

**ACR**  
**Summer Assignment #1**  
***Basics of Scientific Research***  
**(40 points)**

You will need to read two papers (both will be emailed to you).

•• Due date: By 11:00 pm on July 12, 2023, provide me with an electronic file (via email) with the following file name:

**ACR–Research Basics(xxx).doc, .docx, or .pdf** (where “xxx” are your initials)

Here are the references and the assignments:

1. Alon, Uri (2009). How to choose a good scientific problem. *Molecular Cell* 36(6), 726-728.

*From this paper, quote three (3) passages that you find interesting or that raise questions for you. Write a brief (2-4 complete sentences) response to each of your chosen quotes.*

Here is a link to a Ted Talk from Dr. Alon which might help clarify some of the ideas in his paper:

[https://www.ted.com/talks/uri\\_alon\\_why\\_science\\_demands\\_a\\_leap\\_into\\_the\\_unknown#t-95423](https://www.ted.com/talks/uri_alon_why_science_demands_a_leap_into_the_unknown#t-95423)

2. Stewart, Anna (2009). *A Research Guide for Students and Teachers*. Syracuse: State University of New York College of Environmental Science and Forestry.

**(Read Part 1: Beginning a Research Project, from page 1 to page 15.)**

*Write answers to the following questions (2-4 complete sentences for each question):*

1. *What is the difference between primary and secondary research?*
2. *How do the two types of research work together in the overall research process?*
3. *What are three (3) reasons to spend a good deal of time doing quality secondary research?*

*After looking over the possible research ideas from the list that begins on page 7 of the Stewart document, choose one possibility that might interest you or come up with another idea based on your interests. Pose two additional related questions that further develop the initial idea presented.*

If you find a paper that you would like to review and you can't retrieve a full-length version, please email me – I may be able to get it for you.

Have a great summer, and if you have any questions, don't hesitate to ask.

Mr. Smith  
ssmith@rvgs.k12.va.us

# Applied Chemical Research

## *Survey of Possible Research Topics*

### **Assignment #1**

(25 points)

#### **What Plants Talk About**

In addition to having watched the video, you will need to read (and cite) either the article on plant communication or the article on allelopathy, both of which are posted on the class Moodle page. You will also need to have at least **one additional source** for this assignment (and no, Wikipedia does not count as a source). The citations for the video and the papers are also on the class Moodle page.

#### **Water Purification and Conservation**

In addition to having watched the video, you will need to read (and cite) either the article on a low cost method for water purification, or the article on tiny packets used to purify water, both of which are posted on the class Moodle page. You will also need to have at least **one additional source** for this assignment (and no, Wikipedia does not count as a source). The citations for the video and the papers are also on the class Moodle page.

#### **Biofuels – The Fuel of the Future?**

In addition to having watched the video, you will need to read (and cite) one of the two articles on biofuels that are posted on the class Moodle page. You will also need to have at least **one additional source** for this assignment (and no, Wikipedia does not count as a source). The citations for the video and the papers are also on the class Moodle page.

**Choose one of the three topics above.** Describe what you would find interesting in the topic, some background information about that topic, and what (if any) benefit the project might have for society. Describe how you would carry out your experiment(s) related to that topic. The description of your proposed experiment should be **at least** 3-5 sentences long, and should include what you would measure, how you would measure it, what you would control, and what type(s) of data analysis you would perform.

Your paper should be between 1.5 and 2.5 pages in length (**not** including the literature cited section), and is due on Tuesday, 08/29/23, at the beginning of class (or on the first day we meet as a class – **whichever comes first**). Use parenthetical citations in the body of your paper, and full citations under the heading **Literature Cited** at the end of your paper. You will also need to submit **an electronic copy** of it to Turnitin no later than 11:00 pm on that same day, with the following file name:

**ACR–Survey2(xxx).doc**, or **.docx**, or **.pdf** (where “xxx” are your initials)

Be sure to look at your copy of the **ACR Assignment Format** **handout** so your paper will be correctly formatted. (If you can't find yours, it is also on the class Moodle page.)

**Applied Chemical Research**  
***Survey of Possible Research Topics***  
**Assignment #2**  
(25 points)

**Nanotechnology**

In addition to having watched the video, you will need to read (and cite) either the brochure on nanotechnology, one (or both) of the articles on nanoparticles and seed germination, or the article on nanoparticles cleaning up the environment. You will also need to have at least **one additional source** for this assignment (and no, Wikipedia does not count as a source). Citations for the video and the papers are on the class Moodle page.

**Metals (Treasures of the Earth)**

In addition to having watched the video, you will need to read (and cite) the article on metal foam applications (feel free to ignore the mathematical treatments in sections 3.1 & 3.2). You will also need to have at least **one additional source** for this assignment (and no, Wikipedia does not count as a source). Citations for the video and the paper are on the class Moodle page.

**Batteries**

In addition to having watched the video, you will need to read (and cite) the article on flexible batteries and/or the website that describes how to make an aluminum-air battery. You will also need to have at least **one additional source** for this assignment (and no, Wikipedia does not count as a source). Citations for the video, the website, and the paper are on the class Moodle page.

**Solar Cells**

In addition to having watched the video, you will need to read (and cite) either the article on quantum dot solar cells, or the article on making your own solar cell. (You may also use one or both videos, but one of the papers **must** be used.) You will also need to have at least **one additional source** for this assignment (and no, Wikipedia does not count as a source). Citations for the videos and the papers are on the class Moodle page.

**Choose one of the three topics above.** Describe what you would find interesting in the topic, some background information about that topic, and what (if any) benefit the project might have for society. Describe how you would carry out your experiment(s) related to that topic. The description of your proposed experiment should be **at least** 3-5 sentences long, and should include what you would measure, how you would measure it, what you would control, and what type(s) of data analysis you would perform.

Your paper should be between 1.5 and 2.5 pages in length (**not** including the literature cited section), and **is due on Tuesday, 08/29/23, at the beginning of class (or on the first day we meet as a class – whichever comes first)**. Use parenthetical citations in the body of your paper, and full citations under the heading **Literature Cited** at the end of your paper. You will also need to submit **an electronic copy** of it to Turnitin no later than 11:00 pm on that same day, with the following file name:

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