

Name _____

Math & Moles

- Determine the number of significant figures for the following.
 - 456,000 apples _____
 - 55 boats _____
 - .0000900 cans _____
- Express the sum of 56.99 and 4.5? Use the correct number of significant digits?
- Express the product of 9.8 mm and 6.00 mm using the correct number of significant digits?
- Write the following numbers in scientific notation.
 - .000678 _____
 - .0000000000007689 _____
 - 789,000 _____
- What is an accurate measurement? Give an example.
- What is a very precise measurement? Give an example.
- What is Avogadro's number?
- Convert the following using dimensional analysis.
 - 456.7 meters to centimeters

 - 98 millimeters to meters

 - .0056 kilograms to grams
- The molar mass of hydrochloric acid is 36.45 grams per mole. A mass of 679.9 grams of HCl is equivalent to how many moles?
- The molar mass of sodium phosphate is 163.97 g/mol. What is the mass of 45 moles of sodium phosphate?

11. How many moles of calcium chloride are in a 60.0 gram sample?
12. What is a mole?
13. How many moles are in 2.50×10^{23} molecules of sodium hydroxide?
14. Calculate the number of atoms that are in a 3.50 mole sample of barium fluoride?
15. What do you need to know to convert between the mass and the number of moles of a substance?
16. How is Avogadro's law related to the volume of a gas at STP?
17. What is the volume of 4.50 moles of H_2 at STP?
18. Calculate the percent composition of silver acetate.
19. The percent composition of the compound contains 27.3% sodium, 1.2% hydrogen, 14.3% carbon, the remainder is oxygen. Calculate the empirical formula and the molecular formula with the molecular mass of 420 gram/mole.
20. Calculate the molar mass of magnesium phosphate.
21. How many grams are in 8.33 moles of potassium chlorate?

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Stoichiometry Review

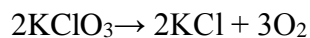
1. What is the definition of stoichiometry?
2. True or False In a chemical reaction the mass of the products is equal to the mass of the reactants?
3. Assuming STP, how many moles are in these volumes? 1 mole = 22.4 liters

a. 67.2 L SO₂

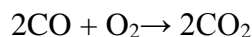
b. 0.880 L He

c. 1×10^3 L C₂H₆

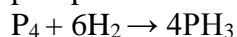
4. How many liters of oxygen are produced by the decomposition of 6.54 g of potassium chlorate?



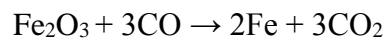
5. How many liters of oxygen are required to burn 3.86 L of carbon monoxide?



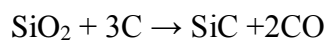
6. How many liters of phosphine are formed when .42 L of hydrogen reacts with phosphorous?



7. When 84.8 g of iron (III) oxide reacts with an excess of carbon monoxide, 54.3 g of iron is produced. What is the percent yield of this reaction?



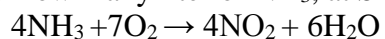
8. Silicon dioxide is heated with an excess of carbon, 27.90 g of silicon carbide is produced. How many grams of carbon monoxide will be produced?



9. What is the total number of liters of oxygen gas formed when 228 g NH_4NO_3 is decomposed?



10. How many liter of NH_3 , at STP, will react with 7.5g of O_2 to form NO_2 and water?



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Gas Laws Review

- Write the formula for each of the five gas laws we covered.
 - BOLYES
 - CHARLES
 - COMBINED
 - IDEAL
 - GAY-LUSSACS
- Given the equation, solve for the variable given:
 - Solve for V_2 using $P_1 \times V_1 = P_2 \times V_2$ _____
 - Solve for T_2 using $\frac{V_1}{T_1} = \frac{V_2}{T_2}$ -----
 - Solve for T_1 using $P_1 \times V_1 \times T_2 = P_2 \times V_2 \times T_1$ _____
 - Solve for T using $PV = nRT$ _____
- If a sample of gas occupies 6.8L at 325°C, what will its volume be at 25 °C if the pressure does not change?
- 5.0 L of air at -50°C is warmed to 100.0 °C. What is the new volume if the pressure remains constant?
- A gas at 155 kPa and 25°C occupies a container with an initial volume of 1.00 L. By changing the volume, the pressure of the gas increases to 605 kPa as the temperature is raised to 125°C. What is the new volume?

6. A 5.00 L of air sample at a temperature of -50°C has a pressure of 107 kPa. What will be the new pressure if the temperature is raised to 102°C and the volume expands to 7.00L?

7. When the temperature of a rigid hollow sphere containing 685 L of helium gas is held at 621 K the pressure of the gas is 1.89×10^3 kPa. How many moles of helium does the sphere contain?

8. What pressure will be exerted by .450 mol of gas at 25°C if it is contained in a 0.650 L vessel?

9. At what temperature will 8 grams of CO_2 exert a pressure of 600 torr at a volume of 500 mL.(Mass of $\text{CO}_2=44$ grams)

10. A gas occupies a volume of 6 L at 10.1 kPa. What volume will the gas occupy at 101 kPa?

11. A sample of gas occupies 40.0 mL at -123°C . What volume does the sample occupy at 27°C ?

12. If a balloon is squeezed, what happens to the air pressure within the balloon?

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Thermochemistry

1. A chunk of silver has a heat capacity of 42.8 J. If the silver has a mass of 181g and the temperature is 25°C. Calculate the specific heat of silver.
2. What is the amount of heat required to raise the temperature of 500 g water by 24.0 °C?(Specific heat of water =4.186 g/°C)
3. When 435 J of heat is added to 3.4 g of olive oil at 21°C, the temperature increases to 85°C. What is the specific heat of the olive oil?
4. Using calories, calculate how much heat 32.0 grams of water absorbs when it is heated from 25.0°C to 80.0°C. How many joules is this?
(Specific heat of water =4.186 g/°C)
5. The temperature of a piece of copper with a mass of 95.4 g increases from 25.0 °C to 48.0 °C when the metal absorbs 849 J of heat. What is the **specific heat** of copper?
6. Convert the following from calories to joules or joules to calories. 1cal= 4.18J
 - a. 250 cal _____
 - b. 65 cal _____
 - c. 250J _____
 - d. 90 J _____
7. What is endothermic and exothermic?
8. The following reactions represent endo- or exo, label each one.
A + B → C+ D+ heat _____
A + B+ heat → C+ D _____
NO₂ + kcal → N + O₂ _____

Name _____

Water & solutions

1. Define solvent
2. Define solute
3. Define suspension
4. Concentrated & dilute solution
5. Give 5 examples of colloids.

6. Name three factors that influence the rate at which a solute dissolves in a solvent.
7. When the temperature of a solution increases what happens to the solubility? Circle the correct answer. (Increases, decreases, stays the same)
8. What holds water molecules together in a liquid?
9. What causes water to have high surface tension?
10. What is surface tension?
11. What is supersaturated?
12. What is the Tyndall effect? What type of substance exhibits this?
13. What happens to a solution if you increase the temperature?
14. What is an electrolyte and nonelectrolyte? Give examples of both.

Molarity = moles / liters

15. A solution has a volume of 2.0 L and contains 36.0 g of glucose is 180g/mol, what is the molarity of the solution?
16. Calculate the **molarity** of each solution.
- 400 g CuSO_4 in 4.00 L of solution
 - 0.060 mol NaHCO_3 in 1500 mL of solution

17. Calculate the **molarity** of each solution.
- 1.0 mol KCl in 750 mL of solution
 - 0.50 mol MgCl_2 in 1.5 L of solution
 -

Molarity by dilution = $M_1V_1 = M_2V_2$

18. How many milliliters of a stock solution of 4.00 M KI would you need to prepare 250.0 mL of 0.760 M KI ?

19. Suppose you need 250 mL of 0.20 M NaCl , but the only supply of sodium chloride you have is a solution of 1.0M NaCl , how do you prepare the required solution?

20. You have the following stock solutions available: 2.00M NaCl , 4.0M KNO_3 , and 0.50M MgSO_4 . Calculate the volumes you must dilute to make the following solutions
- 5.00 mL of 0.500M NaCl
 - 50.0 mL of 0.20M KNO_3
 - 2.0 L of 0.20M MgSO_4

21. Calculate the molarity of a solution made by dissolving 31.50 g of NaNO_3 in 435ml of water.

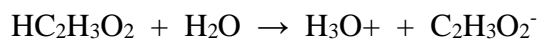
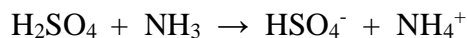
22. Calculate the molarity of a solution made by dissolving 408 g of $(\text{NH}_4)_3\text{PO}_4$ in 9467 ml of water.

23. How many grams of NaCl are present in a 1.21M solution made by using 1.440 L of water?

Name _____

ACIDS AND BASES

1. Name the properties of an acid?
2. Name the properties of a base?
3. Define the 3 acid base theories- Bronsted, Lowry, Arrhenius
4. According to the Bronsted Lowry theory, label the acid (A), base (B), conjugate acid (CA), and conjugate base (CB) in each of the following reactions.



5. What compounds are formed when an acid reacts with a base?
6. Name the following pH as acid or base or neutral.
 - a. pH=7 _____
 - b. pH=2.5 _____
 - c. pH=14 _____
 - d. pH= 6.5 _____

7. Fill in the Table.

pH	[H ₃ O ¹⁺]	pOH	[OH ¹⁻]	ACID or BASE?
3.78				
	3.89 x 10 ⁻⁴ M			
		5.19		
			4.88 x 10 ⁻⁶ M	
8.46				
	8.45 x 10 ⁻¹³ M			
		2.14		
			2.31 x 10 ⁻¹¹ M	
10.91				
	7.49 x 10 ⁻⁶ M			