

LOST INSIDE THE MPONENG

The Scenario

"This has got to be it!" says Harry in a loud whisper. "My source said our best chance of getting a viable sample of our little friend is down this abandoned Mponeng shaft." As excited as you are at getting closer to *Desulforudis audaxviator*, your heart pounds with apprehension – almost, it seems, as loudly as the pounding of the equipment echoing through the tunnels. "You're forgetting the warning about the other illusive inhabitants – the ones that will not be exactly thrilled to find us here, Harry," you loudly whisper back. "What if they are in there waiting for us?" Determined as always, Harry says, "I say we go in anyway. We don't bother them, they won't bother us. Anyway, we're nowhere near the reef." You cautiously crawl around boards and snag your jacket on a sign that says "CAUTION: DO NOT ENTER." The radio you are carrying squawks loudly as the lab tries to contact you. "Keep that radio quiet," Harry whispers. You quickly answer the radio call, informing the lab of your location, "We're just past 1.5 km, so it can't be far now." "Just be careful," the boss cautions when you tell him what Harry is up to now. "If you get trapped in there, it could be several days before we could get to you. We'd hate for you to miss the New Year's Eve party." You use your flashlights to move through carefully through the old tunnel. You explore for a few minutes but find nothing. Just as you are about to suggest checking the hand-drawn map again, Harry says, "Do you hear something ticking?" You turn the corner and there it is, in the middle of the floor, a "gift" the ghost miners have left for you. A bomb.

"Let's get out of here!" yells Harry. As you turn and race to get out, you hear a terrible rumbling sound and the ground begins to tremble underneath you, causing you to trip over your bulky rubber boots. The wooden support beams of the mine shaft are shaking around you and you realize the ghost miners must have exploded the entrance to the tunnel leaving you trapped. Suddenly, you hear a horrendous crash, and through the cloud of dust and debris you see a huge beam from the roof of the mine crashing down toward Harry. "Harry, look out!" you scream. But it is too late. As you rush toward him to push him out of the way, you hear what sounds like a gunshot inside your head, and you feel a searing pain for a split second before a merciful ocean of blackness envelops you.

You awaken in darkness. It's a miracle, but the cave-in did not set off the bomb. You grope around and find your flashlight. "Please, let it work," you pray. The light is very faint, the batteries are almost dead, but all around you can make out the wreckage of what used to be the ghost miners' hide out. Then through the flickering light you see Harry trapped under a wooden beam. "Harry!" you moan. You stumble over to try to pull the huge wooden beam off him. Unfortunately, he is dead. You feel something wet dripping down the side of your face. It is blood. Through the quietness you hear the sinister ticking sound of the bomb, and as you turn your head toward it you see a small flashing light coming from it that you did not notice before. It's a timer and it is counting down with only 99 seconds left.

The entrance to the mine is blocked. Your only hope is to go deeper into the mine shaft and try to escape the explosion. You try to contact headquarters for help, but you realize the radio was crushed in the cave-in. The list that follows describes those items that you see around you in the now demolished hide out. Quickly examining the wreckage scattered around, you grab ten items you think will help you survive until you can be rescued. And you run for your life.

The Items

1. One meter of 1/4" OD refrigeration grade copper tubing
2. One skein of white cotton macramé cord
3. American Red Cross lifeguard whistle with break-away lanyard
4. Wooden box of brown glass bottles labeled "KClO₃"
5. Two liters of kerosene/oil mixture in a corked amber-colored bottle
6. Forty square-meter sheet of yellow opaque polyhexamethylene adipamide with a tag labeled "Property of W. H. Carothers"
7. Cardboard box of empty Ball 4oz quilted jelly jars with lids and bands
8. Case of aluminum foil
9. Metal container labeled "Promethium Chloride"
10. Five liter bottle labeled "80% C₂H₅OH"
11. Loaded pistol
12. Wooden crate containing bottles labeled "HCl(aq)" and "NaOH(aq)"
13. Gentleman Jon 3.7 Ounce Alum Block in Plastic Case
14. 250g bottle of MnO₂
15. Small amber colored bottle labeled "Potassium"
16. Small bag labeled "Suurlemoene, Een Dосyn"
17. Wooden crate with two metal canisters labeled "VX"
18. Brown plastic bottle of Retinol EZ Melts 5000 IU, Natural Strawberry Flavor, 60 Tablets
19. Bag of Brim's® Pork Cracklin Dippers, 2.2125 oz.
20. Book entitled Modern Morse Code in Rehabilitation and Education: New Applications in Assistive Technology
21. One strand of 100 LED Christmas fairy lights
22. Wicker basket containing three live canaries
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 bomb 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 white coveralls you find, in addition to 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.

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 and you 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.

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

- SOURCES:** You must have at least three different sources that you may use multiple times each. 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 cannot use any video sources as a final source for your paper, but you may use them as a place to get ideas.
- You will have a ton of research to keep up with, so a STRONG suggestion is to use a tool like Evernote to organize your online research and then only print what you need at the end. 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.

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.

This is the end of PHASE 1, the research phase of your project. STOP 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.

CHEMISTRY RESEARCH PROJECT: LOST INSIDE THE MPONENG

PHASE 2: Now that you've begun your research, it's time to start assembling everything to start writing your paper.

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.*)

- 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.
- 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 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.
- ILLUSTRATIONS:** You must include at least three (3) full paged, 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.
- 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 internal documentation.
 - 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 Gold Mining in South Africa 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: (“Geothermal Gradient” 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’s web site, and the date – like this: (“World’s Deepest Mine Gets \$1Billion Injection” 2017). NEVER USE the website or the URL in your internal documentation. Only include it with your other info in the Works Cited. If a website has no copyright date, put **n. d.** in place of the date.

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.

"Geothermal Gradient." 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.

"World's Deepest Mine Gets \$1Billion Injection" Internet. 2017.
<http://www.mining.com/worlds-deepest-mine-gets-1-billion-injection/>