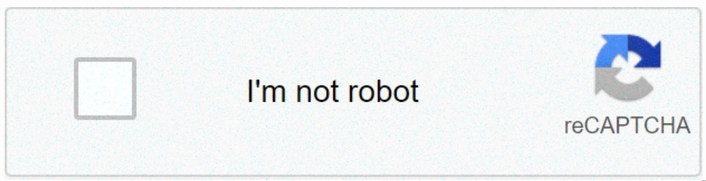


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# Acid base titration lab discussion

Writing the discussion section of the laboratory report The standard laboratory report will usually have 8 sections: 1. Title 2. Abstract 3. Introduction 4. Experimental 5. Results 6. Discussion 7. Conclusion 8. The Discussion References: What do your results mean? The discussion section of the laboratory report is where the results are interpreted, especially with the objectives indicated in the Introduction. It is also a place where you can discuss experimental anomalies, errors or other surprising results. For the Chemistry 1210 laboratory, the expected length is 1 to 2 paragraphs. When you type the Discussion section, consider including the following 3 points: 1. Discuss the trends or functional relationships that can be seen in the results (from figures, tables, charts, etc.). This is a sophisticated summary with the interpretation of your data. For example, Based on the degree curve shown in Figure 1, you can see that the qualification of a strong acid with a strong base results in a point of equivalence in exactly pH = 7. This indicates that at the point of equivalence of this degree, there are only neutral species in solution. In addition, the pH change rate away from the equivalence point and the tilt of the curve near the equivalence point region provide evidence that there are no buffer regions during the qualification of a strong acid with a strong base. 2. Discuss the possible causes (chemical or otherwise) that explain their results. Does your results make sense in terms of theory? For example, These results can be understood according to _____ theory ... etc. [Go into some detail here.] For example, These results can be understood in the context of acid/base neutralization reaction theory. In the case of strong acid reacting with a strong base, the reaction occurs in a stomach-high shape with the strong base reacting completely with strong acid to produce water and salt. Significantly, since the conjugate base of a strong acid is in itself an imitably weak base, when there are equivalent amounts of strong acid and base present in solution, there will only be spectator ions and water. In addition, at each point before the point of equivalence, there is only strong acid, water and the conjugally weak base of strong acid. Therefore, there are no buffer regions before the equivalence point. 3. Optional: Discuss abnormal observations and/or experimental errors and/or interesting results. Example 1: The irregular behavior of the pH during the first two seconds of each measurement may be the result of an inadequate mixture of the solution being tested. Example 2: A mysterious wax film in one of our bottles may have had some influence on the blow on the title curve of Figure 1. Back to the laboratory this is an example laboratory report of the CHM 116 WebCT course that has been modified so that the cover is consistent with the CHM 115 autumn 2004 format described in its laboratory manual. However, you can use it as a guide to organize chm 115 reports. We put it together so you know what we will be looking for in your reports. Everything in RED is an explanation and /or suggestion. The BLACK text is the one that will appear in the report. If you have any questions about what appears in this example, talk to your teaching assistant or contact the course manager. Project summary report for the qualification of an acid and a CHEM base 115Names _____XXX_____ Section __ __ __ __ __ __ _____YYY_____ Date: _____ The report must always include the title of the experiment, your name along with the names of your laboratory partners, your section number, the date on which the laboratory was completed and converted. If a lab partner doesn't help write the report, despite your best efforts to include that person, you can leave that person's name outside the report. This is an indication to your teaching assistant that there was a problem with your group and that the person cannot receive credit for the experiment. Objective: The objective of this laboratory is to titrate an acid, HCl, with a base, NaOH, in order to determine the concentration of the base. The goal cannot be a literal reaffirmation without reference of the objective or purpose that appears in the laboratory manual. This is plagiarism and you will not receive any credit for this part of the report. You should set the goal in your own words, not just rearrange the words used in the lab manual. Procedure: Qualification of an acid and a base, Laboratory Manual Chem 116, PurdueUniversity, Autumn 2003, pp. 25 – 31. You don't need to write the procedure unless explicitly instructed to do so. However, you should give a full reference to where you can find the procedure. It must include the title of the experiment, the name of the laboratory manual, and the page numbers on which you can find the laboratory (the whole laboratory, not just the procedure). You should also include changes to the procedure, for example, if the laboratory manual requires HCl and we have used HBr instead, this change should be indicated after the reference. The changes include any changes to the procedure written in the laboratory manual, which includes glassware and concentrations, as well as chemicals. Data: This is a section where it is easy to lose many points to simply leave the information. Be careful to include all the details! This would include UNITS (such as mL, g, atm, etc.), IDENTITIES of all solutions, CONCENTRATIONS of known solutions, initial and final volumes in a degree, and UNKNOWN NUMBERS. You must rewrite all of the laboratory notebook, attaching laboratory notebook pages referring to them is NOT suitable and will not receive any credit for this section. Acid used: HCl, 0.0100 M Base used: NaOH, unknown An indicator used: Phenolphthalein, 2 drops for each degree Titration Number Volume of HCl (mL) Naoh Buret Initial reading (mL) Final NaOH Buret Reading(mL) NaOH Volume Added (mL) 1 25.00 0.11 15.56 15.45 2 2 2 25.00 0.20 16.23 16.03 3 25.00 0.05 15.89 15.84 We took our final reading of buret when the solution in the flask changed from colorless to pale pink. The first degree was the lightest in color of the three titrations and the second degree was the darkest. The data includes observations in addition to numerical measurements. The data section must be organized and consistent with any format suggested in the laboratory manual. Data tables are always a good idea! Simple calculations (such as addition and rest) can be added to data tables, however, the calculation has yet to be displayed in the Analysis section. On a side note, note that buretreading readings SHOULD NOT start at 0.00 whenever you know where you started, and buret readings always have 2 decimal places. You may lose credit for having the wrong number of sigfigs! Data analysis: Data analysis includes the reasoning and formulation of conclusions that are based on descriptive or qualitative data, as well as numerical calculations based on quantitative data. When data analysis involves reasoning with qualitative data, such as identifying the substance in an unknown, you must verbally describe the relationships between your observations and conclusions. When data analysis involves quantitative processes, an example calculation must be shown for each calculation or each step in a series of calculations. Added base volume = End volume - Initial volume You should start each calculation by identifying what you are calculating and showing the formula, equation, or algorithm you are using. This will help your TA give you partial credit if you have errors. Without a written explanation like this, if the TA can't find your error, you're likely to lose the full credit for this calculation. Follow this with a numerical example and values for all other tests.** ALWAYS INCLUDE UNITS ALONG YOUR CALCULATIONS! ** Essay 1: 15.56 mL NaOH – 0.11 mL NaOH = 15.45 mL NaOH Trial 2: 16.03 mL NaOHTrial 3: 15.84 mL NaOHBalanced Equation: HCl(aq) + NaOH(aq) ---> NaCl(aq) + H2O(l) If a reaction occurs in your experiment, you must include a balanced equation somewhere in your report. The laboratory manual can dictate where it should appear. If you don't, the Data Analytics section is a good place to put it. Make sure and use superscripts and subscripts when necessary, in other words, it is H2O no H2O (or SO42-, instead of this seems to have a charge of 42, which makes no sense). NaOH concentration:Volume of MolarityHCl x Stoichiometric Ratio of NaOH to HCl = Moles NaOH Moles Moles Moles Moles = Molarity NaOHVolume NaOH Note: Calculations can be done in steps or in one step, as long as your TA can easily follow what you are doing!  Be sure to ALWAYS USE UNITS!! Essay 1: 25.00 mL HCl x 1 L x 0.0100 mol HCl x 1 mol NaOH = 0.0002500 mol NaOH 1000 mL 1 L 1 mol HCl When using scientific notation, use it correctly, do not use the webCT (or Excel) form of writing scientific notation. For example, it is 2,500 x 10 4 mol NaOH, not 2,500E-4 mol NaOH.  0.0002500 mol NaOH x 1000 mL = 0.01618 M NaOH 15.45 mLNaOH 1 LTrial 2: 0.01560 M NaOHTrial 3: 0.01578 M NaOH Always make sure your sigfigs are correct!!  NaOH average = Trial 1 + Trial 2 + Trial 3 0.01618 M NaOH + 0.01560 M NaOH + 0.01578 M NaOH = 0.01585 M NaOH 3Results: Base concentration, NaOH, was determined to be 0.01585 M. Back to your purpose or goal – said the results you said you were looking for? The results of your work must be indicated or listed briefly in this section.  The identity of the desired unknowns or final results must be indicated in this section.  A phrase such as Refer to data analysis is NOT appropriate. It may seem redundant, but you need to reset the results in the Results section! Discussion/Error Analysis: its section is where you demonstrate, in your own words, that you have really understood the concepts included in the laboratory project.  This section must be written assuming that the reader is not familiar with the project and must contain the following: Links between laboratory procedures and calculations and theoretical concepts that are discussed in conference and are in the textbook.  In other words, ask and answer this question for each step in the procedure: What principle or concept is this procedure based on? Or Why does a certain step work? Answers to any question posed in the laboratory manual or given by the teaching staff. Why is n't the amount of water added to the flask during the degree accurately measured? The reason we were able to add water to the bottle without measuring it while we were titled was that the number of HCl moles does not change when dilution occurs.  Therefore, when water was added, the amount of HCl did not change and therefore the amount of NaOH needed to react completely with the HCl did not change with the addition of water.  Water.