

CHEM. 1A LAB FINAL Monday, March 16, 4 – 6 PM* Broida 1610

*If you have a foreign language final at this time, you can take the lab final Friday, March 13, 4 – 6 PM, Chem. 1179.

SCANTRON FORMS will be PROVIDED. You must BRING:

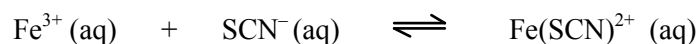
- 1) **Reg. Card (Picture ID), PERM number**
- 2) **Soft #2 PENCIL**
- 3) **CALCULATOR**

NOTE: Taking the lab final is required to complete the course. If you do not take the lab final you will fail the course. **SHOW ALL YOUR WORK ON THE EXAM.** If there is a problem with your exam, we can evaluate your answers **ONLY IF YOUR WORK IS SHOWN.**

INFORMATION PAGE will be provided: The Periodic Table, Tables shown in Appendix 1, 2, and 5 in the lab manual, Equations, and Conversion factors. No notes or books are allowed. The final will have 20 multiple choice questions.

1. Express the answer of the following operation to the correct number of significant figures.
 $(18.3 + 35.48) / 45.25$
2. The masses of three pennies were measured to be 4.36 g, 4.41 g and 4.38 g. Calculate the average deviation from the mean.
3. What is the molarity of a 45.0 mL solution containing 6.00 g sodium hydroxide.
4. How many moles of solute are present in 150 mL of 6.0 M sodium hydroxide?
5. If the Environmental Protection Agency set the maximum allowable nitrate ion concentration in water at 0.8 ppm, calculate the molarity of nitrate ion at this concentration.
6. Consider the following reaction. $\text{Mg} + \text{H}_3\text{PO}_4 \rightarrow$ magnesium phosphate and hydrogen
What is the molecular formula for magnesium phosphate?
7. When the reaction, $\text{Mg} + \text{H}_3\text{PO}_4 \rightarrow$ magnesium phosphate and hydrogen, is balanced, what is the stoichiometric coefficient in front of the hydrogen.
8. How many moles of hydrogen gas will be produced if 25.0 g of Na (s) reacts completely with excess HCl?
9. What volume of 0.3 M HCl is required to neutralize 75.0 mL of 0.5 M Ca(OH)₂?
10. Give the molecular formula for aluminum hydroxide. How many equivalents of hydrochloric acid will react with aluminum hydroxide?
11. For the reaction of silver nitrate with potassium chloride, what precipitate will form?
12. What is the net ionic equation for calcium chloride reacting with ammonium hydroxide?
 - a) $\text{Ca}^+ + \text{OH}^- \rightarrow \text{CaOH}$
 - b) $\text{Cl}^- + \text{NH}_4^+ \rightarrow \text{NH}_4\text{Cl}$
 - c) $\text{Ca}^{2+} + \text{Cl}^- + \text{NH}_4^+ + 2 \text{OH}^- \rightarrow \text{Ca}(\text{OH})_2 + \text{NH}_4^+ + \text{Cl}^-$
 - d) $\text{Ca}(\text{Cl})_2 + 2\text{NH}_4\text{OH} \rightarrow \text{Ca}(\text{OH})_2 + 2\text{NH}_4\text{Cl}$
 - e) $\text{Ca}^{2+} + 2 \text{OH}^- \rightarrow \text{Ca}(\text{OH})_2$
13. What is the net ionic equation for hydrochloric acid reacting with sodium hydroxide.
 - a) $\text{Na}^+ + \text{Cl}^- \rightarrow \text{NaCl}$
 - b) $\text{Na}^+ + \text{OH}^- + \text{H}^+ + \text{Cl}^- \rightarrow \text{H}_2\text{O} + \text{Na}^+ + \text{Cl}^-$
 - c) $\text{NaOH} + \text{HCl} \rightarrow \text{NaCl} + \text{H}_2\text{O}$
 - d) $\text{H}^+ + \text{OH}^- \rightarrow \text{H}_2\text{O}$
 - e) $\text{Na}^+ + \text{OH}^- \rightarrow \text{NaOH}$

14. How many moles of hydrogen gas will form if 3.0 mol of potassium metal reacts completely with hydrochloric acid?
15. The density of an ideal gas is 0.850 g/L at 25°C and 380 torr. Calculate the molar mass of the gas.
16. If the volume of an ideal gas is 100 mL, at 740 torr and 18°C, what is the volume at STP?
17. A 275.0 mL sample of O₂ is collected over water at 60.0°C. The total pressure is 755 torr. What is the volume of the O₂ at STP? (The vapor pressure of water at 60°C is 149 torr).
18. If 0.45 g of an ideal gas occupies 275 mL at 25°C and 780 torr, calculate the molar mass of the gas.
19. What volume of 0.300 M Fe(NO₃)₃ is needed to make 75 mL of 0.00300 M Fe(NO₃)₃.
20. What is the concentrations of NO₃⁻ in a 0.300 M Fe(NO₃)₃ solution?
21. A solution is made by mixing 3.00 mL 0.020 M Fe(NO₃)₃ with 4.00 mL 0.020 M KSCN and 3.00 mL 1.0 M HNO₃. After equilibrium is established, the concentration of Fe(SCN)²⁺ was determined to be 0.003 M. Calculate the equilibrium constant for this reaction.



22. A 1.513 g sample of KHP (C₈H₅O₄K) is dissolved in 50.0 mL of DI water. When the KHP solution was titrated with NaOH, 14.8 mL was required to reach the phenolphthalien end point. Calculate the molarity of the NaOH solution? KHP is a monoprotic acid.
23. Determine the number of moles of HCl that can be neutralized by an over the counter antacid tablet which contains 300 mg Mg(OH)₂.
24. A 10.0 mL sample of vinegar, which contains acetic acid, is titrated with 0.5 M NaOH, and 15.6 mL is required to reach the end point. What is the molarity of the acetic acid?
25. a) How many grams of silver chloride can be prepared by the reaction of 100.0 mL of 0.25 M silver nitrate with 100.0 mL of 0.20 M calcium chloride? b) Calculate the concentrations of Ag⁺, NO₃⁻, Ca²⁺ and Cl⁻ that remain in solution when the reaction is complete.
26. **The best way to prepare for the lab final is to work the pre-lab and review problems in the lab manual and the assigned problems on WebAssign (including the nomenclature questions).** You must do problems more than once. It will help you do well on the lecture final also. Good luck on all your finals.

CREDIT for this ASSIGNMENT: Work out the problems on this practice lab final and bring your work to the lab final review the last week of lab. You will receive credit for completing this assignment and by taking a quiz as part of the lab final review. **QUIZ:** The quiz will have questions from the practice lab final.

Answers to questions:

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|--------------|--|---------------|---------------------------------------|-----------------------------|--|
| 1. 1.19 | 2. 0.017 | 3. 3.33M | 4. 0.90 moles | 5. 1.3 x 10 ⁻⁵ M | 6. Mg ₃ (PO ₄) ₂ |
| 7. 3 | 8. 0.543 moles | 9. 0.250 L | 10. Al(OH) ₃ 3 equivalents | 11. AgCl (s) | |
| 12. e | 13. d | 14. 1.5 moles | 15. 41.6 g/mol | 16. 91 mL | 17. 180. mL |
| 18. 39 g/mol | 19. 0.75 mL | 20. 0.9 M | 21. K = 200 | 22. 0.5 M | 23. 0.010 moles |
| 24. 0.78 M | 25. a) 3.58 g AgCl b) [Ag ⁺] = 0, [NO ₃ ⁻] = 0.125 M, [Ca ²⁺] = 0.1 M, [Cl ⁻] = 0.075 M | | | | |