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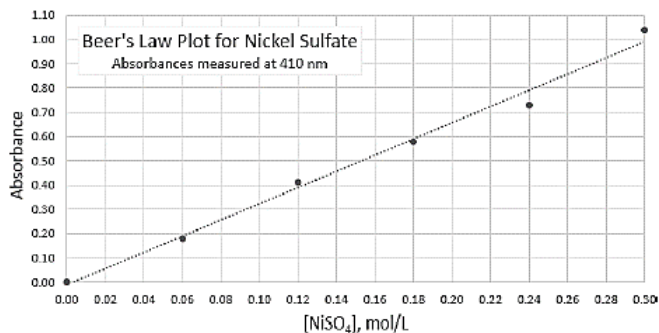
Period:

Seat#:

Directions: Any worksheet that is labeled with an * means it is suggested extra practice. We do not always have time to assign every possible worksheet that would be good practice for you to do. You can do this worksheet when you have extra time, when you finish something early, or to help you study for a quiz or a test. If and when you choose to do this Extra Practice worksheet, please do the work on binder paper. You will include this paper stapled into your Rainbow Packet when you turn it in, even if you didn't do any of this. We want to make sure we keep it where it belongs so you can do it later if you want to (or need to). If you did the work on binder paper you can include that in your Rainbow Packet after this worksheet. If we end up with extra class time then portions of this may turn into required work. If that happens you will be told which problems are turned into required. Remember there is tons of other extra practice on the class website...and the entire internet! See me if you need help finding practice on a topic you are struggling with.

- 1) A solution of salt (molar mass 90 g/mol) in water has a density of 1.29 g/mL. The concentration of the salt is 35% by mass. Assume a 100 g sample. Calculate:
 - a. the molarity of the sol'n. 5.0 M
 - b. the total # of moles in the sol'n 4.0 M
 - c. the mole fraction of the salt in the sol'n. 0.10
- 2) Ethylene glycol ($\text{C}_2\text{H}_4(\text{OH})_2$; 150g) is added to ethanol ($\text{C}_2\text{H}_5\text{OH}$; 250g). Calculate:
 - a. the mass % of ethylene glycol in the sol'n. 37.5%
 - b. mole fraction of ethylene glycol in the sol'n. 0.31
- 3) Concentrated sulfuric acid contains very little water, only 5% by mass. It has a density of 1.84 g/mL. What is the molarity of this acid? 17.8M
- 4) The lattice energy of a salt is 350 kJ/mol and the solvation energies of its ions add up to 320 kJ/mol for the preparation of a 0.50 M solution. In the preparation of this solution would the solution get colder or warmer? What is the driving force for this solution process?
- 5) Addition of excess sodium nitrate to water to form a saturated solution results in the following equilibrium. The solution process is endothermic.
 $\text{NaNO}_3(\text{s}) \leftrightarrow \text{Na}^+(\text{aq}) + \text{NO}_3^-(\text{aq})$
Which of the following could increase the concentration of sodium nitrate in the solution?
Circle choice. Then explain why or why not for each:
 - a. Add more $\text{NaNO}_3(\text{s})$
 - b. Increase the pressure on the solution
 - c. Increase the temperature
 - d. Stir the solution more vigorously
- 6) A student dissolves 5.00 g of copper(II) nitrate trihydrate in water to make 100.0 mL solution. Calculate the concentration of the solution.
- 7) The lab technician dissolved 12.8g of naphthalene, C_{10}H_8 , in ethanol to prepare 2.00 L of solution.
 - a. What is the solute, what is the solvent?
 - b. What is the solution's concentration?
- 8) What mass of $\text{Mg}(\text{NO}_3)_2$ is needed to prepare 250.0 mL of 0.120 M solution?
- 9) A chemist has pipetted 10.00 mL of 0.0500 M CaCl_2 into a test tube. How many moles of CaCl_2 is this?
- 10) A student used a graduated cylinder to obtain 25.0 mL of ethanol. She poured the ethanol into a 200.0 mL volumetric flask and added distilled water to prepare a solution. Pure ethanol ($\text{C}_2\text{H}_5\text{OH}$) has a density of 0.789 g/mL
 - a. How many moles of ethanol were used?
 - b. Calculate the molarity of the solution.
 - c. How many molecules of ethanol are in the solution?
- 11) You need to prepare 500.0 mL of 40.0% (by volume) isopropyl alcohol in water. In a bullet list, with specific volumes, describe how to make the solution. Refer to two different types of appropriate lab glassware also.
- 12) A lab tech needs to prepare 500.0 mL of 0.0400 M ammonium sulfate.
 - a. What mass of the salt should she use?
 - b. List the steps to prepare the solution.
- 13) You pipette 25.00 mL of a 0.300 M NaCl solution into a petri dish and allow it to completely evaporate. What mass of salt will remain in the dish?
- 14) Explain what it means to dilute an aqueous solution. Mention both the volume and the concentration of the solution.
- 15) A student dilutes a 200.0 mL solution of 0.150 M sucrose solution to a new volume of 250.0 mL. Calculate the new concentration.
- 16) A student mixes 6.00 mL of distilled water with 4.00mL of 0.400 M CuSO_4 . What is the [] after dilution?
- 17) You are given 20.0 mL of 0.500-M KOH and asked to use all of it to create a 0.200-M. What volume of water should you add to do this?
- 18) Solutions of nickel(II) sulfate were prepared. Violet colored light (410 nm) was passed through the solutions and the absorbance recorded. The Beer's Law plot was created.
 - a. Estimate the concentration of a solution whose abs. is 0.30. Include units.

- b. 10.0 mL of a sol'n whose absorbance was 0.70 was diluted with the addition of 40.0 mL of water. What will be the absorbance for the new sol'n?
- c. You want to prepare 50.0 mL of a nickel(II) sulfate solution whose absorbance will be 0.50. What mass of the salt should you use?



For the following, practice doing:

- Write out the chemical equations.
- Identify type of reaction.
- For any single replacement – just assume the reaction takes place. We are not going to worry about the Activity Series.
- For any double replacement – use the Solubility Rules to identify if a precipitate forms.
- Identify any gases that form.
- For single replacement and double replacement reactions - practice writing overall balanced reaction, total ionic reaction, and net ionic reaction.
- These are copied and pasted, it is very likely there are duplicates. Oh well!
- You may need to look things up like the formulas for the acids in some problems.

- 1) $\text{Al}_{(s)} + \text{CuCl}_{2(aq)} \rightarrow$
- 2) $\text{Al}_{(s)} + \text{HCl}_{(aq)} \rightarrow$
- 3) Aluminum hydroxide and sulfuric acid neutralize to make water and aluminum sulfate.
- 4) Aluminum hydroxide becomes Aluminum oxide and water
- 5) Aluminum sulfate and calcium hydroxide become aluminum hydroxide and calcium sulfate.
- 6) Ammonia plus water yields Ammonium hydroxide
- 7) Barium chloride reacts with sodium sulfate to produce barium sulfate and sodium chloride.
- 8) Barium hydroxide and sulfuric acid make water and barium sulfate.
- 9) Barium metal reacts with Iron (III) sulfate to produce barium sulfate and iron metal.
- 10) Barium oxide is added to carbon dioxide making Barium carbonate
- 11) Bismuth (III) oxide and zinc metal react to produce zinc oxide and bismuth metal.
- 12) $\text{Br}_{2(l)} + \text{CaI}_{2(aq)} \rightarrow$

- 13) $\text{C}_2\text{H}_5\text{OH} + \text{O}_2 \rightarrow \text{CO}_2 + \text{H}_2\text{O}$
- 14) $\text{C}_6\text{H}_{12}\text{O}_6 + \text{O}_2 \rightarrow$
- 15) $\text{C}_7\text{H}_6\text{O} + \text{O}_2 \rightarrow \text{CO}_2 + \text{H}_2\text{O}$
- 16) Calcium carbonate will come apart when you heat it to leave calcium oxide and carbon dioxide.
- 17) Calcium fluoride and sulfuric acid make calcium sulfate and hydrogen fluoride (HF)
- 18) Calcium Hydroxide breaks into Calcium Oxide & water
- 19) Calcium metal reacts with phosphorus to produce calcium phosphide.
- 20) Calcium oxide and aluminum make aluminum oxide and calcium
- 21) Calcium phosphate and sulfuric acid make calcium sulfate and phosphoric acid (H_3PO_4).
- 22) Cesium Carbonate separates into Cesium Oxide and carbon dioxide
- 23) $\text{CH}_3\text{COCH}_3 + \text{O}_2 \rightarrow \text{CO}_2 + \text{H}_2\text{O}$
- 24) $\text{CH}_4 + \text{O}_2 \rightarrow \text{CO}_2 + \text{H}_2\text{O}$
- 25) Chlorine gas and sodium bromide yield sodium chloride and bromine
- 26) Copper metal and silver nitrate react to form silver metal and copper II nitrate.
- 27) Copper reacts with sulfuric acid and water to produce copper sulfate pentahydrate and sulfur dioxide
- 28) $\text{Cr}_2(\text{SO}_3)_3(s) + \text{H}_2\text{SO}_4(aq) \rightarrow$
- 29) $\text{Cu(II)}_{(s)} + \text{FeSO}_4(aq) \rightarrow$
- 30) Dinitrogen pentoxide added to water yields nitric acid
- 31) Electrolysis of water to individual elements
- 32) $\text{H}_2\text{C}_2\text{O}_4 + \text{O}_2 \rightarrow \text{CO}_2 + \text{H}_2\text{O}$
- 33) Hydrochloric acid reacts with solid calcium bicarbonate to make water, carbon dioxide, calcium chloride.
- 34) Hydrofluoric acid reacts with sodium hydroxide.
- 35) Iron (III) Hydroxide becomes Iron (III) oxide and water
- 36) $\text{I}_{2(g)} + \text{MgCl}_{2(aq)} \rightarrow$
- 37) Lead (II) nitrate and sodium iodide react to make lead iodide and sodium nitrate.
- 38) Lithium oxide and water make lithium hydroxide
- 39) Magnesium Chloride plus Oxygen yield Magnesium Chlorate
- 40) Magnesium Oxide is added to water make Magnesium Hydroxide
- 41) Magnesium solid added to Oxygen makes Magnesium Oxide

- 42) $\text{Mg}_{(s)} + \text{HCl}_{(aq)} \rightarrow$
- 43) Nickel (II) Chlorate \rightarrow Nickel Chloride and Oxygen
- 44) Nitrogen plus Hydrogen make Ammonia gas
- 45) Nitrous Acid \rightarrow Dinitrogen trioxide and water
- 46) Phosphoric acid (H_3PO_4) plus sodium hydroxide.
- 47) Potassium Chlorate becomes Potassium chloride and oxygen
- 48) Potassium nitrate decomposes to form potassium nitrite and oxygen
- 49) Propane (C_3H_8) burns (with oxygen)
- 50) $\text{RaCl}_2 \rightarrow \text{Ra} + \text{Cl}_2$
- 51) Rubidium Chlorate decomposes to Rubidium Chloride and Oxygen
- 52) Silver acetate plus potassium chromate \rightarrow
- 53) Sodium metal + chlorine react to make sodium chloride.
- 54) Solid Calcium Hydroxide + sol'n of phosphoric acid
- 55) Solid Sodium is added to Chlorine gas
- 56) Steam (add water vapor) to methane (CH_4) to get hydrogen and carbon dioxide
- 57) Sulfur burns in oxygen to make sulfur dioxide.
- 58) Sulfur trioxide and water combine to make sulfuric acid (H_2SO_4).
- 59) Sulfuric acid (H_2SO_4) reacts with zinc
- 60) Sulfuric Acid breaks into Sulfur trioxide and water
- 61) Table salt plus oxygen produces \rightarrow Sodium chlorate
- 62) The combustion of $\text{C}_{23}\text{H}_{16}\text{O}_4$
- 63) Zinc and copper II sulfate yield zinc sulfate and copper metal
- 64) Zinc Carbonate becomes Zinc oxide and carbon dioxide
- 65) Zinc sulfide and oxygen become zinc oxide and sulfur.

EVEN MORE PRACTICE! Hard work now during the chapter will set you up for success and save you time long term! Make smart, mature choices!

- 66) Consider doing some of the Honors Chem worksheets! (You would be surprised how many AP Chem students miss points on exams for Honors level questions and not even the AP level questions! You will hear me all year long saying "don't lose points in AP Chem for Honors level material!")
- <https://mychemistryclass.net/HCrainbowpacket11.html>



- 67) Read, take notes, try some problems from your Tro online Textbook. (Remember that the textbook often covers more material than we need for this class. If it isn't something I talked about in my lectures/handouts/worksheets, then you can skip it! I won't officially assign reading or problems from the textbook because it isn't a very efficient way to teach this class, but some students might need to read the textbook sections, or do extra practice in order for things to "click" differently for them. That is ok! Not everyone is going to need the same amount or type of studying. A lot of this class is figuring out what you personally need to do in order to feel successful. You will have access to the textbook all year, don't forget about it!)
- Chapter 11: Liquids, Solids, and IMFs
- Chapter 13: Solutions
- mlm.pearson.com/northamerica/masteringchemistry/



- 68) Don't forget that there is extra practice on the class website too! AP Chem Tab \rightarrow Study Materials Link \rightarrow Scroll to the chapter we are on \rightarrow Extra Study Materials Link. (I don't always have answer keys for the extra materials. If there is one, it will be in the folder!)

- 69) Don't forget that there is extra practice on GoFormative too! www.goformative.com (Another teacher made some assignments on GoFormative the year the school was Remote due to Covid. I have not proofread all the remote assignments, but I have published them so they are available for you to try if you would like!)

- 70) Don't forget that there is extra practice on AP Classroom too! <https://myap.collegeboard.org> (AP Classroom is a bit clunky, doesn't allow me to easily post questions in the order we go, sometimes crashes, still has old material we no longer cover, etc. BUT it is a source of questions that we know came from College Board! You can use the "tags" I made to pull up practice that is just on the chapter you are interested in studying.)

- 71) ScienceGeek.net has some good online practice tests. I haven't checked all of them, but the ones I have checked are pretty good!
- <https://www.sciencegeek.net/APchemistry/APtaters/directory.shtml>

- 72) Don't forget that you can sign up for my Access periods! You must sign up by Tuesday 8am of the week you want to attend. The links are on the front page of my class website and at the top of my Class Calendar.

- 73) Don't forget that our school has free peer tutoring available through the Academic Leadership class! The links are on the top of my Class Calendar