Score Levels	Above Average	Average	Poor
Pre-Lab (20 pts)	▪ Clearly and precisely states all of the lab objectives ▪ Fully describes all background theory/concepts and their relationships pertaining to the lab. ▪ Includes all necessary equations and sample calculations along with descriptions and relationships specific to the lab. ▪ Includes known literature values with proper referencing ▪ Includes multiple references cited properly ▪ Clear tables with proper descriptions, units, and format for recording of data. ▪ Includes instructions (including safety precautions if necessary) and calculations for lab preparation that are clear and concise. ▪ Proper significant figures used ▪ Typed or written neatly with no grammatical, spelling or punctuation errors. ▪ Information is clearly focused in an organized and thoughtful manner. ▪ Turned in on time	▪ Clearly and precisely states most of the lab objectives ▪ Describes most of the background theory/concepts and their relationships pertaining to the lab. ▪ Includes all necessary equations and sample calculations along with descriptions and relationships specific to the lab. ▪ Includes known literature values with proper referencing ▪ Includes few references cited properly ▪ Clear tables with proper descriptions, units, and format for recording of data ▪ Includes instructions and calculations for lab preparation that are clear and concise. ▪ Proper significant figures used ▪ Typed or written neatly with few grammatical, spelling or punctuation errors. ▪ Organization of information could use improvement.	▪ States only a few or no lab objectives ▪ Poorly describes background theory/concepts and fails to define their relationship pertaining to the lab ▪ Missing necessary equations and sample calculations and fails to give proper descriptions ▪ Does not include known literature values ▪ Does not make use of proper citations and references ▪ Tables are not properly formatted, missing proper units and descriptions, or not included. ▪ Does not include instructions and calculations for lab preparation, or directions are not clear ▪ Does not use proper significant figures or units ▪ Typed or written with many grammatical, spelling or punctuation errors. ▪ Information is not organized. ▪ Either turned in late or not turned in at all
Comments			

Score Levels	Above Average	Average	Poor
Data Collection and Lab Participation (50pts)	▪ Data tables are clearly labeled with a concise description using proper units and significant figures. ▪ Data is clearly focused in an organized and thoughtful manner ▪ Data is directly recorded neatly in the notebook using pre-constructed tables ▪ All data includes the correct units and significant figures ▪ Instrumental error recorded for each measurement. ▪ Measurements are accurately read ▪ Method of data collection is clearly stated ▪ Written neatly with no grammatical, spelling or punctuation errors. ▪ Student actively participated in lab. ▪ Student properly cleaned all glassware, disposed of waste and cleaned lab benches. ▪ Student was properly dressed and used proper personal protective equipment at all times in the lab.	▪ Data tables are clearly labeled with a concise description using proper units and significant figures. ▪ Data is directly recorded neatly in the notebook using pre-constructed tables ▪ All data includes the correct units and significant figures ▪ Instrumental error recorded for each measurement. ▪ Measurements are accurately read ▪ The method descriptions are stated but need clarification, either not enough information, or too detailed. ▪ Typed neatly with few grammatical, spelling or punctuation errors. ▪ Organization of data could use improvement ▪ Student actively participated in lab. ▪ Student properly cleaned all glassware, disposed of waste and cleaned lab benches. ▪ Student was properly dressed and used proper personal protective equipment at all times in the lab.	▪ Tables are not properly formatted, missing proper units and descriptions, or not included ▪ Data is not organized ▪ Data is not directly recorded in the notebook or is illegible. ▪ Missing correct units and/or significant figures ▪ Instrumental error not recorded for every measurement ▪ Measurements are obviously not read/taken properly ▪ Method of data collection is unclear and sketchy ▪ Written with many grammatical, spelling or punctuation errors. ▪ Student did not actively participate in lab. ▪ Student left the lab messy and did not follow cleaning or waste disposal protocol ▪ Student was not properly dressed and refused to use proper personal protective equipment at all times in the lab.
Comments			

Score Levels	Above Average	Average	Poor
Calculations and Results (15 pts)	▪ Calculations are performed neatly and correctly with easy to follow example calculations using the correct units and significant figures ▪ Associated error is calculated correctly using the correct units and significant figures ▪ How and why calculations are performed clearly explained ▪ All figures are properly labeled with clear and concise figure legends, with proper units and significant figures used. ▪ Information is clearly focused in an organized and thoughtful manner. ▪ Information is constructed in a logical pattern to support the solution. ▪ Typed or written neatly with no grammatical, spelling or punctuation error	▪ Calculations are performed neatly and correctly with easy to follow example calculations using the correct units and significant figures ▪ Associated error is calculated correctly using the correct units and significant figures ▪ Description of how and why calculations are performed could be improved ▪ All figures are properly labeled with clear and concise figure legends, with proper units and significant figures used. ▪ Typed neatly with few grammatical, spelling or punctuation errors. ▪ Organization of information could use improvement.	▪ Missing calculations and results, and\or contains math errors ▪ Associated error is not calculated or calculated incorrectly ▪ Sample calculations are hard to follow, or using improper units and significant figures ▪ Using the wrong formula/approach ▪ No or poor descriptions of how and why calculations are performed ▪ Figures and tables are not properly formatted with poor descriptions or are missing. ▪ Information is not organized ▪ Typed or written with many grammatical, spelling or punctuation errors.
Comments			

Score Levels	Above Average	Average	Poor
Discussion (15 pts)	▪ Results are discussed and compared with known literature values. ▪ Theory and concepts introduced in the prelab are discussed clearly and concisely to support the results. ▪ Any associated error with measurement and calculation is discussed ▪ Proper use of references and citations ▪ Goes above and beyond to draw out possible new concepts and conclusions not discussed in the prelab ▪ Information is clearly focused in an organized and thoughtful manner. ▪ Information is constructed in a logical pattern to support the solution. ▪ Typed neatly with no grammatical, spelling or punctuation errors	▪ Results are discussed and compared with known literature values. ▪ Theory and concepts introduced in the prelab are discussed clearly and concisely to support the results. ▪ Any associated error with measurement and calculation is discussed ▪ Proper use of references and citations ▪ Does not attempt draw out possible new concepts and conclusions not discussed in the prelab ▪ Typed or written neatly with few grammatical, spelling or punctuation errors. ▪ Organization of information could use improvement.	▪ Results are not discussed and compared to known values, or are discussed poorly. ▪ Does not draw back to theory and concepts introduced in the prelab. ▪ Poorly discusses or does not include error calculated in the results or from data collection. ▪ Does not reference outside sources or does not reference properly ▪ Poor explanation or grasp of the significance of the results ▪ Information is not organized ▪ Typed or written with many grammatical, spelling or punctuation errors. ▪ .
Comments			