AP® Chemistry
Common Summer Assignment
Pinellas County Schools

This assignment was developed by the collective team of AP Chemistry teachers in order to refresh the prerequisite skills and knowledge necessary for success in the course. Because the skills reviewed in this assignment are necessary for success in AP Chemistry, the due date for this assignment is the first day of school.

Should you have questions or if you would like support with this assignment, please refer to your PCS student email account for information about the AP Summer Assignment Support Sessions (AP SASS) that will be held July 31-August 1 at various locations. You can access your student email account by going to www.office.com and using your PCS username and password to login.

Video Resources for the Math Review:
- https://www.khanacademy.org/math/arithmetic-home/arith-review-decimals/arithmetic-significant-figures-tutorial/v/significant-figures
- https://www.youtube.com/watch?v=6oj4y0d44nQ
- https://www.khanacademy.org/math/algebra/units-in-modeling/rate-conversion/v/dimensional-analysis-units-algebraically
- https://www.youtube.com/watch?v=06xxjtd8yoE
- https://www.youtube.com/watch?v=UBzVf8XeMYA

Video Resources for the Nomenclature Review:

- https://www.khanacademy.org/science/chemistry/atomic-structure-and-properties/introduction-to-compounds/v/naming-ions-and-ionic-compounds
- https://www.khanacademy.org/science/chemistry/atomic-structure-and-properties/names-and-formulas-of-ionic-compounds/a/naming-monatomic-ions-and-ionic-compounds
- https://www.youtube.com/watch?v=PKA4CZwbZWU

Video Resources for the Chemical Reaction Review:

- https://www.khanacademy.org/science/biology/chemistry--of-life/chemical-bonds-and-reactions/v/chemical-reactions-introduction
- https://www.khanacademy.org/science/chemistry/chemical-reactions-stoichiome/balancing-chemical-equations/v/balancing-chemical-equations-introduction

Video Resources for the Stoichiometry Review:

- https://www.khanacademy.org/science/chemistry/atomic-structure-and-properties/introduction-to-compounds/v/molecular-mass-and-molecular-weight
- https://www.khanacademy.org/science/chemistry/chemical-reactions-stoichiome/stoichiometry-ideal/a/stoichiometry

I. __Math Review__

SIGNIFICANT FIGURES & ROUNDING

A. Determine the number of significant figures in the value provided, then round each to the number of significant figures indicated.

*Example: 1.234 has _4_ significant figures and, rounded to 2 significant figures is _1.2_*

1. 0.6034   has _____ significant figures and, rounded to **2** significant figures, is _____

2. 12,700   has _____ significant figures and, rounded to **2** significant figures, is _____

3. 12,700.00 has _____ significant figures and, rounded to **1** significant figures, is _____

4. 0.000983   has _____ significant figures and, rounded to **2** significant figures, is _____

5. 123342.9   has _____ significant figures and, rounded to **5** significant figures, is _____

B. Given calculations with a calculator, write the answer with the appropriate number of significant figures.

*Example: 6.00 x 3.00 = 18   The answer should be _18.0_*

1. 23 + 46 = 69   The answer should be _____

2. 56.00 – 35.0 = 21   The answer should be _____

3. 3.24 x 5.63 = 18.2412   The answer should be _____

4. (2.355 + 2.645) x 10.00 = 50   The answer should be _____

5. 654 ÷ 32 = 20.4375   The answer should be _____

SCIENTIFIC NOTATION & UNIT ANALYSIS

Change the following to Scientific Notation (maintain the number of significant figures):

1. 5.280 = _____   6. 2,560 = _____

2. 2,000 = _____   7. .0009 = _____

3. 15,000 = _____   8. 8,900,000 = _____

4. 6,589,000 = _____   9. .0920 = _____

5. 70,400,000,000 = _____ 10. .0000000105 = _____

Make the following Metric System conversions using "dimensional analysis" (you may use scientific notation):

1.   2,350 kg   _____ = _____ g

2.   19 mL   _____ = _____ cL

3.   52 km   _____ = _____ m

4.   36 m   _____ = _____ cm

5.   18 cm   _____ = _____ mm

II.   <u>Nomenclature</u>

Create a presentation (PowerPoint, Prezi, Google Slides, Sway, etc…) for nomenclature that shows how to name and write the formulas for all of the types of compounds. Your presentation must include:

1. How to identify ionic compounds, molecular compounds, and acids.
2. How to determine the charges of ions from the periodic table.
3. How to write names and formulas of simple binary ionic compounds.
4. 2 examples of writing names and 2 for writing formulas
5. How to determine the charges of transition metals.
6. How to write names and formulas of ionic compounds with transition metals.
7. 2 examples of writing names and 2 for writing formulas
8. How to write names and formulas of ionic compounds with polyatomics
9. 2 examples of writing names and 2 for writing formulas
10. How to write names and formulas of covalent compounds
11. 2 examples of writing names and 2 for writing formulas
12. How to write names and formulas of acids
13. 2 examples of writing names and 3 for writing formulas
14. Summary slide showing simplified explanation of all the rules

Please note that your presentation is an individual assignment and you must use your own understanding to write in the information. You may not copy/paste anything from any website, or use any information from a presentation made by another student. Your teacher will give you instructions for submission.

III.   Chemical Reactions

Identify the type of reaction (combination/synthesis, decomposition, single replacement, double replacement, or combustion) and balance each of the following chemical equations.

1.   __ZnS + __HCl → __ZnCl$_2$ + __H$_2$S

2.   __HCl + __Cr → __CrCl$_2$ + __H$_2$

3.   __Al + __Fe$_3$O$_4$ → __Al$_2$O$_3$ + __Fe

4.   __H$_2$ + __Br$_2$ → __HBr

5.   __Na$_2$S$_2$O$_3$ + __I$_2$ → __NaI + __Na$_2$S$_4$O$_6$

6.   __LaCl$_3$ + __Na$_2$CO$_3$ → __La$_2$(CO$_3$)$_3$ + __NaCl

7.   __NH$_4$Cl + __Ba(OH)$_2$ → __BaCl$_2$ + __NH$_3$ + __H$_2$O

8.   __Ca(OH)$_2$ + __H$_3$PO$_4$ → __Ca$_3$(PO$_4$)$_2$ + __H$_2$O

9.   __La$_2$(CO$_3$)$_3$ + __H$_2$SO$_4$ → __La$_2$(SO$_4$)$_3$ + __H$_2$O + __CO$_2$

10. __Na$_2$O + __(NH$_4$)$_2$SO$_4$ → __Na$_2$SO$_4$ + __H$_2$O + __NH$_3$

11. __C$_4$H$_{10}$ + __O$_2$ → __CO$_2$ + __H$_2$O

12. __C$_7$H$_6$O$_2$ + __O$_2$ → __CO$_2$ + __H$_2$O

13. __P$_4$O$_{10}$ + __H$_2$O → __H$_3$PO$_4$

14. __FeS$_2$ + __O$_2$ → __Fe$_2$O$_3$ + __SO$_2$

15. __NH$_3$ + __O$_2$ → __NO + __H$_2$O

16. __Fe + __HCl → __H$_2$ + __FeCl$_2$

17. __PbO$_2$ + __HCl → __H$_2$O + __PbCl$_2$ + __Cl$_2$

18. __Fe$_2$O$_3$ + __H$_2$SO$_4$ → __Fe$_2$(SO$_4$)$_3$ + __H$_2$O

19. __NO$_2$ + __H$_2$O → __NO + __HNO$_3$

20. __C$_2$H$_6$S + __O$_2$ → __CO$_2$ + __H$_2$O + __SO$_2$

Write a complete combustion reaction for each of the following. Make sure the final equation is balanced.

      21. C_6H_{14}

      22. C_6H_6

IV.   Stoichiometry

Step 1: Choose a reaction
- Choose a reaction that you would like to use for this project. You may do research on YouTube or other sites.
- Make sure that your reaction is a CHEMICAL CHANGE. This means you should see one of these indicators: gas, heat/light, color change, or precipitate formed. Most of the demos involving liquid nitrogen or dry ice deal with physical changes.
- Below are some suggested reactions to research. You may use one of these or find your own.
    - https://www.youtube.com/watch?v=6Lc0G6fnaRU
    - https://www.youtube.com/watch?v=JCyd1gnF2xc
    - https://www.youtube.com/watch?v=1h850WxkOyc
    - https://www.youtube.com/watch?v=xxl0v5ka2qQ
    - https://www.youtube.com/watch?v=TLOFaWdPxB0
    - https://www.youtube.com/watch?v=53T5WZHQ_Ck
    - https://www.youtube.com/watch?v=1Y5aCSOSQgU
    - https://www.youtube.com/watch?v=kA12Y-B-U08
    - https://www.youtube.com/watch?v=4scUk5T-V_o

Step 2: Write the balanced equation for your reaction.
- Using an internet resource, determine the balanced chemical equation for your reaction chosen above.

Step 3: Classify your reaction
- Determine if your reaction is synthesis, single displacement, double displacement, combustion, or decomposition.

Step 4: Choose one reactant and determine the quantity of that reactant you want to use.
- If you were going to complete the demonstration, decide how much of each reactant you would like to use. You can just pick a value. How much is not important for this.
    - Solids and pure liquids (water, methanol, ethanol) should have units in **grams.**
    - Solutions should have a **volume in mL** and a **concentration in M.**
- There is not a right or wrong answer, but you should stay below 400g of any reactant.
- Since you are choosing your own quantities, it is highly unlikely that anyone else will use your exact same amounts. This will be used to screen for plagiarism.

Step 5: Determine the moles of each reactant and each product and show all work
- If you have a pure liquid or solid, use mole conversions to calculate to moles.
- If you have a solution, use M=mol/L to convert to moles
- You must show all work.
- Provide a written explanation for how to you converted to moles

Step 6: Determine the amount of products produced in your reaction.
- Use stoichiometry to determine how much of a product will form.
- You should convert the units of products to **grams**
- If you have multiple products, you must calculate **each one produced**
- Provide a written explanation of how to calculate the amount of products

Step 7: Put this in a report form or on a poster
- Include:
  - A link to the video of the reaction
  - An image (hand drawn, screen capture, google images) of your reaction.
  - Balanced chemical equation
  - Classification of your reaction
  - Quantity of the reactant you chose to use
  - Molar masses of all reactants and products
  - Mole conversions with explanations
  - Quantities of products and written explanation