Appendix C – Guidelines for Tables and Graphs for Chemistry

Characteristics of Good Data Tables

1. All tables have a descriptive title that concisely and specifically describes the contents of the table. The title should not simply restate the column headings.
2. If there are several tables in a report, it is necessary to number them such as "Table #" followed by a descriptive title.
3. All columns (or rows depending on how the table is organized) must have an appropriate and descriptive heading of what is in the column/row. Units are included in the column/row heading in parenthesis, not next to individual data points.
4. Numerical data (calculated and measured) should be reported with appropriate significant figures or tolerances for each data type. This may be different by column/row since the data may be collected from different equipment or may have been calculated. The data in a column/row should have significant figures that align.
5. Only one datum should be recorded per cell. If the cell has no data a dash (-) should be marked in the cell to indicate no data, rather than the possibility of missing data. Ditto marks may not be used; if the data is the same, write the value over in the correct cell.

Characteristics of Good Graphs

1. All graphs have a descriptive *title* that describes the data that is represented. Simply repeating the axes labels in the title is not an acceptable title. It is better to give more information about the graph that the axes labels do not include.
   For example, a graph that has the concentration of iron nitrate on the x-axis and conductivity on the y-axis may have this title: ***Calibration Curve of the Conductivity of Iron nitrate to Determine the Iron Concentration in an Unknown Sample of Allendale Clay***. The title describes what is on the axes, and more. Units are not necessary in titles of graphs, though concentrations of solutions must be included when known.
2. If there are several graphs in a report, they should be *numbered* such as "Graph #" followed by the descriptive title.
3. Both axes have descriptive labels, including units in parenthesis as appropriate.
4. The independent variable belongs on the x-axis. (This is the variable that you already have or are measuring to determine some other variable— for example concentration values, wavelengths, volume added, etc.).
5. The dependent variable belongs on the y-axis. (This is the variable corresponding to the data you are collecting or have calculated from the independent variable—for example absorbance or intensity readings, pH, etc.)
6. Axes *do not have to start at zero*. Axes start at the first logical value below the smallest data point. For example, if you are plotting the spectrum of visible light, which ranges from 400-700 nm, start the axis at 400 nm (not 0 nm) and end it at 700 nm. Choosing the correct scale for a graph is one of the most important tasks in constructing a good graph.

The scale of the axis should suit the data and give a nice rectangular presentation that fills the page. Landscape usually works best.

7. Graphs should fill the page—graphs are meant to be used, so they must be large enough to read. For experiments, graphs should be submitted full page so that the data can be read and interpreted with as much detail as possible. For publications, publishers may include graphs scaled smaller than the submitted work to accommodate page restrictions.
8. In CHM 115, graphs can be drawn by hand or generated with a graphing program such as Excel®.
9. If only one curve is shown on a graph, there is no need for a key or legend.
10. If multiple curves are shown on a graph, each is shown in a different color or symbol. The key or legend shows the color/symbol and labels the data with a clear descriptor (e.g. 0.020M acetate ion /0.030M acetic acid buffer, or 0.080M sodium tetrafluoride, not "series 1").
11. If a line of best fit is needed, draw it (curves should always be drawn by hand; linear can be drawn by hand or computer), never "connect the dots".
12. If the equation for the line of best fit is needed, make sure it is legible, not overlapped by other graph features.

Tables and Graphs Grading Rubric – 10 points possible

Points	Criteria
10	All criteria present, prepared before class, easily read
6	Any of the following: one criteria missing, up to two errors in criteria (two errors example: Title present but poorly written and units missing from one of three headings), not readable or disorganized or sloppy
4	Two criteria missing or more than three errors in criteria
0	More than two criteria missing or more than four errors in criteria, or not own work

Table Criteria

1. Appropriate and descriptive *title*.
2. If more than one table: each should be *numbered*.
3. Appropriate and descriptive column and row *headings*.
4. *Units* in the column or row headings, must not be in individual cells.
5. Use *correct significant figures* for all values – measured and calculated.
    a. Pipets (graduated and volumetric) – x.xx mL
    b. Burettes – x.xx mL
    c. Volumetric flasks – x.xx mL

d. Balance – x.xxx g

6. *No empty* cells, no arrows; use a dash "-" or "data not available" if data is truly not measured or calculated. Ditto marks may not be used.
7. Only *one datum* per cell.

Graph Criteria

1. Appropriate and descriptive *title*.
2. If more than one graph: each should be *numbered*.
3. Appropriate and descriptive *axis labels*.
4. *Units* in parenthesis after the axis labels
5. *Independent variable* on the X-axis
6. *Dependent variable* on the Y-axis
7. Use appropriate *numbering* and *scale* for axis units. Axes do not have to start with zero. Graph should *fill the page*. Landscape is usually best.
8. If multiple curves – must have a *legend or key*; if only one data set/line *no legend*.
9. Lines or curves must be present *as instructed* (Trendlines are always 'Least Squares' lines)
10. If a trendline for a Calibration/Standards Curve is required, *the y-intercept line equation and* R^2 value must be displayed in the empty space of the graph.