

## Summer Study Assignment – AP Chemistry

- Round the following numbers to three significant figures.
  - 4325
  - $6.873 \times 10^3$
  - 0.17354
- Perform the indicated operations and round your answers to the proper number of significant figures. Assume that all answers were obtained from measurements.
  - $(2.11 \times 10^{-3}) + (1.54 \times 10^{-3})$
  - $(1.54 \times 10^{-3}) + (2.11 \times 10^{-2})$
  - $(4.56 + 18.7)/(1.23 \times 10^2)$
  - $(1.23 \times 10^{-2})(4.56 + 1.87)$
- Make the following conversions:
  - 0.75 kg to milligrams
  - 1500 millimeters to km
  - 2390 g to kg
  - 0.52 km to meters
- How many cubic meters ( $m^3$ ) are there in 4312 cubic centimeters ( $cm^3$ )?
- The helium gas stored inside a large weather balloon weighs 13.558 grams. What is the volume of this balloon if the density of helium is 0.1786 g/L?
- A rectangular block of copper metal weighs 1896 grams. The dimensions of the block are 8.4 cm by 5.5 cm by 4.6 cm. From this data, what is the density of copper?
- Write the formula for the following compounds:
  - ammonium sulfide
  - sodium nitrate
  - cupric bromide
  - aluminum sulfate
  - potassium nitrate
  - ferrous carbonate
  - lead (II) phosphate
  - diphosphorus pentoxide
  - cupric hydroxide
  - calcium fluoride
  - nickel (II) nitrate
  - silver cyanide
  - ammonium sulfite
  - zinc sulfate
  - tin (II) chloride
  - antimony (III) chloride
  - silver sulfide
  - magnesium hydroxide
  - ammonium carbonate
  - nickel (II) acetate
- Write the name of the following compounds:
  - KF
  - $CaSO_4$
  - HCl
  - $SbCl_3$
  - $As_4O_{10}$
  - $NH_4Cl$
  - $NH_4NO_3$
  - $IF_5$
  - $NaHCO_3$
  - $Ba(OH)_2$
- Write the electron configuration (long way) for sulfur.
- Write the orbital notation (boxes) for magnesium.
- Write the electron configuration using the Noble Gas (shorthand) core method for radium.
- Write a balanced equation and indicate the reaction type (single or double replacement, decomposition, combustion or synthesis) for each of the following:
  - Sodium hydroxide (aq) + sulfuric acid (aq)  $\rightarrow$  sodium sulfate (aq) + water (l)
  - Magnesium (s) + oxygen (g)  $\rightarrow$  magnesium oxide (s)
  - Ammonium phosphate (aq) + barium hydroxide (aq)  $\rightarrow$
- Calculate the percentage composition of the following compounds:
  - Ferric oxide
  - Silver oxide
- $4 FeCr_2O_7 + 8 K_2CO_3 + O_2 \rightarrow 2 Fe_2O_3 + 8 K_2CrO_4 + 8 CO_2$

- a. How many grams of iron (II) dichromate are required to produce 44.0 grams of carbon dioxide?
  - b. How many grams of oxygen gas are required to produce 100.0 grams of ferric oxide?
  - c. If 300.0 grams of iron (II) dichromate react, how many grams of oxygen gas will be consumed?
  - d. How many grams of iron (III) oxide will be produced from 300.0 grams of ferrous dichromate?
15. If 5.00 grams of copper metal react with a solution containing 20.0 grams of  $\text{AgNO}_3$ , which reactant is limiting?
- $$\text{Cu (s)} + \text{AgNO}_3 \text{ (aq)} \rightarrow \text{Cu(NO}_3)_2 \text{ (aq)} + \text{Ag (s)}$$
16. What is the volume of a sample of oxygen gas that has a mass of 50.0 grams and is under a pressure of 1.20 atm at 27.0°C?
17. The thermite reaction has been used to weld railroad tracks. The reaction is
- $$\text{Fe}_2\text{O}_3 \text{ (s)} + 2 \text{Al (s)} \rightarrow 2 \text{Fe (s)} + \text{Al}_2\text{O}_3 \text{ (s)}$$
- How many grams of aluminum would be needed to produce 15.0 grams of iron?
18. Sea water contains roughly 28.0 grams of NaCl per liter. What is the molarity of sodium chloride in sea water?
19. What is the molarity of 245.0 grams of  $\text{H}_2\text{SO}_4$  dissolved in 1.00 L of solution?
20. What is the molarity of 5.30 grams of  $\text{Na}_2\text{CO}_3$  dissolved in 400.0 mL solution?
21. Calculate the empirical formula of the compounds which have the following percentage compositions:
- a. 40.2 % K, 26.9% Cr, and 32.9% O
  - b. 21.8 % Mg, 27.9% P, and 50.3% O
22. In what order are the elements listed on the PRESENT periodic table?
23. State the periodic law.
24. What name is given to the elements in a vertical column on the periodic table?
25. What name is given to the elements in a horizontal row on the periodic table?
26. How many significant figures does each of the numbers contain?
- a. 0.0278 meter
  - b. 1.3 centimeter
  - c. 1.00 foot
  - d. 8021 yards
  - e.  $7.98 \times 10^{-3}$  pounds
27. Make the following conversions:
- a. 65 kg to grams
  - b. 750 micrograms to grams
  - c. 0.25 nanometers to cm
  - d. 23.8 milligrams to kg
28. How many cubic decimeters ( $\text{dm}^3$ ) are there in  $1.773 \times 10^5$  cubic meters ( $\text{m}^3$ )?
29. What volume of silver metal will weigh exactly 2500.0 grams? The density of silver is  $10.5 \text{ g/cm}^3$ .
30. What is the weight of 215 L of hydrogen sulfide gas if the density of hydrogen sulfide is 1.54 g/L?
31. Write the electron configuration (long way) for palladium.
32. Write the orbital notation (boxes) for scandium.
33. Write the formula for the following compounds:
- a. sodium chromate
  - b. chromic bisulfate
  - c. potassium permanganate
  - d. silver perchlorate
  - e. potassium phosphate

- f. nickel (II) iodide
- g. mercurous oxide
- h. lead (II) chloride
- i. hydrogen iodide
- j. iron (II) bisulfite
- k. magnesium nitrate
- l. iron (III) chromate
- m. iron (II) chromate
- n. copper (II) hydroxide
- o. cuprous carbonate
- p. chromic acetate
- q. calcium chlorate
- r. ammonium oxide
- s. aluminum perchlorate
- t. zinc bicarbonate

**34. Write the name of the following compounds:**

- a.  $\text{FeCl}_3$
- b.  $\text{HF}$
- c.  $\text{PbSO}_4$
- d.  $\text{KrF}_2$
- e.  $\text{NaCl}$
- f.  $\text{P}_2\text{O}_5$
- g.  $\text{AlBr}_3$
- h.  $\text{Ba}(\text{NO}_3)_2$
- i.  $\text{BrF}_5$
- j.  $\text{P}_4\text{O}_{10}$

35. Write the electron configuration using the Noble Gas core method for californium.

**36. Write a balanced equation and indicate the reaction type (single or double replacement, decomposition, or composition/synthesis) for each of the following:**

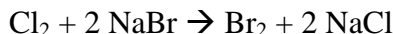
- a. Calcium hydroxide (aq) + nitric acid (aq)  $\rightarrow$
- b. Chromium (III) sulfite (aq) + sulfuric acid (aq)  $\rightarrow$
- c. Zinc chloride (aq) + ammonium sulfide (aq)  $\rightarrow$
- d. Silver acetate (aq) + potassium chromate (aq)  $\rightarrow$

37. Determine the percentage of sodium in sodium sulfate.

**38. Given the reaction  $\text{S} + \text{O}_2 \rightarrow \text{SO}_2$**

- a. How many grams of sulfur must be burned to give 100.0 grams of  $\text{SO}_2$ ?
- b. How many grams of oxygen will be required for the reaction in part a?

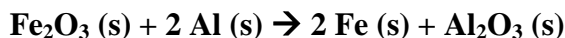
39. What reactant is limiting if 3000  $\text{cm}^3$  of  $\text{Cl}_2$  at STP react with a solution containing 25.0 grams of NaBr?



**40. What is the volume at STP of a sample of  $\text{CO}_2$  that has a volume of 75.0 mL at  $30.0^\circ\text{C}$  and 680 mm Hg?**

41. What is the volume of a sample of oxygen gas that has a mass of 50.0 grams and is under a pressure of 1.20 atm at  $27.0^\circ\text{C}$ ?

**42. The thermite reaction has been used to weld railroad tracks. The reaction is**



**How many grams of iron (III) oxide would be needed to produce 15.0 grams of iron?**

43. What is the molarity of 5.00 grams of NaOH in 750.0 mL of solution?

**44. How many moles of  $\text{Na}_2\text{CO}_3$  are in 10.0 mL of a 0.20 M solution?**

45. How many moles of NaCl are contained in 100.0 mL of a 0.20 M solution?

**46. What is the most active metal?**

47. What is the most active nonmetal?

**48. Calculate the empirical formula of the compounds which have the following percentage compositions:**

- a. 65.7% Sr, 10.4% Si, and 23.9% O
- b. 34.58% Na, 23.30% P, and 42.12% O

49. What is the significance of the zig zag line running diagonally down and to the right near the right side of the periodic table?



63. If 20.0 grams of KOH react with 15.0 grams of  $(\text{NH}_4)_2\text{SO}_4$ , calculate the moles of  $\text{K}_2\text{SO}_4$  produced.



64. A rigid container holds a gas at a pressure of 0.55 atm at  $-100^\circ\text{C}$ . What will the pressure be when the temperature is increased to  $200^\circ\text{C}$ ?

65. What weight (in grams) of NaCl would be contained in 100.0 mL of a 0.20 M NaCl solution?

66. What weight in grams of  $\text{H}_2\text{SO}_4$  would be needed to make 750.0 mL of a 2.00 M solution?

67. What volume in mL of 18.0 M  $\text{H}_2\text{SO}_4$  is needed to contain 2.45 grams of  $\text{H}_2\text{SO}_4$ ?

68. Calculate the empirical formulas for the following:

a. Fe 77.7% and O 22.3 %

b. Fe 72.4 % and O 27.6 %

69. What is ionization energy and which element has the highest ionization energy?

70. Metals \_\_\_\_\_ electrons. (Gain or lose)

71. Nonmetals \_\_\_\_\_ electrons. (Gain or lose)

72. Which is more active metal OR nonmetal in each pair?

a. Carbon or oxygen

d. Hydrogen or francium

b. Fluorine or neon

e. Uranium or calcium

c. Zinc or sodium

73. Express the following exponentials as ordinary numbers:

a.  $7.23 \times 10^4$

b.  $8.193 \times 10^2$

c.  $1.98 \times 10^{-3}$

74. Make the following conversions:

a.  $9.57 \times 10^{-8}$  mm to nm

c. 35.38 mL to L

b. 2.00 L to mL

d.  $5000 \text{ cm}^3$  to mL

75. The volume of a sample of water is found to be  $86.3 \text{ cm}^3$ . What is the volume of the sample in  $\text{mm}^3$ ?

76. Find the weight of 250.0 mL of benzene. The density of benzene is 0.90 g/mL.

77. Write the formula for the following compounds:

a. ferric oxide

f. calcium iodide

b. silver phosphate

g. cupric sulfate

c. sodium hypochlorite

h. cuprous chloride

d. ammonium chromate

i. ferric carbonate

e. barium carbonate

j. zinc phosphate

78. Write the name of the following compounds:

a.  $\text{Sr}(\text{HCO}_3)_2$

f.  $\text{NH}_4\text{F}$

b.  $\text{Sr}(\text{OH})_2$

g.  $\text{XeF}_6$

c.  $\text{P}_4\text{S}_{10}$

h.  $\text{K}_2\text{Cr}_2\text{O}_7$

d.  $\text{Hg}_2\text{O}_2$

i.  $\text{NH}_4\text{OH}$

e.  $\text{Hg}_2(\text{OH})_2$

j.  $(\text{NH}_4)_3\text{PO}_4$

79. Write the electron configuration (long way) for barium.

80. Write the orbital notation (boxes) for selenium.

81. Write the electron configuration using the Noble Gas core method for protactinium.

82. Write a balanced equation and indicate the reaction type (single or double replacement, decomposition, or composition/synthesis) for each of the following:

a. barium carbonate (s) + hydrochloric acid (aq)  $\rightarrow$

b. chlorine (g) + magnesium iodide (Aq)  $\rightarrow$



**100. Calculate the density of sulfuric acid if 35.4 mL of the acid weighs 65.14 grams.**

101. Write the formulas for the following compounds:

- |                                 |                                  |
|---------------------------------|----------------------------------|
| a. sodium nitrite               | k. cobalt (II) iodide            |
| b. silver oxide                 | l. chromium (II) bicarbonate     |
| c. nickel (II) bromide          | m. sodium hydroxide              |
| d. magnesium oxide              | n. silver nitrate                |
| e. mercuric perchlorate         | o. mercury (II) nitrate          |
| f. lithium hypochlorite         | p. hydrochloric acid             |
| g. oxygen difluoride            | q. aluminum bisulfite            |
| h. cobalt (II) hydrogen sulfate | r. cobalt (III) hydrogen sulfate |
| i. acetic acid                  | s. ferric hydrogen carbonate     |
| j. barium hypobromite           |                                  |
| k. ammonium hydroxide           |                                  |

**102. Write the name of the following compounds:**

- |              |              |
|--------------|--------------|
| a. $N_2O_5$  | f. CuS       |
| b. $SnCrO_4$ | g. $MgI_2$   |
| c. $Al_2O_3$ | h. $CoCl_3$  |
| d. $CuCO_3$  | i. NaCN      |
| e. $ClO_2$   | j. $Hg_3N_2$ |

103. Write the electron configuration (long way) for francium.

**104. Write the orbital notation (boxes) for cadmium.**

105. Write the electron configuration using the Noble Gas core method for lead.

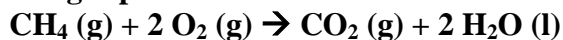
**106. Write a balanced equation and indicate the reaction type (single or double replacement, decomposition, or composition/synthesis) for each of the following:**

- cobalt (III) hydroxide (aq) + nitric acid (aq)  $\rightarrow$
- bromine (l) + sodium iodide (aq)  $\rightarrow$
- sodium hydroxide (aq) + phosphoric acid (aq)  $\rightarrow$
- ammonium sulfate (aq) + calcium hydroxide (aq)  $\rightarrow$

107.  $NaCl + AgNO_3 \rightarrow AgCl + NaNO_3$

If you have 78.00 grams of NaCl, how many grams of AgCl should be produced?

**108. If 20.0 dm<sup>3</sup> of methane, CH<sub>4</sub>, react with 200.0 dm<sup>3</sup> of air at STP, calculate the dm<sup>3</sup> of carbon dioxide gas produced.**



109. A mass of air occupies a volume of 5.7 L at a pressure of 0.52 atm. What is the new pressure if the same mass of air at the same temperature is transferred to a 2.0 L container?

**110. What weight in grams of KCl is there in 2.50 L of a 0.50 M KCl solution?**

111. What is the molarity of a solution containing 12.0 grams of NaOH in 250.0 mL of solution?

**112. Arrange each of the following in order of increasing atomic radii:**

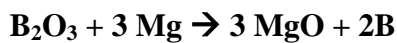
- the alkaline earth metals
- the noble gases
- the main group elements in the third period
- C, Si, Sn, Pb

113. Arrange the following in order of decreasing radius: Br, I, Se, Li.

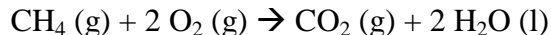
- 114. What is ionization energy and why it increase from left to right across a period?**
115. Arrange the members of each of the following sets of elements in order of increasing first ionization energy:
- the alkali metals
  - the halogens
  - the elements in the second period
  - Br, Cl, B, Ga, Cs, and H
- 116. Perform the indicated operations and round off your answers to the proper number of significant figures. Assume that all numbers were obtained from measurements.**
- $(1.54 \times 10^3) + (2.11 \times 10^3)$
  - $(1.54 \times 10^3) + (2.11 \times 10^2)$
  - $(1.23 \times 10^2)/(4.56 + 18.7)$
  - $(4.56 + 8.7)/(1.23 \times 10^{-2})$
117. Make the following conversions:
- $7.8825 \times 10^5$  mm to cm
  - $5.79 \times 10^{-8}$  m to mm
  - $6.24 \times 10^8$  km to cm
  - 0.0031 km to m
  - 50,000 MHz to kHz
- 118. How many  $\text{m}^3$  are there in  $5,240 \text{ dm}^3$ ?**
119. A small object is found to have a volume of  $3.44 \times 10^{-4}$  mL. Express this length in  $\text{dm}^3$ .
- 120. A flask built to hold exactly 2.5000 L is filled with nitrogen. The weight of the nitrogen in the flask at standard conditions is 0.1250 grams. What is the density of the nitrogen?**
121. Write the formulas for the following compounds:
- Phosphorus pentabromide
  - Nickel (II) chloride hexahydrate
  - Ammonium aluminum sulfate
  - Iron (III) hydrogen carbonate
  - Mercury (I) bicarbonate
  - Plumbic hydrogen sulfate
  - Mercuric hydrogen phosphate
  - Mercurous bisulfite
  - Copper (II) sulfate pentahydrate
  - Chromic dihydrogen phosphate
  - Sodium acetate
  - Zinc sulfite
  - Silver sulfide
  - Potassium iodide
  - Lead (IV) chlorite
  - Mercurous chromate
  - Lead (II) nitrite
  - Potassium dichromate
  - Magnesium carbonate
  - Calcium hydroxide
- 122. Write the name of the following compounds:**
- $\text{BrO}_3$  (not an ion)
  - $\text{SiF}_4$
  - $\text{Sb}_2\text{O}_5$
  - $\text{LiH}$
  - $\text{SF}_6$
  - $\text{KOH}$
  - $\text{SnI}_4$
  - $\text{K}_2\text{O}$
  - $\text{H}_2\text{SO}_4$
123. Write the electron configuration (long way) for potassium.
- 124. Write the orbital notation (boxes) for chromium.**
125. Write the electron configuration using the Noble Gas core method for iodine.

126. Write a balanced equation and indicate the reaction type (single or double replacement, decomposition, or composition/synthesis) for each of the following:
- Aluminum nitrate (aq) + sodium hydroxide (aq) → aluminum hydroxide (s) + sodium nitrate (aq)
  - Potassium chlorate (s) → potassium chloride (s) + oxygen (g)
  - Phosphoric acid (aq) + magnesium hydroxide (aq) → magnesium phosphate (s) + water (l)
  - Ammonium nitrite (s) → nitrogen (g) + water (l)
  - Silver nitrate (aq) + potassium chloride (aq) → silver chloride (s) + potassium nitrate (aq)
127. An essential amino acid which cannot be made (synthesized) by the body and must be obtained in the diet is methionine. What is the percentage of carbon, nitrogen, and sulfur in this amino acid if the formula of methionine is  $\text{CH}_3\text{SCH}_2\text{CH}_2\text{CHNH}_2\text{COOH}$ ?
128. If  $20.0 \text{ dm}^3$  of methane,  $\text{CH}_4$ , react with  $200.0 \text{ dm}^3$  of air at STP, calculate the grams of carbon dioxide produced.
- $$\text{CH}_4 (\text{g}) + 2 \text{O}_2 (\text{g}) \rightarrow \text{CO}_2 (\text{g}) + 2 \text{H}_2\text{O} (\text{l})$$
129. Determine the total pressure of a gas mixture that contains CO, Ne, and He if the partial pressures of the gases are  $P_{\text{CO}} = 1.53 \text{ atm}$ ,  $P_{\text{Ne}} = 0.82 \text{ atm}$ , and  $P_{\text{He}} = 0.34 \text{ atm}$ .
130. Ammonia is produced by the reaction of nitrogen and hydrogen according to this balanced equation:
- $$\text{N}_2 (\text{g}) + 3 \text{H}_2 (\text{g}) \rightarrow 2 \text{NH}_3 (\text{g})$$
- What volume of ammonia would be produced if 13.4 grams of hydrogen gas reacted at STP?
131. Given the following balanced equation
- $$4 \text{Hg} (\text{l}) + \text{O}_2 (\text{g}) \rightarrow 2 \text{Hg}_2\text{O} (\text{s})$$
- How many grams of oxygen will be required to react with 67.3 grams of Hg?
132. Determine the molarity of these solutions:
- 4.67 moles of  $\text{Li}_2\text{SO}_3$  dissolved to make 2.04 L of solution.
  - 0.629 moles of  $\text{Al}_2\text{O}_3$  to make 1.500 liters of solution.
  - 4.783 grams of  $\text{Na}_2\text{CO}_3$  to make 10.00 liters of solution.
133. Arrange the members of each of the following sets of elements in order of increasing electron affinities:
- the Group IA metals
  - the Group IVA elements
  - the elements in the second period
  - Li, K, C, F, and Cl
134. Define electron affinity, and then arrange the following elements in order of increasing electron affinities: P, S, Cl, and I.
135. Explain the trend in size of either the atom or ion as one moves down a group.
136. What is electronegativity? How does it compare to electron affinity?
137. Round off the following to three significant figures.
- 4.76200
  - 0.0299817
  - 506789.2

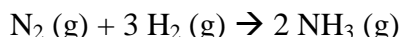
- 138. Make the following conversions:**
- |                                   |                   |
|-----------------------------------|-------------------|
| a. $3.44 \times 10^{-6}$ cm to hm | c. 0.6321 kg to g |
| b. 10.00 kg to mg                 | d. 458 cg to mg   |
139. How many dm<sup>3</sup> are there in 6.245101 cm<sup>3</sup>?
- 140. Calculate the number of L in 8,062.95 cm<sup>3</sup>.**
141. What is the weight of ethyl alcohol that exactly fills a 200.0 mL container? The density of ethyl alcohol is 0.789 g/mL.
- 142. Calculate the density of helium in g/L if a balloon with a capacity of 5.00 L holds 0.890 grams.**
143. Write the formulas for the following compounds:
- |                           |                       |
|---------------------------|-----------------------|
| a. aluminum hydroxide     | k. iron (II) chromate |
| b. cobaltous oxide        | l. ferric bromide     |
| c. ferric permanganate    | m. zinc sulfate       |
| d. ammonium chromate      | n. boron phosphide    |
| e. nitrogen triiodide     | o. ferric carbonate   |
| f. ammonium dichromate    | p. cupric bisulfate   |
| g. iron (III) bicarbonate | q. ammonia            |
| h. ammonium perchlorate   | r. barium bisulfite   |
| i. cobaltic acetate       | s. nitric acid        |
| j. cobalt (II) hydroxide  |                       |
- 144. Write the name of the following compounds:**
- |                                  |                                   |
|----------------------------------|-----------------------------------|
| a. NaOH                          | f. NBr <sub>3</sub>               |
| b. NI <sub>3</sub>               | g. Cl <sub>2</sub> O <sub>3</sub> |
| c. ClF <sub>3</sub>              | h. CsF                            |
| d. P <sub>3</sub> H <sub>5</sub> | i. CO                             |
| e. UF <sub>6</sub>               | j. Cu <sub>2</sub> S              |
145. Write the electron configuration (long way) for sodium.
- 146. Write the orbital notation (boxes) for fluorine.**
147. Write the electron configuration using the Noble Gas core method for gold.
- 148. Write a balanced equation and indicate the reaction type (single or double replacement, decomposition, or composition/synthesis) for each of the following:**
- Ammonium nitrite (s) → nitrogen (g) + water (l)
  - Ammonia (g) + oxygen (g) → nitrogen (II) oxide (g) + water (l)
  - Barium chloride (aq) + sodium sulfate (aq) → sodium chloride (aq) + barium sulfate (s)
  - Iron (III) oxide (s) + carbon monoxide (g) → iron (s) + carbon dioxide (g)
  - Magnesium hydroxide (aq) + ammonium phosphate (aq) → magnesium phosphate (s) + ammonia (g) + water (l)
  - Magnesium hydroxide (aq) + phosphoric acid (aq) → magnesium phosphate (s) + water (l)
149. Calcium dihydrogen phosphate is an important fertilizer. What is the percent phosphorus in Ca(H<sub>2</sub>PO<sub>4</sub>)<sub>2</sub>?
- 150. How much boron can be obtained from 10.00 grams of diboron trioxide? How much magnesium?**



151. If 20.0 dm<sup>3</sup> of methane, CH<sub>4</sub>, react with 35.0 dm<sup>3</sup> of air at STP, calculate the grams of water produced.



152. **Nitrogen gas in a steel cylinder is under a pressure of 150 atm at 27°C. What will be the pressure in the tank if the tank is left in the sun and the temperature rises to 55°C?**
153. Ammonia is produced by the reaction of nitrogen and hydrogen according to this balanced equation:



What volume of ammonia would be produced if 13.4 L of nitrogen gas react at STP?

154. **Determine the molarity of these solutions:**
- 0.894 grams of (NH<sub>4</sub>)<sub>2</sub>CO<sub>3</sub> to make 250 mL of solution.**
  - 0.0348 grams of PbCl<sub>2</sub> to form 45.0 mL of solution.**
155. Two compounds are analyzed and found to contain:
- 0.89 grams K, 1.18 grams Cr, and 1.27 grams O
  - 1.03 grams K, 0.69 grams Cr, and 0.84 grams O
- Determine the empirical formulas for these two compounds.
156. **Arrange the members of each of the following sets of elements in order of increasing electronegativities:**
- Pb, C, Sn, Ge**
  - S, Na, Mg, Cl**
  - P, N, Sb, Bi**
  - Se, Ba, F, Si, Sc**
157. Which has the larger radius, Br or Br<sup>-</sup>? Why?
158. Which has the largest atomic radius: S, Se, or Cl? Why?
159. **How many significant figures does each of the numbers contain?**
- 0.2003 ton**
  - 4.69 x 10<sup>4</sup> tons**
  - 1 x 10<sup>12</sup> atoms**
  - 1.73 x 10<sup>24</sup> atoms**
160. Make the following conversions:
- |                      |                        |
|----------------------|------------------------|
| a. .002023 mg to kg  | c. 0.00031 grams to dg |
| b. 89.00 grams to cg | d. 62,000 mg to dkg    |
161. **A book is found to have a mass of 0.6321 kg. Calculate its mass in grams and its density if its volume is 12 cm<sup>3</sup>.**
162. Calculate the number of dm<sup>3</sup> in 1000 cm<sup>3</sup>.
163. **Sugar is used to fill a box that has a volume of 200 cm<sup>3</sup>. The sugar weighs 316 grams. What is the density of sugar? (Ignore the space between the sugar crystals.)**
164. Mercury metal is poured into a graduated cylinder that holds exactly 22.5 mL. The mercury used to fill the cylinder weighs 306.0 grams. From this information, calculate the density of the mercury.
165. **Write the names for the following compounds:**
- |                      |                     |
|----------------------|---------------------|
| a. KHCO <sub>3</sub> | d. HgO              |
| b. SbCl <sub>5</sub> | e. PCl <sub>3</sub> |
| c. CO <sub>2</sub>   | f. PBr <sub>5</sub> |



166. Write the electron configuration (long way) for carbon.
167. **Write the orbital notation (boxes) for chlorine.**
168. Write the electron configuration using the Noble Gas core method for cesium.
169. **Write a balanced equation and indicate the reaction type (single or double replacement, decomposition, or composition/synthesis) for each of the following:**
- Iron (III) bromide (aq) + ammonium sulfide (aq)  $\rightarrow$  iron (III) sulfide (s) + ammonium bromide (aq)**
  - Calcium oxide (s) + diphosphorus pentoxide (s)  $\rightarrow$  calcium phosphate (s)**
  - Magnesium chloride (aq) + silver nitrate (aq)  $\rightarrow$  magnesium nitrate (aq) + silver chloride (s)**
  - Sodium carbonate (aq) + sulfuric acid (aq)  $\rightarrow$  sodium sulfate (aq) + carbon dioxide (g) + water (l)**
  - Iron (II) sulfide (s) + hydrochloric acid (aq)  $\rightarrow$  iron (II) chloride (aq) + hydrogen sulfide (g)**
170. The sugar substitute sodium benzosulfimide (sodium saccharin) has a sweetness of about 500 times that of regular sugar. Calculate the percentage of sodium and carbon in the sweetener if its formula is  $\text{C}_7\text{H}_4\text{O}_3\text{SNNa}$ .
171.  **$\text{SnO}_2$  is reduced by carbon according to this reaction:  $\text{SnO}_2 + \text{C} \rightarrow \text{Sn} + \text{CO}_2$ .**
- How many liters of  $\text{CO}_2$  are produced if 300.0 grams of tin are produced at STP?**
  - How many grams of  $\text{SnO}_2$  are required to produce 1800.0 grams of tin?**
  - How much tin is produced per 100.0 grams of carbon used?**
172. If 20.0 grams of hydrogen gas react with 15.0 grams of nitrogen, which gas is the limiting reactant? How many  $\text{dm}^3$  of ammonia will be produced? Assume the reaction takes place at STP.
173. **If  $50.0 \text{ dm}^3$  of methane,  $\text{CH}_4$ , react with  $10.0 \text{ dm}^3$  of air, calculate the grams of water produced.**
- $$\text{CH}_4 (\text{g}) + 2 \text{O}_2 (\text{g}) \rightarrow \text{CO}_2 (\text{g}) + 2 \text{H}_2\text{O} (\text{l})$$
174. How many grams of water vapor will be produced when 1.18 grams of methane gas react completely with oxygen? (Use the equation in #173.)
175. **Determine the number of moles of solute to prepare these solutions:**
- 2.35 L of a 2.00 M  $\text{Cu}(\text{NO}_3)_2$  solution.**
  - 16.00 mL of a 0.415 M  $\text{Pb}(\text{NO}_3)_2$  solution.**
  - 3.00 L of a 0.500 M  $\text{MgCO}_3$  solution.**
176. White lead contains 80.1% lead, 16.5% oxygen, 3.10% carbon, and 0.260% hydrogen. What is the formula of this compound?
177. **What is ionization energy and which has the largest ionization energy: N, P, or As? Why?**
178. Compare the elements Na, B, Al, and C with regard to the following properties:
- Which has the largest atomic radius?
  - Which has the largest electron affinity?
  - Place the elements in order of increasing ionization energy.
179. **List the four quantum numbers and their symbols. Tell what property of the electron each quantum number describes.**





**o. Silver oxide**

**p. Lead (II) chlorite**

**q. Copper (I) chromate**

**r. Calcium perchlorate**

**s. Acetic acid**

210. Write the names of the following compounds:

a.  $\text{CoSO}_4 \cdot 6\text{H}_2\text{O}$

b.  $\text{MgCl}_2 \cdot 6\text{H}_2\text{O}$

c.  $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$

d.  $\text{NaHS} \cdot \text{H}_2\text{O}$

e.  $\text{Cr}(\text{OH})_3$

f.  $\text{HClO}$

g.  $\text{HClO}_2$

h.  $\text{HClO}_3$

i.  $\text{HClO}_4$

j.  $\text{Al}(\text{MnO}_4)_3$