AP Chemistry

Summer Packet

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Welcome to AP Chemistry! This course is designed to give you a more complete experience of chemistry that will prepare you for both the AP Chem exam in the spring of next year and for introductory chemistry in college.

The only way to complete all the topics in this course is to move at a very rapid pace. Therefore, it is critical for all students to complete the Summer Assignment to be ready to get after it in the fall.

**Course Overview:**

The course is taught through a series of lectures and laboratories with homework problems, practice exams, and individual projects. Chapter exams, laboratories and homework assignments comprise the bulk of the grading criteria. Homework is expected to be accomplished within one or two days after assignment. Lab notebooks are e

**Tips for achieving success in AP Chemistry**:

* Study AP Chem every day for at least one hour. This means that if there are no formal assignments, you should be using this time to review your class notes, read the text, give yourself a practice quiz, etc. You must budget this time carefully. If you have a job or are involved in sports, your study time must take priority.
* Choose a study partner that you can also use as a lab partner. **This class is very difficult if done alone.** Pairs are better than larger groups. Get together at regularly scheduled times for study and homework. Avoid “splitting up” the work.
* Avoid getting behind in this course. If you get stuck on a concept or H/W set, get help immediately.
* Attend study sessions regularly. Study sessions are held every Tuesday morning from 6:45-7:30. Clear this time right away with your coach or boss or parent. During this time we are able to take the time to go over H/W problems, old exam questions & etc.

**The Commitment:**

If you taking this course, you have already enjoyed success in your academic career. Taking a course such as AP Chem will be very different than courses you have taken in the past. It will involve a level of work and commitment that you may not have experienced before. Below is list of realities that you must face:

* Straight-A students often get their first B in AP Chem and other students receive their first C. An A in this course will take tremendous effort.
* Missing class for sports, vacations, activities, etc, will result in falling behind and extreme difficulty in getting caught up. You may have been able to manage missing more than a few days each quarter in the past. In this course multiple missed days will be very hard to make up.
* You must accept the fact that you will have significant work outside of class and will need to get help on assignments and lab work.
* You must complete the summer assignment that follows. We will have a test on this material on the **second day of class**. In order for us to save some valuable time later in the course, everyone needs to be ready to go. Carefully read the information on the summer packet on the pages that follow.

We are going to have an exciting, challenging and fun year. I look forward working with you all next year. I hope you have a great summer. If you do have any questions please feel free to email me this summer. I cannot promise to check it everyday, but I will get back to you as soon as I can.

Remember your summer assignment and second-day test, and I’ll see you in the fall!

AP CHEM SUMMER ASSIGNMENT

Before you arrive on the first day of class, you will need to have memorized or learned the following items or concepts. **You will be responsible for everything on the pages to follow**.

You must be ready to be tested on this material on the second day of class.

Some of the material is review from Chem I. Some of the material will be new and may seem strange. Nonetheless, you need to know it all and know it well.

Glance through the pages now and notice those areas likely to require effort on your part. Keep this folder handy and take it with you into situations this summer where you are likely to find yourself with periods of free time. Learn a little at a time. There are also some excellent reviews online.

Putting this off until right before school starts will lead to undo stress. Make some flash cards, get your parents to quiz you or get together with a buddy. Study it in small chunks rather than trying to learn it all at once. Good Luck!

Make sure you memorize the following items. Know name, formula (or symbol) and charges:

**Common Polyatomic Ions**

|  |  |  |
| --- | --- | --- |
| **-1** | **-2** | **-3** |
| acetate CH3COO –1  chlorate ClO3-1  chlorite ClO2-1  cyanide CN-  dihydrogen phosphate H2PO4-1  hydrogen carbonate HCO3-1 (bicarbonate)  hydrogen sulfate HSO4-1 (bisulfate)  hydrogen sulfide HS-1 (bisulfide)  hydrogen sulfite HSO3-1 (bisulfite)  hydroxide OH-1  hypochlorite OCl-1  iodate IO3-1  nitrate NO3-1  perchlorate ClO4-1  permanganate MnO4-1  thiocyanate SCN-1 | carbonate CO32-  chromate CrO42-  dichromate Cr2O72-  hydrogen phosphate HPO42-  oxalate C2O42-  peroxide O22-  silicate SiO32-  sulfate SO42-  sulfite SO32-  thiosulfate S2O32- | arsenide As3-  phosphate PO43--  phosphite PO33- |

\*Ammonium NH4+

**THE SOLUBILITY RULES**

1. The nitrates, nitrites, chlorates, and acetates of all metals are soluble in water.

2. All Group I and ammonium salts are soluble in water.

3. The chlorides, bromides, and iodides of all metals except lead, silver, and mercury (I) are soluble in water.

4. The sulfates of all metals except lead, strontium, mercury (I), and barium are soluble in water.

5. The carbonates, phosphates, borates, sulfites, chromates, and arsenates of all metals except sodium,

potassium, and ammonium are insoluble in water.

6. The sulfides of all metals except lithium, barium, calcium, magnesium, potassium, sodium, and

ammonium are insoluble in water.

7. The hydroxides of lithium, sodium, potassium, and ammonium are very soluble in water.

**Naming Review**

**Write your answers in the space provided. I must be able to read your work or I will not grade it. Make sure you have correct sizing of your letters.**

|  |  |
| --- | --- |
| 1. AlCl3 | 26. Magnesium silicate |
| 2. C2H6 | 27. Carbon monoxide |
| 3. Cu(NO3)2 | 28. Sulfurous acid |
| 4. SI6 | 29. silicon disulfide |
| 5. CF4 | 30. Iron (III) oxide |
| 6. HClO4 | 31. Potassium iodate |
| 7. C8H18 | 32. Sodium thiocyanate |
| 8. K3N | 33. Zinc (II) nitrate |
| 9. HF | 34. Barium phosphite |
| 10. BBr3 | 35. Diphosphorus pentoxide |
| 11. NH4F | 36. Phosphoric acid |
| 12. Sn(CN)4 | 37. Butane |
| 13. Mg(OH)2 | 38. Sodium thiosulfate |
| 14. NaI | 39. Potassium permanganate |
| 15. H2SO4 | 40. Hydrobromic acid |
| 16. PbCO3 | 41. Selenium hexaiodide |
| 17. NH4NO3 | 42. Silver (I) nitrate |
| 18. NaOH | 43. Ammonium dichromate |
| 19. HCl | 44. Dinitrogen tetroxide |
| 20. HNO3 | 45. Hydrosulfuric acid |
| 21. CuO | 46. Arsenic pentafluoride |
| 22. Cu2O | 47. Xenon difluoride |
| 23.H2O2 | 48. Propane |
| 24. Ca(HSO4)2 | 49. Tin (IV) hypoiodite |
| 25. Ag2S | 50. Nitrous acid |

**Units in Measurement**

1.) Use prefixes to express each measurement without any exponents and to the proper number of significant figures. (Ex. 5.3x10-3 m 🡪 5.3 mm)

a. 1.2 x 10-9 m \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

b. 1.5 x 103 g \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

c. 3.24 x 10-6 L \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

d. 55.2 x 10-4 s \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

e. 2.70 x 10-2 mol \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

2.) Use scientific notation to express each quantity with only the base units (no prefixes).

a. 4.5 ns \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

b. 18 cm \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

c. 128 pm \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

d. 35 µm \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

e. 710. kg \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

3.) Complete the table.

|  |  |  |
| --- | --- | --- |
| a. 1245 kg | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ g | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ mg |
| b. 515 km | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ dm | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ cm |
| c. 122.36 s | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ ms | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ks |
| d. 3.35 J | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ kJ | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ mJ |

**Significant Figures**

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

1.) 402 m \_\_\_\_\_\_\_\_\_\_\_

2.) 34.20 lbs \_\_\_\_\_\_\_\_\_\_\_

3.) 0.03 sec \_\_\_\_\_\_\_\_\_\_\_

4.) 0.00420 g \_\_\_\_\_\_\_\_\_\_\_

5.) 3,200 liters \_\_\_\_\_\_\_\_\_\_\_

6.) 0.0300 ft. \_\_\_\_\_\_\_\_\_\_\_

7.) 5.1 x 104 kg \_\_\_\_\_\_\_\_\_\_\_

8.) 0.48 m \_\_\_\_\_\_\_\_\_\_\_

9.) 1, 400.0 m \_\_\_\_\_\_\_\_\_\_\_

10.) 78,323.01 g \_\_\_\_\_\_\_\_\_\_\_

Carry out the following calculations and round your answer to the proper number of significant figures.

1. 9.15 ÷ 4.970 = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

2. 1.54 x 0.03060 x 0.69 = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

3. 27.5 x 1.82 ÷ 100.04 = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

4. (2.290 x 106) ÷ (6.7 x 104) = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

5. 43.7 — 2.341 = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Classifying Matter**

1. Classify each substance as a pure substance (PM) or mixture (M). If pure substance, classify as an element (E) or compound (C). If mixture, classify as heterogeneous (HT) or homogeneous (HO).

a. sweet tea \_\_\_\_\_\_\_\_\_

b. aluminum \_\_\_\_\_\_\_\_\_

c. carbon dioxide \_\_\_\_\_\_\_\_\_

d. vegetable soup \_\_\_\_\_\_\_\_\_

e. iron \_\_\_\_\_\_\_\_\_

f. fruit salad \_\_\_\_\_\_\_\_\_

g. magnesium oxide \_\_\_\_\_\_\_\_\_

h. apple juice \_\_\_\_\_\_\_\_\_

i. hydrogen peroxide \_\_\_\_\_\_\_\_\_

2. Classify each of the properties of isopropyl alcohol as physical (P) or chemical (C)

a. colorless \_\_\_\_\_\_\_\_\_

b. flammable \_\_\_\_\_\_\_\_\_

c. liquid at room temperature \_\_\_\_\_\_\_\_\_

d. density = 0.79 g/mL \_\_\_\_\_\_\_\_\_

e. mixes with water \_\_\_\_\_\_\_\_\_

3. Classify the following as a physical (P) or chemical (C) change.

a. Liquid propane evaporates \_\_\_\_\_\_\_\_\_

b. Liquid propane burns \_\_\_\_\_\_\_\_\_

c. Iron rusts \_\_\_\_\_\_\_\_\_

d. Sugar dissolves in water \_\_\_\_\_\_\_\_\_

e. Platinum becomes dull from abrasion \_\_\_\_\_\_\_\_\_

**Atomic Structure**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Name | Symbol | Atomic # | Mass # | Neutrons | Protons | Electrons |
| Titanium |  |  |  | 26 |  |  |
|  | C |  | 12 |  |  |  |
| Lithium-7 |  |  |  |  |  |  |

Isotopic Abundance. Round your answer to two decimal places.

1. Determine the average mass of an element based on data table the isotopic abundance and the mass of each isotope of Neon.

|  |  |
| --- | --- |
| Isotope | % Abundance |
| 20Ne | 90.48 |
| 21Ne | 0.27 |
| 22Ne | 9.25 |

**Stoichiometry**

Show work on separate sheet of paper and label this section as “Stoichiometry”. Write your final answer on the space provided. For each of the following, you must show cancellation of units in order to receive credit. Round your answer to the proper number of significant figures.

1. How many atoms are in 5.43 g of sodium? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

2. How many grams of nitrogen are in 1.21 mol of ammonium nitrate?\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

3. What mass of water is present when there are 2.0 x 1023 molecules? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

4. How many hydroxide ions are present in 17.1 mol of magnesium hydroxide? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

5. How many moles of sodium are in 2.13 g of sodium phosphate? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

6. What mass of iron can be isolated from 0.765 g of iron (III) oxide? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

7. How many moles of aluminum nitride are in 1.23 g? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

8. How many molecules of potassium chlorate are in 9.12 kg? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

9. What mass of lead (II) nitrate would be required to produce 8.25 mol?\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

10. How many chloride ions are in 3.200 mg of strontium chloride? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

11. Ammonia reacts with oxygen to produce nitrogen monoxide and water.

a. What mass of water will be produced when 100.0 g of ammonia is reacted with excess oxygen?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

b. If the reaction is done with 25.0 g of each reactant, what mass of nitrogen monoxide can be collected?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

12. Sodium sulfide reacts with silver (I) nitrate.

a. If the above reaction is carried out with 50.0 g of sodium sulfide and 35.0 g of silver nitrate, which is the limiting reactant?

b. What mass of the excess reactant remains? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

c. What mass of silver sulfide would precipitate? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

d. What is the percent yield if only 5.76 g of silver (I) sulfide is collected?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_