

Chemistry 4000

Introduction to Inorganic Chemistry: The Different Perspectives of Bonding

Group Selection and Topic Selection: March 5, 2024 (E-mail submission)

Rough Draft Due: April 12, 2024 (E-mail submission)

Final Draft Due: April 26, 2024 (E-mail submission)

Presentations: May 1, 2024 (Location to be determined)

Project: Tuning the toxicity of the essential metal copper for cancer therapy and diagnosis applications

Paper Assignment. Much of our course will focus on using classical and modern bonding theories to ultimately understand how atoms interact with one another in coordination compounds. To see how this fundamental knowledge is applied in a real-world context, I want you to participate in a class project, divided into three groups of seven to eight students to explore how the coordination chemistry of copper(I/II) is utilized for the treatment and diagnosis of cancer. In this study, we will assess the properties and coordination chemistry of Cu(I/II) and present the significant context of how this metal became a lead element of interest in the fight against cancer. Each group will tackle different subtopics on current efforts being taken by leaders in the field to tune extracellular and intracellular Cu for the development of anticancer or cancer diagnosis/theranostic agents. Your research references must come from publications between 2018-2024. You are welcomed to resort to older literature to establish the relevant research background of your subtopic.

For this assignment, you will select one of the topics highlighted in bold and prepare a formal perspective article in twelve double-spaced pages. This writing will be a critical analysis of the contributions and address the outlined areas of interest. In your analysis you will discuss key experiments including relevant data and present the relevant coordination chemistry and structural characterization. You need to emphasize the significance of the results that were obtained and how they were analyzed/interpreted. You should also incorporate your perception of the major accomplishments of the work, both positive and negative but written in a manner that is constructive. Your writing shall not be a simple laundry list of experiments performed but rather an objective review of the “big picture” being constructed by the study.

Grading Scheme for the written assignment.

A. Paper Format (90%)

Please format your paper in the following format but DO NOT include these titles in the actual writing. Use subheadings that are specific to the themes being addressed.

Introduction: Present a formal introduction to the topic that you have selected and the overview of the key points that will be addressed in your perspective review. Make sure to include references that will help to explain the background of the work and contextualize the contributions being made to the field.

Body: In this section you will discuss the key experiments and outcomes by the leaders toward the respective development of anticancer or cancer diagnostic agents.

Conclusion: Define the major accomplishments, the questions left unanswered, and the new directions currently being taken. Also present your opinion about the work performed and any new insights that you have obtained.

You will include three appendices separate from your twelve pages.

Appendix A: This section will include your equations, figures, schemes, and tables. Make sure you label all of these things numerically using the abbreviation Eq. to represent equations, Fig. to represent figures, and the words Scheme or Table. Equation labels must go to the right of the equation. Figure legends must go beneath a figure and table legends must go above a table. If your figures and tables are borrowed from a reference make sure to use the superscript system defined below to reference these materials.

Appendix B: Your reference page. See referencing format below.

Additional Information-

Your assignment must be written in 12 pt. Times New Roman font. Please include figures and tables that are necessary to convey an important argument using ChemDraw or some other chemical drawing software. Remember to properly cite any figures that are NOT your own original creation but only insert high quality versions of the figure. High quality figures can be found in the HTML version of the manuscripts. I do not want to see poor copy/paste versions of the figures.

The purpose of this writing assignment is to expose you to journal search engines and to scientific writing in the form of research articles. There is a reasonable selection of journals available on-line through the University's webpage. Please refer to <http://biblioteca.uprrp.edu/Bases-Datos.html> to gain access to different search engines. Please note that papers from review journals (those that summarize a topic but do not present original work) or non-referenced sources (for instance, an entertainment magazine) will not be accepted. I also recommend using the Web of Science, SciFinder, and Google scholar to help you find references. Any form of plagiarism whether of the literature or of another student will result in total loss of credit for this assignment. Structural plagiarism is not permitted.

B. Grammar (10%)

All assignments must be written using proper grammar and featuring a coherent presentation of the material. The manuscript can be written in English or in Spanish but avoid Spanglish.

How to reference. Please cite your sources by referencing them in the following way. In the text cite any information that you obtained from a journal or other source in numerical order by placing a number superscript next to the information. If there are two authors address them by their last names in the paper. If there are more than two authors, then address them by writing the last name of the first author followed by the phrase et al. For example:

López studied metal phosphate structures and observed many abnormalities.¹

Tinoco et al. synthesized an awesome titanium compound.²

The 1 and 2 would indicate that these are the first and second reference that you cite. You will from then on refer to these references as 1 and 2 in your superscripts.

Please cite your sources in the following way.

listing for your reference. Last name (written completely), First name (abbreviated). (You will do this for all the authors). Name of the article. Abbreviated name of the journal written in italics. The journal number written in bold followed by a comma. The pages corresponding to the article and immediately followed by the year the article was published in parenthesis. This format is for a research article from a peer-reviewed journal. As an example:

3. Hager, L.P., Morris, D.R., Brown, F.S. & Eberwein, H. Utilization of halogen anions. *J. Biol. Chem.* **241**, 1769-1777 (1966).

For Books

List all authors by last name and initials, separated by commas if there are more than two authors. Put an "&" before the last author in the list. Then put the title of the book in italics, the publisher, the city, and the number of pages in the book. Follow this with the year the book was published in parenthesis and then a period.

One author:

Gould, S. J., *Hen's Teeth and Horse's Toes*, W. W. Norton, New York City, 413 p, (1983).

Two or more authors:

Ingmanson, D. E. & Wallace, W. J., *Oceanography: An Introduction*, Wadsworth, Belmont, CA, 530 p (1985).

For Articles or Chapters with separate authors from a Book or Compilation

List the author(s) of the article using the same format given above for books, the title of the article or chapter (no quotes, italics or underlines), then the name(s) of the editor(s) of the book or compilation, followed by "ed." or "eds.". Then put the title of the book in italics, the publisher, the city, and the page numbers where the article can be found. Follow this with the year the book was published in parenthesis and then a period.

Rodgers, J., 1983, The life history of a mountain range-- Appalachians, in Hsu, K. J., ed., *Mountain Building Processes*, Academic Press, Orlando, 229-243 (1983).

For an Article from a Journal or Magazine

List the authors by last name (written completely), first name (abbreviated). Place an & before the last author. Name of the article. Abbreviated name of the journal written in italics. The journal volume number written in bold followed by a comma. The pages corresponding to the article and immediately followed by the year the article was published in parenthesis.

One author:

Maddox, J. The great ozone controversy. *Nature*, **329**, 101-105 (1987).

Two or more authors:

Hager, L.P., Morris, D.R., Brown, F.S. & Eberwein, H. Utilization of halogen anions. *J. Biol. Chem.* **241**, 1769-1777 (1966).

For Internet sources

Give the author's last name and initials (if known). Next, list the full title of the work (e.g. the specific web page), and then the title of the complete work or site (if applicable) in italics. Include any version or file numbers, enclosed in parentheses. Most important, provide the full URL to the resource, including the protocol, host address, and the complete path or directories necessary to access the document. You need to carefully write this out. In parenthesis include the year published (or last modification).

Focazio, M.J., Welch, A.H., Watkins, S.A., Helsel, D.R., and Horn, M.A., A retrospective analysis on the occurrence of arsenic in ground-water resources of the United States and limitations in drinking-water-supply characterizations, *U.S. Geological Survey Water-Resources Investigation Report*, 99-4279, <http://co.water.usgs.gov/trace/pubs/wrir-99-4279/> (1999).

For any additional references, please use the above template and modify accordingly.