3^{2-}

thiosulfate, $S_2O_3^{2-}$

3-

phosphate, PO_4^{3-}

phosphite, PO_3^{3-}

arsenate, AsO_4^{3-}

Strong Acids

HCl

HBr

HI

H_2SO_4

HNO_3

$HClO_4$

$HClO_3$

Strong Bases.

Group I hydroxides (LiOH, NaOH, KOH, etc)

$Ca(OH)_2$

$Sr(OH)_2$

$Ba(OH)_2$

Solubility Rules

1. All compounds that contain a group I element (alkali metal) are soluble.

2. All compounds that contain an ammonium ion (NH_4^+) are soluble.

3. All compounds that contain a nitrate ion (NO_3^-), acetate ion ($C_2H_3O_2^-$), and perchlorate ion (ClO_4^-) are soluble.

4. All other compounds are INSOLUBLE, unless otherwise noted.

Name: _____ Date: _____

AP Chemistry Mrs. Minsal

Due on Monday, August 20th, 2018.

Directions: Answer the following five questions in the spaces provided.

1. a) Write the ground state electron configuration for a chlorine atom, showing the number of electrons in each subshell.

_____

b) Predict the charge on the chlorine ion. _____

c) Write the ground state electron configuration for a chlorine ion, showing the number of electrons in each subshell.

_____

d) Is an isolated chlorine atom in the ground state paramagnetic or diamagnetic? Explain briefly.

_____

_____

_____

e) Explain how the electron configuration of the chlorine atom in the ground state is consistent with the existence of the following known compounds: NaCl, SCl_2. Use Lewis structures is necessary.

_____

_____

_____

_____

_____

2. Explain each of the following observations using principles of atomic structure.
   a) Potassium has a lower first-ionization energy than lithium.

b) The ionic radius of N^{3-} is larger than that of O^{2-}.

c) A chlorine atom is larger than a zinc atom.

3. Calculate the volume of 0.589 M H_2SO_4 that can be completely neutralized with 2.46 grams of sodium bicarbonate $NaHCO_3$.

4. a) Write the net ionic equation for the neutralization reaction between solutions of nitric acid and barium hydroxide.

b) The molarity of nitric acid is to be determined using titration. A 25.00 mL sample of the acid is titrated with 0.100 M of barium hydroxide. The equivalence point was achieved with 48.6 mL of the base. Calculate the molarity of the nitric acid.

c) What is the pH of the nitric acid?

5. Answer the following questions about $MgSO_4$ (s) and its hydrate.
   a) Calculate the mass percent of water in the hydrated form of the solid that has the formula $MgSO_4 \cdot 7\ H_2O$

   b) When heated to 310.°C, $MgSO_4 \cdot 7\ H_2O$ (s) dehydrates completely as represented below.

$$MgSO_4 \cdot 7\ H_2O\ (s) \text{ —> } MgSO_4\ (s) + 7\ H_2O(g)$$

   If 5.48 g of $MgSO_4 \cdot 7\ H_2O$ (s) is heated to 310.°C, calculate

      i. the mass of $MgSO_4$ (s) formed, and,

ii. the volume of the $H_2O(g)$ released, measured at STP conditions.

6. A 2.00×10^{-3} mole sample of pure acetylsalicylic acid (a monoprotic acid, MM: 180.157g/mol) was dissolved in enough water to make 15.00 mL of solution and then titrated with 0.100 M NaOH(aq). Calculate:
   a) The molarity of the acetylsalicylic acid.

   b) The number of molecules of acetylsalicylic acid in the solution before titration.

   c) The volume of NaOH required to react with the acid.

7. $Fe(s) + O_2(g) \longrightarrow Fe_2O_3(s)$

Iron reacts with oxygen to produce iron(III) oxide, as represented by the equation above.

A 65.0 g sample of Fe(s) is mixed with 10.7 L of $O_2(g)$ at STP.

   a) Identify the substance that is oxidized and the one being reduced.

b) Calculate the number of moles of each reactant before the reaction begins.

c) Identify the limiting reactant when the mixture is heated to produce $Fe_2O_3(s)$. Support your answer with calculations.

d) Calculate the number of moles of Fe_2O_3 (s) produced when the reaction proceeds to completion.

8. For the molecules below
   i. Draw the Lewis structure
   ii. State the molecular symmetry
   iii. State the strongest intermolecular force present between the molecules of the same compound.

   a) CF_4

i	ii	iii

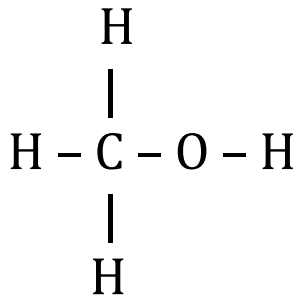
b) NCl_3

i	ii	iii

c) H_2O

i	ii	iii

d) CH_3OH

i	ii	iii
		

e) CO_2

i	ii	iii