

## CHEMISTRY RESEARCH PROJECT

# Lost in the Don Juan Basin

### 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 aircraft. As you twist around in the seat to close the co-pilot hatch, you see the terrorists 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 terrorists are still taking shots at you, but now you are out of range. Harry pulls the plane to 15,000 feet and levels off. "It's gonna be a long ride to Christchurch," he says. "You look like you need to be buried." 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 - just in time to give your sweetie a Valentine.

A sudden jolt awakens you from your rest. Harry is wrestling the yoke, trying to keep the plane level. "They shot my baby. We may be slightly off course," 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. You know that the oil systems in both engines are interconnected and that the engine on the left will stop soon. As you look outside your window, you can see smoke billowing from the other engine. Ahead, the barren, frozen, tundra of Wright Valley extends as far as the eye can see. For a brief moment you wonder if somehow you've been transported to Mars. "The other one's out!" Harry yells, "We're losing altitude fast! As close as I can figure, we're about 130 km northwest of Scott Base. 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. Suddenly 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 frozen desert of the Don Juan basin.

1. Red Polyethylene Bel-Art Biohazard Autoclave Bags, 0.43 Gallon (Pack of 100)
2. Small clear plastic bottle labeled "*Acetylsalicylic Acid*"
3. Wooden crate labelled "Property of Professor Clark" containing bottles labeled "*Muriatic Acid*" and "*Caustic Soda*"
4. Carabiner snap hook with neodymium magnet
5. One meter of thin Flexible conduit
6. Clear plastic bottle with a pale yellow powder labelled "*Europium Doped Strontium Aluminate*"
7. Forty square-meter sheet of black opaque polyvinyl chloride
8. Two liters of kerosene/oil mixture in a corked amber-colored bottle
9. Gerber shard
10. Five liter bottle of  $80\% \text{C}_2\text{H}_5\text{OH}$
11. Half empty jar of Kirkland Signature Peanut Butter Pretzels, 52 ounce
12. Small amber colored bottle labeled "*Sodium*"
13. Mini sewing kit with two buttons, two needles, a safety pin, and 20" each of white, tan, blue, and black thread
14. Small box with a partially peeling label, "*Laudanum*"
15. Twenty square-meter sheet of orange opaque polyvinyl chloride
16. Harry's grandfather's jewelers loupe
17. 64 oz bag labeled "Pure Organic Quicklime"

18. VST JetScream Whistle
19. Mesh bag labeled "Rēmana – kotahi tekau mā rua"
20. Wooden crate labeled "SARIN"
21. One hundred milliliter bottle with torn label that reads "...cobinamide cyanide phosphate..."
22. Case of Daily Chef Heavy Duty Food Service Foil
23. Wooden box labeled "2, 4, 6-trinitrotoluene"

### The Mission

From your knowledge of chemistry, survival tactics, and research information, 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 ECW parka you find, in addition to the other 10 items you had gathered, 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. The only other items you have are the ECW gear you were required to wear.

If you do everything correctly – and that includes 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 your return to civilization, you will write an illustrated journal account of your survival. (This is the typed research paper that you will turn in on the due date.)

**Your journal account must have some type of introduction and a conclusion and must include these three major sections with illustrations.** Each section listed below must start on a new page, and be divided into smaller, "mini" paragraphs containing the following:

- 1) The ten items you chose and a brief explanation as to why each would be chosen by an expert survivalist/chemist;
- 2) 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;
- 3) Items you absolutely do not want to take with you and your reasons why.

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. 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 10 points per item instead of 4. 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.

**IMPORTANT:** Please 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.

**SUPER IMPORTANT:** The next two pages of guidelines must be carefully followed in researching and writing your journal account. If you do not, your paper may not be accepted. Read and follow carefully.

**Journal Guidelines** (Use the boxes below to check off each item to make sure you have met all of the requirements.)

1.  **INTERNAL DOCUMENTATION:** Every item you discuss, no matter in which section of your paper, must be internally documented separately, highlighted in yellow, and listed in its own separate "paragraph."
  - Even information that is common knowledge must be documented.
  - You will write about all 23 items, so you **MUST** have at least 23 separate internal references, one (or more) for each individual item, even if they all come from the same source. It will not be unusual for you to have more than one different internal reference for items, so you will have a lot more than 23 internal references. That's just the start!!
  - The internal documentation within the paper should follow immediately after the item is mentioned or when its use is described. (For the style of documentation to be used, see the end paragraph, *Documenting Your Research Paper*.)
  - If several items are being used to make one thing, they may be included together in the same paragraph; however, even then, each item must each be documented separately.
  
2.  **SOURCES:** You must have at least three different sources that you may use multiple times. Anything from the Internet will count as one source. This means you will have to have at least two physical published sources such as a physical book, journal, etc. Once you have three different sources, you may use any one of them as many times as you need. For example, if you have two other sources besides the Internet, you may use the Internet many times.
  - You cannot use Wikipedia, WiseGeek.org, About.com, Yahoo Answers, Google.com, Quora.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 you must have a professional, published source to reference in your paper.
  - You must make printed copies of ALL the sources you use, including Internet sources, books or any other sources. **IMPORTANT:** Only turn in a copy of the first page and the page(s) that you use, and highlight the portions that you use. Staple multiple pages. (Printing front and back will save paper and space!)
  - The printed copies of Internet sources must contain the URL at the top or bottom of the page. You may not copy and paste from Internet sources.
  
3.  **ILLUSTRATIONS:** You must include at least three (3) hand drawn/traced and labelled illustrations to help explain your survival techniques. Drawing a picture of an item by itself is not acceptable.
  - You may not use photocopies or computer printouts. The drawings should each take a full sheet of paper.
  - At the bottom of each illustration, you must include internal documentation. Also the source for the drawing must be included in the Works Cited. You will put the labelled drawings in a special Appendix section at the end of your paper, after the Works Cited.
  
4.  **WORKS CITED:** At the end of your journal account, **starting on a new page**, you must include a Works Cited.
  - The entries in the Works Cited should be listed in the order that they occur in your paper, not in alphabetical order. Use reverse indentation.**
  - The beginning of each Works Cited entry should EXACTLY MATCH the beginning of the internal documentation that you had for that item in your paper.
  - Encyclopedia articles, dictionary entries, and Internet articles must be listed by the title of the article in BOTH the internal documentation AND the Works Cited.
  
5.  Your journal account must be in manuscript form - typed and double spaced. You must include a title page, and every page following the title page must include your last name and page number in the top right hand corner. Check the Internet for samples of title pages and choose one that fits your own personal style.
  
6.  Your journal must be put in the right pocket of an ordinary two-pocket folder. Do not put it in the brads. Put the copies of your sources in the left pocket of the folder in the order that they occur in your paper.
  
7. **The project is due at the beginning of the class period on the day assigned.** Because the project has been pre-assigned, **no late papers will be accepted**. If for any reason you are absent the day the project is due, it is still your responsibility to see to it that your paper is brought to school and turned in on time.

## MANUSCRIPT FORM CHECKLIST EXAMPLES (with points counted off):

- Title page (*minus 10 points*)
- Internal documentation (*paper will not be accepted without it*)
- Correct internal documentation (*minus 2 points for each occurrence, up to 20 points*)
- Three sections (each starting on a new page) with each item **highlighted in YELLOW**, and in a separate paragraph within the section (*minus up to 20 points*)
- Sources copied (*minus 25 points if none, or minus 2 points each*)
- Copied sources highlighted (*minus 20 points if none, or minus 2 points each*)
- Illustrations (*minus 20 points*)
- Illustrations documented on the page of the illustration (*minus 10 points*)
- Works cited (*paper will not be accepted without it*)
- Works cited manuscript form (*minus up to 20 points*)
- Internal references included in paper also in Works Cited (*minus 2 points each up to 20 points*)
- Copied sources or Works Cited not in the correct order (*up to 20 points, and paper may not be accepted*)

### Documenting Your Research Paper

Internal documentation in your chemistry research paper will be different than a standard English research paper. You will always use the **year of publication** instead of the page number in the documentation. If your source is a book with an author or editor, **use the last name of the author or editor and the copyright date of the work, not the page number** – like this: (McManners 2007).

For books that have more than one author, list the first name mentioned, et al, and the date (Nesbitt, et al. 1984). If the book does not have an author, use the name of the book and the date – like this: (The History of Anactica 2016).

For multi-volume or multi-entry works such as an encyclopedia, dictionary, The Merck Index, etc., site the entry and the copyright date of the work – like this: ("Permafrost" 2017). This is also how the articles will be listed in the Works Cited, first by the name of the article, and then the rest of the source (see below).

Works that do not have a copyright or publishing date should be followed by "n.d.". For Internet sites, you will often have to scroll down to the bottom of the site to find the copyright date.

For Internet sites, use the title of the article or the name of the organization web site, and the date – like this: ("Modern Antarctic Clothing Extreme Cold Weather Clothing" 2001). If the website has no copyright date, put **n. d.** in place of the date. **NEVER USE the website or the URL in your internal documentation, only include it in the Works Cited.**

#### **Works Cited – Samples Only!!**

*(Not in alphabetical order, but in the order they occur in your paper!)*

McManners, Hugh. The Complete Wilderness Training Manual. London: Dorling Kindersley, 2007.

"Permafrost." World Book Encyclopedia. 2017 ed.

Nesbitt, P., Pond, A. and Allen, W. A Pilot's Survival Manual. Reinhold: New York, 1978.

Craighead, F. and Craighead, J. How to Survive on Land and Sea. U.S. Navy: Annapolis, Md., 1984.

"Modern Antarctic Clothing Extreme Cold Weather Clothing" Internet. 2001.

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