INDEPENDENT LITERATURE SEARCH

The following form must be completed and uploaded to our *CHEM6C* Canvas course site in *.pdf* format by

FRIDAY, APRIL 30, 2021 at 11 PM

Please replace all text in blue ONLY.

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I plan to submit a: Written essay (written OR video essay* OR other creative project)

If video essay, I intend to collaborate with _____ (name of partner).

The topic I intend to explore is: **Wastewater Treatment**

To help us categorize topics, please also complete the Survey (link on CANVAS).

GRADING: _____ / 30 POINTS = ____ / 8% of Final Grade

INSTRUCTIONS: *To complete this independent literature search, each student is expected to use the tools and strategies modeled in the weekly Chemical Information Literacy (CIL) videos and assignments. To begin, select a research topic of interest. In doing so, you are encouraged to consider: What are you curious about? What is your major? Is there a topic that links to this or your future career goals? Would you like to get involved in undergraduate research, and if so, in what area? Any or all of these prompts can lead a student to a topic choice, but to enhance perspectives and seed ideas, see the list of topics provided on TritonEd. Topics are grouped according to the United Nation's Sustainable Development Goals ; many are purposely broad and flexible so that students can modify their focus as interest and necessity dictates. Next, use the Library Guide to explore the literature and refine your topic by answering the questions below.*

TO ACCESS ONLINE and PRINT RESOURCES in the Chemical Sciences:
http://libguides.ucsd.edu/chem6c

PART 1: LAUNCH YOUR SEARCH (5 POINTS)

What are the keywords and phrases that you are using to search your topic? Note that you may refine and add new terms as you complete PART 2. Consider synonyms or alternative terms, as well as key authors. For example, you might search on polar as well as arctic, or pharmaceuticals and the narrower term, endocrine disruptors. You might also identify key authors/researchers in the field of interest. **List a minimum of 5 and maximum of 10 words or phrases.**

Wastewater
Electroreduction
Water Treatments
Dechlorination
Electrochemical
Water Pollutants
Chromium
Nitrate
Industrial Pollution

PART 2: LOCATE YOUR INFORMATION SOURCES (5 POINTS PER SOURCE)

General Instructions: Locate at least 3 literature sources related to your topic, and enter as much information that you can find about those sources. Justify the relevance and reliability of each source. IMPORTANT: These will be the literature sources that you use and cite in your

research essay, so it is critical that you invest the time *in advance* to find the appropriate sources. The information you are asked to provide below about these sources (author, title, year of publication, etc.) is what you will need when you cite them in your research essay. You may not find every single item listed.

2.1 Research journal article (recent, last 1-3 years)

Research articles in scholarly (peer-reviewed) journals are the principal way that scientists **REPORT THEIR RESEARCH FINDINGS** to others in their field. Along with patents and conference proceedings these are considered the "**PRIMARY LITERATURE**" in the sciences.

Sources to try (See the Library Guide for links - http://ucsd.libguides.com/chem6c/articles):

* Databases that index the journal literature, including Web of Science, PubMed, SciFinder Scholar. Also Academic Search Complete, but limit your results to scholarly/peer-reviewed articles.

Note: Some journals also publish review articles, in which someone may write a broader paper about the recent advances and studies in their field by summarizing multiple research articles rather than write about what they did in their own lab; the *CHEM 6C* guide has an example to help you spot the differences between the two types of articles.

Title of the article: **Electrochemical removal of nitrate by Cu/Ti electrode coupled with copper-modified activated carbon particles at a low current density**

Author(s): **Qing Wang, Hui Huang, Laichun Wang, and Yinguang Chen**

Affiliation:

A. Wang: State Key Laboratory of Pollution Control and Resource Reuse, Tongji University; Yixing Environmental Research Institute, Nanjing University

B. Huang: State Key Laboratory of Pollution Control and Resource Reuse, Nanjing University

C. Wang: Yixing Environmental Research Institute, Nanjing University

D. Chen: State Key Laboratory of Pollution Control and Resource Reuse, Tongji University

Title of the journal: **Environmental Science and Pollution Research**

Year of Publication: **2019**

Issue, Page(s): **Volume 26, Issue 17, pages 17567-17576**

DOI for the article, or a URL if you can't one: https://doi.org/10.1007/s11356-019-05043-y

A DOI, digital object identifier, is a persistent identifier for an online object that should always works even if the URL changes. DOIs are commonly assigned to journal articles and

look something like this: 10.1021/jacs.7b00147, 10.1107/S0108270184005710, or 10.1039/C7CC02063E. It could also be written as a hyperlink: http://dx.doi.org/*10.1039/C7CC02063E.*

In 2-3 sentences, what are the key points? How does it relate to your topic/support your thesis?

The article describes the electroreduction of nitrate using six different types of titanium (Ti) cathodes under different conditions (different pHs, different electrodeposit times of copper (Cu), and addition of activated carbon (AC) and copper-modified activated carbon(Cu/AC)) and comparing them to the control which was the individual cathodes used with a low current density. The purpose of the study was to reduce the costs of nitrate removal while optimizing the efficiency, and the conducted experiment found that the best conditions were when the Cu/Ti cathode was used in a neutral pH with a copper electrodeposited time of 30 minutes and the addition of the AC and Cu/AC. This supports the thesis by explaining how electroreduction can be used as an efficient remove nitrate from wastewater which would help prevent the negative environmental and human health effects that result from nitrate pollution.

2.2 News article from a popular or trade magazine or news site.

These sources can provide a **REAL-WORLD CONTEXT** for your topic/question. They often refer back to research articles in the scholarly/peer-review literature, but are written for a more general audience.

Sources to try (See the Library Guide for links – See: http://ucsd.libguides.com/chem6c/news):

* Chemical trade magazines like *C&EN Global Enterprise* (aka *Chemical & Engineering News*) and *Chemistry World*;
* News sections of scholarly science journals like *Science* and *Nature*;
* Science sections of more general news sources like the *New York Times*; or
* A search engine or database that indexes or crawls hundreds of science news sources, like Google News or Academic Search Complete. If you use Academic Search Complete, limit your results to popular and trade magazines.

Title of article: **Why antibiotic pollution is a global threat**

Author(s): **Author King**

Name of the magazine, newspaper, or news site where you found the article: **Chemistry World**

Year of publication, and if available the month and day: **20 May 2018**

Issue and page(s) if available: **N/A**

URL for the article:

https://www.chemistryworld.com/news/why-antibiotic-pollution-is-a-global-threat/30090

21.article

If you see a DOI with a number that looks like 10.xxx/xxxxxxxxx, include that as well.

In 2-3 sentences, what are the key points? How does it relate to your topic/support your thesis?

This article depicts how antibiotic pollution in the environment from sources such as sewage and pharmaceutical waste that pollute water supplies, such as those in India and China, are causing an increase in the number of antibiotic resistant bacteria due to the ability of bacteria to mutate from this exposure to a nonlethal dose of antibiotics in the environment. The development of these antibiotic resistant bacteria and their spread to humans can cause bacterial infections that are unresponsive to treatments, and due to this there is a greater need for improved wastewater treatment. This article supports the thesis because it demonstrates the need for proper wastewater treatments in order to maintain human health and

2.3 Background information source (book, encyclopedia)

These sources provide GENERAL or BACKGROUND INFORMATION on your topic. They often cite journal articles in their references as part of the research overview, but don't contain original research themselves.

Sources to try (See the Library Guide for links - http://ucsd.libguides.com/chem6c/books and http://ucsd.libguides.com/chem6c/reference):

* Encyclopedias and other major reference works. Also books, which you can find—both print and electronic—through the library catalog, Roger (http://roger.ucsd.edu).

Title of the encyclopedia article, book chapter, or other source: **Electrochemical technologies for wastewater treatment and resource reclamation**

Author(s): **Yujie Fung, Lisha Yang, Junfeng Liu and Bruce E. Logan**

Affiliation:

A. State Key Laboratory of Urban Water Resource & Environment, Harbin Institute of Technology (Fung, Yang, and Liu)

B. Department of Civil and Environmental Engineering, The Pennsylvania State University (Logan)

Title of the encyclopedia or book: **Environmental Science: Water Research and Technology**

Editor of the encyclopedia or book: **Paige Novak, Wenhai Chu, Kathrin Fenner, Graham Gagnon, Stuart Khan, Zhiyong "Jason" Ren, Krista Wigginton, Takahiro Fujioka, Xia Huang, Ligy Philip, Eveline Volcke, Niel Scriven, Emma Eley, Alessia Millemaggi, Grace**

Thoburn, Claire Darby, Claire Hedgecott, Sarah Holmes, Peter Seavill, Michael Spencelayh, Kate Bandoo, and Linda Warncke

If the book chapters have different authors, you should find an editor listed for the entire work, which you would cite. You may or may not find the editor(s) for an encyclopedia.

Year of Publication: **2016**

Publisher and city of publication, if you can find them: **Sam Keltie**

Pages, if you can find them: **800-831**

URL or DOI if applicable: **10.1039/C5EW00289C**

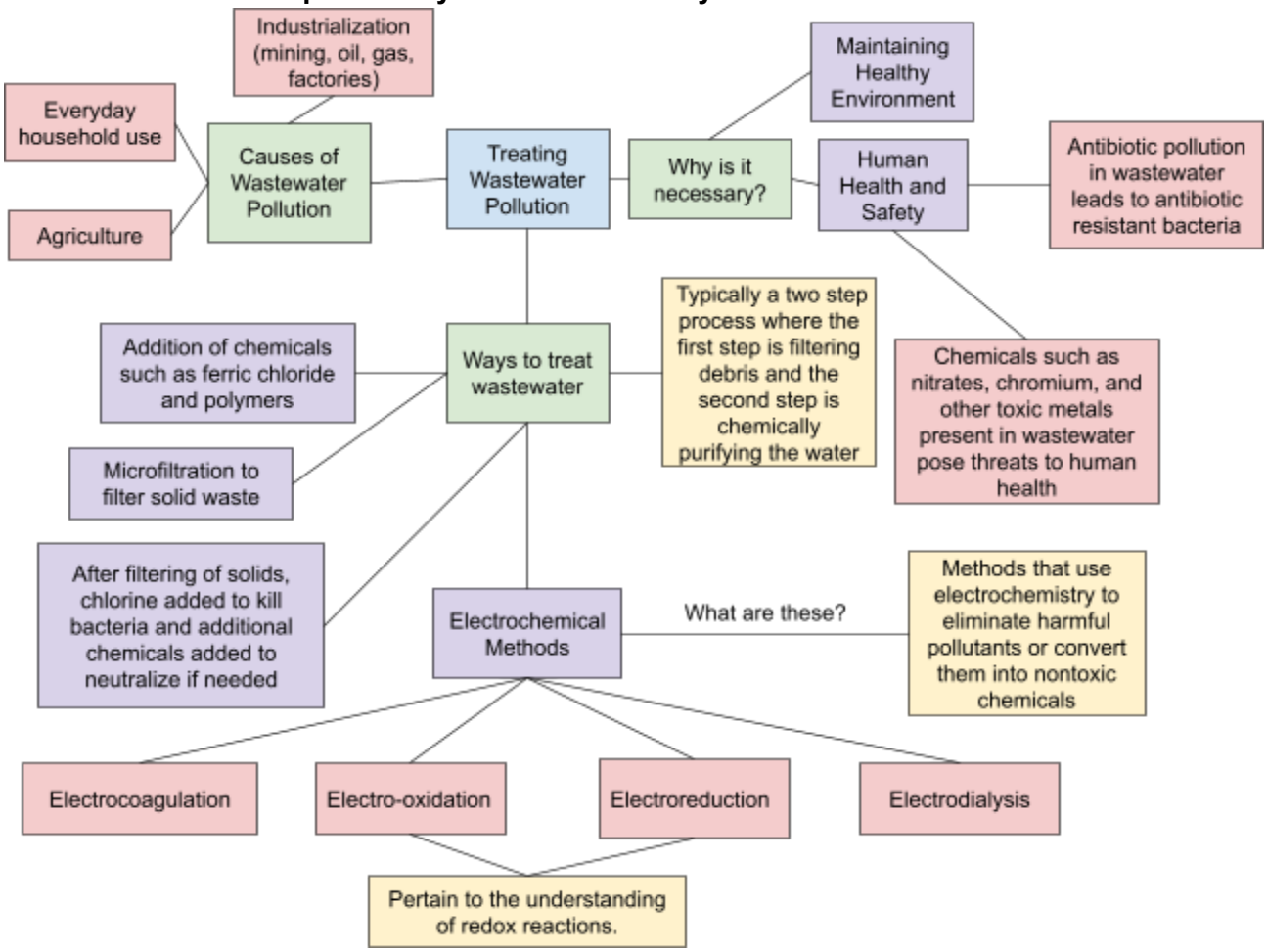
Some encyclopedias and ebooks will have DOIs, and print books won't have a URL or DOI.

In 2-3 sentences, what are the key points? How does it relate to your topic/support your thesis?

This article is a comprehensive review of how electrochemistry is being used in order to develop methods to prevent and treat the release of environmental pollutants into wastewater. In addition to depicting the use of different electrochemical processes (electrochemical oxidation, electrochemical reduction, electrocoagulation, and electrodialysis) for wastewater treatment, the article also depicts the parameters and barriers that influence the overall effectiveness of these processes, and the article also discusses how electrochemistry has been integrated into other types of approaches (photochemical and sonoelectrochemical) to treat wastewater as well. This article relates to the chosen topic because it compiles information relating to the treatment of wastewater, and it supports the thesis by providing detailed information on how electroreduction has been used to remove toxic metals, dechlorinate chlorinated organic compounds, and reduce nitrate from wastewater.

PART 3: READ and ORGANIZE YOUR IDEAS (8 POINTS)

Develop an organizational diagram or 'mind map' for your topic. From the central theme, fill in the branches of ideas that have emerged from your literature search (*Compare to the Diagram featured on *CIL* Video #3). You can edit the diagram below, adding more CHEMISTRY concepts and sub-topics as you connect the major and minor ideas, and thus decide on the emphasis of your research essay.



PART 4: ESTABLISH THE MAIN POINT OF YOUR RESEARCH ESSAY (2 POINTS)

Provide a tentative thesis statement of your research essay (written, video, or other). To help you formulate the main point of your essay, give a <u>one sentence summary</u> to the following question: *What recent chemical research study are you highlighting, and how is this relevant and interesting?*

The research essay will highlight the use of electroreduction to treat wastewater of chemicals which is relevant to readers since some of the chemicals present in wastewater can cause adverse environmental effects, such as eutrophication, and adverse human health effects.