

CHEMISTRY RESEARCH PROJECT  
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Lost in the Danakil Depression

The Scenario

"Let's get out of here, Harry!" you yell as you jump into the seat next to the pilot of Chemily, a two seated dual-engine plane. As you twist around in the seat to close the co-pilot hatch, you see the rebels come rushing out of the hanger's side door. One of them stops and levels his semi-automatic assault weapon at your plane. The noise of his shots is covered by the plane's engine suddenly exploding to life. "Get outa here Harry; they're going to hit the plane!" He pushes the throttle forward and mutters to his plane, "Come on baby. We're gonna need all you got." To your relief, the gap between the Chemily and the airstrip's hangar quickly widens. The rebels are still taking shots at you, but now you are out of range. Harry pulls the plane to 15,000 feet and levels off. "Whew! I don't know if those guys were Eritrean or Tigray, and I don't care. I'm just glad to be headed south!" he says with a sheepish grin. "You might as well catch some shut eye. It's a long ride to Djibouti." Exhausted, you settle back in your seat. Since you haven't slept for days you are really looking forward to a long, uneventful trip home in time for the Patriot Day ceremony and a fat slice from Lombardi's.

A sudden jolt awakens you from your rest. Harry is wrestling the yoke, trying to keep the plane level. "They shot my baby," he growls through his teeth. He taps one of the gauges with his finger. You lean over to see that the oil pressure is critically low. One of the shots must have hit the oil line. "We've lost the starboard engine." Harry shouts. "I'm was trying to make it to the salt flats at Lake Kerum, but it doesn't look good." You know that the oil systems in both engines are interconnected and that the engine on the left is about to stop also. As you look outside your window, you can see smoke billowing from the other engine. Below, the alien terrain of the Dallol hydrothermal system rushes closer and closer. "The other one's out!" Harry yells, "We're losing altitude fast! I filed a flight plan with headquarters before we left, with any luck they'll send help. Brace yourself we're going down!"

Suddenly you hear the deafening clamor of what sound like tearing metal. Just as you think the noise will never stop, you realize that you have crashed. With blood dripping down your face, you slowly unbuckle your seat belt and try to awaken Harry. Unfortunately, he is dead.

And now you realize that you smell fuel. Knowing that the plane will blow up at any minute, you quickly examine the cargo and debris scattered about the cabin of the plane. The list that follows describes those items that you are considering taking with you to survive the Gateway to Hell.

## The Items

1. 250 mL bottle labeled "Acetylsalicylic Acid"
2. 36 yard roll of brown polytetrafluoroethylene, 4.3 mil
3. Chinook Seedery Lemon Pepper Sunflower Seeds, 4 oz. bag
4. Backpack filled with maps of the constellations, maps of the Ethiopia Arfar region, and an Amharic language dictionary
5. Brown glass bottle labeled " $\text{KClO}_3$ "
6. Victory Pealess Whistle
7. Moso Natural Shoe Odor Absorbers, 2 mini bags
8. Box labeled "C-4" containing two small, white blocks wrapped in black plastic
9. Glass vial with peeling white label, "Bacillus Anthracis Spores"
10. Corked glass bottle labeled " $80\% \text{C}_2\text{H}_5\text{OH}$ "
11. Kitbrite heavy duty aluminum foil, one unopened box
12. Livestock rumen magnets, half a package
13. Mesh bag tied with a copper wire labeled አንድ ደርዘን ሎሚ
14. Wooden crate labeled "Property of Chef Marcus" containing bottles labeled "Spirits of Salt" and "Caustic Soda, 25% Solution"
15. Potlimepan birthing box
16. Rayvenge D2A diving headlamp with a corroded battery
17. Roll of blue K tape
18. Spicy World Zinc Oxide, one pound bag
19. Condor Kukri
20. Swaarnim Jains' A2 Brahma Muhurta Ghee, 1 L plastic bottle
21. Used metalized polyethylene terephthalate blanket
22. Stainless steel dissecting pins in a torn cardboard box
23. Cooler with broken handle that contains an empty 2 L Pepsi® bottle, an empty Mirinda Orange® can, an opened bag of Pixy Stix, and two empty olive jars

## The Mission

From your knowledge of chemistry, survival tactics, and research, choose only 10 items from the above list which will maximize your chances for rescue.

After you have carried your supplies to a safe distance, the plane explodes, and you turn back to see that every single item you left behind, and also every scrap of debris remaining from the explosion, has disintegrated and disappeared– never to be seen again. Emptying the pockets of your Eddie Bauer flight jacket you find, in addition to your clothing and the other 10 items you had gathered only seconds earlier, a handkerchief, a passport, two quarters, three pennies, your lucky zinc penny, and a wallet containing a few credit cards, three \$50 bills, an address book, and a picture of your family. And now your attempt at survival begins.

If you do everything correctly – and that includes using your knowledge of chemistry and correctly addressing ALL of the aspects of survival, you can assume that you will be rescued in three days.

A hint on how to start: **first**, prioritize your needs, i.e., food, shelter, water, signal, etc. **Second**, identify each item and determine under which category it would be used. The rest is up to you! And now your attempt at survival begins.

## The Journal

After you are rescued, you will write an illustrated journal account of your survival. (This is a typed research paper that you will turn in on the due date. You will also turn in a Google Slides presentation with copies of all your sources.)

Your journal account must have an introduction and a conclusion, and must also include these major sections listed below. Each section must start on a new page.

- Section 1) The Ten Items I Chose: The ten items you chose and a brief explanation as to why each would be chosen by an expert survivalist/chemist. This major section will be divided into smaller "mini" paragraphs for each of the items you are taking.
- Section 2) Items I Would Like to Have Taken: Items that would have been good to choose, but you were not able to because you could only take ten, AND your reasons why you would have taken them. This major section will be divided into smaller "mini" paragraphs for each of the items you would like to have taken, but didn't have room.
- Section 3) Items I Did Not Want to Take: Items you absolutely do not want to take with you and your reasons why. This major section will be divided into smaller "mini" paragraphs for each of the items you did not want to take.
- Section 4) Illustrations: You must include at least two (2) full paged, hand drawn/traced and labelled illustrations to help explain your survival techniques. Each drawing must have correct documentation on the drawing.

## Your Grade

For every item that you tell about that has the correct reason for taking (or reason for not using) and correct documentation, you will receive 4 points. If you don't have either a correct reason or correct documentation, you will receive no points. You will receive 10 points each for your two illustrations that have correct documentation.

There are 10 items that are the top ten that should be chosen for best survival as an "expert chemist." If you choose any of these 10 as the ten you are taking with you to survive, you will receive 8 points per item instead of 4. All of this means the maximum points you can earn on your project (not including extra credit) is 152/100. The highest grade, however, that you can make on the project is 110/100.

## Research Guidelines

- ☐ **SOURCES**: All information in your paper, even information that is common knowledge, must be documented with a published scholarly source. You must have at least three different sources that you can use multiple times each. Anything from the Internet counts as one source. Your other two sources must be at least two different book sources. You can use eBooks as your book sources. Once you have three different sources, you can use any of them as many times as you need. For example, if you have two different books, you can use the Internet as many times as you like. IMPORTANT: If you use only one source - for example, if you only use the Internet, no matter how many different ways you use it, you will only receive 33% of the total points you earn.
- ☐ You cannot use Wikipedia, WiseGeek.org, About.com, Yahoo Answers, Google.com, Quora.com, Reddit.com or any other such site as a source you reference in your paper. If you do so, you will not be given any credit for the item. You may use any of these as a place to get ideas, but for everything you do, you must have a professional, scholarly source to reference in your paper that backs up the information in these sources.
- ☐ You cannot use any video sources as a final source for your paper, but you may use them as a place to get ideas. In order to receive credit, you must have a professional, scholarly source to reference in your paper that backs up the information from any video sources.
- ☐ You must have scans or allowed screen shots of ALL your sources, including Internet sources, books or any other sources. There are EASY Instructions and examples of how you do this on our class website under the Projects tab.

**IMPORTANT:** Be advised, your research on these items will take a long time, and putting your journal together will also take a great deal of work. Make sure you budget your time so that you have not only ample time for research, but also plenty of time to write your journal account and put it in its proper format, as well as compile your Works Cited.

You will have a ton of research to keep up with, so a **STRONG** suggestion is to use a tool like Google or Evernote to organize your online research. There are **EASY** Instructions and example of how you do this in the **Items Planning Sheet** on our class website under the Projects tab. Copy it and start using it to make your own!

**Examples of Sources** – Non-fiction!! Make sure all the sources you use are non-fiction sources.

1. **Book sources** – here are some great ones in our library that will be stored in the chemistry room during the project.

**(IMPORTANT:** You can check out these books at the end of the school day, but you must return them by 8:05 A.M. the next school day so that other students can use the books during the day. If you don't return a book you checked out, you will lose the privilege of checking out books from our library for this project.)

- Hugh McManners – The Complete Wilderness Training Manual
- US Army – How to Survive on Land and Sea
- John Wiseman – How to Survive Anything Anywhere
- **Chemistry textbook** will count as a book source, even if you use it online. It is a GREAT resource, <https://my.hrw.com/>
- Merck Index (not the Merck Manual) – *an index of chemicals by name and formula*

## 2. Internet sites

- Look for sites that are .edu, .gov or .org sites, but some good ones you find will be .com sites. Make sure the site is associated with a reputable organization before you trust it. Avoid personal blogs and forums.
- Look up sites that describe where you are – search the hints that I gave you in the backstory. Pay close attention to specific locations and hints about when you are there.
- Check out weather conditions, etc., at Timeanddate.com, <https://www.timeanddate.com/weather/>
- Look up survival sites that are general sites and also sites that are specific surviving in a similar situation to your yours. Make sure that site is associated with a reputable organization before you trust it. Here's one with good basic information <https://thesurvivaluniversity.com/survival-tips/>
- Avoid personal blogs and forums. Here are some things to avoid:
  - a. If the site says you can drink your urine in an emergency – SKIP IT and move on.
  - b. If the site says you only have to boil water to purify it – SKIP IT and move on. You are a chemist and you know better!!
- **Wikipedia**, WiseGeek.org, About.com, Yahoo Answers, Google.com, Quora.com., Reddit.com - You can ONLY use sites like these to help get you started in trying to find info. You can NEVER use sites like these as a final source for your project. If you source these in your research project, your information will not be accepted.

Project Notes:

This is the end of PHASE 1, the research phase of your project. **STAY HERE FOR NOW** until you have a very good start on your research and are ready to begin assembling everything to start writing your paper. More info on how to write and turn in your project will come in PHASE 2.