

## Why Do I Have to Study Chemistry?

G. Kenneth Barker Jr.

Chemistry Department, Lenape Area Vocational Technical School, 2215 Chaplin Avenue, Ford City, PA 16226-1692; [barkerk@lenape.k12.pa](mailto:barkerk@lenape.k12.pa)

*This question is one that has been asked by many. Your task for this project is to explain the chemistry of something. The article below will give you some good ideas. You may explore something mentioned in the article or something else that it inspires. The project will take the form of a poster display. Display boards must be 121.9 cm x 91.4 cm. This is a 3-sided display board (typically used in science fair projects). Details for the project follow the article. Learn and enjoy!*

Oh boy, there's my alarm. Six-thirty, the morning I've dreaded all week—the day of my first big chemistry exam.

I should get ready. Where's that toothpaste? Fluoride sounds familiar; I wonder why that's in there. There's baking soda and peroxide too. Why would they put those in toothpaste? It's time for a shower. I wonder why soap and water clean so much better than just plain water. How is shampoo different from soap? I wonder why I feel so cool before I dry off. There's isobutane in this mousse. I wonder if that's anything like the butane in lighters. Why would something like that be in this hair styling stuff?

It's time for some tunes. The news is on. They say this beautiful late summer morning will become an ozone action day. I wonder what ozone is. How does it get into the air? Why is it a problem? They keep telling us not to stay out in the sun too long because the ozone layer is disappearing. How can it just disappear, and how is the ozone layer different from the ozone they tell us we shouldn't breathe? I wonder how a sunblock works.

I had better turn on the light. I wonder what's in a light bulb that lets it get so hot and still not melt or catch on fire. It's time to check the laundry and get dressed. How does a detergent work? Maybe I'll wear that tie-dyed T-shirt. I wonder how they tie-dye clothing. How do dyes stay on the clothes without coming off onto my skin? Boy, these jeans are really faded. I wonder what made them fade so much. My socks came out nice and white. What is bleach, and how does it work? My new cross training shoes sure are comfortable. I wonder how they made that foam rubber.

I should fuel up with some breakfast. Maybe I'll fry an egg. I wonder why a fried egg tastes so much better than a raw egg. How does cooking change the egg? It's getting late; I'll just have some orange juice

and cereal. Wait, very time I drink orange juice after I brush my teeth, it tastes really strange. I wonder why that is. I think I'll just try the cereal and skip the juice. I know it has vitamin C, but what does that do for me anyway? This cereal is "fortified with iron". I wonder what kind of iron they put in there; it couldn't be those iron filings we used in chemistry lab, could it? This milk has calcium in it; it surely isn't those little lumps we saw bubbling in water the other day in class. The milk says it has vitamin D added. I wonder what vitamin D is and why it's good for me. There's the calorie count. I wonder if that has anything to do with those energy measurements we read about in the chemistry book.

Time to leave for school. I hope the car starts this morning. I wonder how a battery works. Oh great, the car needs gas. I'll pull in to the mini-mart and fill up the tank. The pump says something about an octane rating. I wonder what octane is and what that octane rating really means. This gas is unleaded; how could they put lead in gasoline? Why would it be used in gasoline anyway? It looks like that tire is a little low. This pressure gauge is reading lower than it did yesterday afternoon. I wonder if it's because it's so much cooler this morning.

Before I leave, I think I'll get a can of soda. Oops, I dropped it; I better not open it until later. I wonder what those bubbles are and how they get them in there.

I made it to school on time. It's supposed to be really hot today. I've heard of car windows popping when it gets really hot, so I'd better open them a little bit. I wonder why they sometimes break when the car gets really hot. I'm glad the windows are coated to shade the inside. That should help, too. I wonder what that coating is, and how they get it in the glass.

It sure is bright out this morning; I'm glad my glasses darken in the sun. I wonder how they do that.

The air conditioning sure will feel good this afternoon. I'm glad I had my air conditioner fixed. What is the refrigerant that the service technician refilled? I wonder how air conditioning works.

Well, here I am in chemistry class. Worrying about this exam is giving me heartburn. I wonder how this antacid works. Why do I have to study chemistry anyway? When will I ever use chemistry in my everyday life? What good is it to me? Why can't I study something that's practical—like biology?

### Details for the project:

You do not need the title labels that come with a science fair board. If you decide not to purchase a science fair board you may substitute a display board of equal size and quality.

**Titles should be in bold print and be 24 point font or larger.**

**Explanations should be 16 point font or larger.** Diagrams generated on a computer may have accompanying information that is in **14 point font.**

### **General directives:**

- Your primary goal is to explain the chemistry of something in detail. You must convey evidence of research, learning and understanding! You definitely need to go beyond the textbook and common factual information.
- Do not plagiarize!! Give credit where credit is due! A **minimum of 5 sources is required**. A bibliography in proper MLA format should be attached to the **back left side of your board** (left from facing the front of the poster board).
- Stay focused on your topic and don't go off on tangents.
- Use **at least three** graphic representations – labeled illustrations, drawings or pictures.
- Posters will be evaluated according to the attached rubric. The poster should be well organized and clearly show evidence of your learning and connections to topics we have covered over the course of the school year. **Please turn in the rubric with your project.**
- Due dates will be announced in class. *There will be a due date by which you must declare your topic (which I must approve) and your partner (if you are working with someone else). There will also be a rough draft due about 3-4 weeks before the final project.*
- You may work by yourself or with **ONE** partner. If you work with a partner, it must be **evident** that both individuals contributed to the final product. **There will be no duplicate projects! Project topics will be on a first-come, first-served basis!**
- Projects will be set up in the lab room and in the classroom so that parents and visitors can view and enjoy them during back-to-school night.

### **Poster set-up:**

- Left side panel: Introduction to include why you chose your topic. Below this begin your explanation.
- Center panel: Title (centered). Below that continue your explanation.
- Right side panel: complete your explanation if needed. Include your reflections on what you have learned and further areas of inquiry that might stem from what you have learned. Be sure to include the connection(s) to what we have learned this year in chemistry.

### **Additional possible topics/questions**

- What is the lithium that is used as a psychoactive drug?
- What is the chemical difference between saturated and unsaturated fats?
- What is smog, chemically?
- What is CFC and what's the big deal?
- What is the difference between brass and bronze? Why did civilization go through a "bronze" age but not a "brass" age?
- Discuss at least 5 metals used in your body (besides iron).
- What are Bucky balls or Bucky tubes?
- What is fluoride? What good is it? Why were people so freaked out about it in the 1950's?
- Why is the Statue of Liberty green? Was it always green? Does copper turn the same color of "green" in all environments?
- Beside color, what are the differences between blond, brunette and red hair? How does chemistry affect this?
- How does hair dye work?
- What's the chemical difference between "hard" and "soft" water? What difference does it make for the average person?
- How do hand warmers work?
- Where does the chlorine in swimming pools come from? Why is it there? At what pH should a "healthy" pool be kept?
- How is it possible for cement to "dry" underwater? Describe the chemistry of this process. What is the difference between cement and concrete?
- How is mercury used in the gold mining industry?
- Discuss the chemical structure/properties of tear gas (chloroacetophenone, C<sub>6</sub>H<sub>5</sub>ClO). How does it work?
- How do nerve gases work?
- Discuss the nuclear bomb and Manhattan project.
- What is acid rain and why does it matter?
- What is hydrogen fuel? How does it work? Discuss the Challenger, Hindenburg and hydrogen cars.
- Why do leaves change color in the fall?
- What is the chemical difference between sunblock and sunscreen?
- Discuss the chemistry behind makeup and perfumes.
- How is chemistry involved in the food industry?

- What is unleaded gasoline? Why would some gasoline contain lead? How is ethanol involved in gasoline?
- What is the chemistry behind artificial sweeteners?
- What does it take for a food to be labeled “organic?”
- What is BPA (bisphenol A)?
- High fructose corn syrup: what’s the big deal?

Name(s) \_\_\_\_\_ Period (s) \_\_\_\_\_

Topic \_\_\_\_\_

Topic approval by instructor (signature) \_\_\_\_\_ Points     /6    

Due date for topic choice: \_\_\_\_\_ Rough draft due: \_\_\_\_\_ Rough draft score:     /64    

**Rubric for rough draft:**

***Rough draft should be typed and in MLA format. You may print double-sided for your rough draft.***

***Points will be deducted for not being typed and/or not being presented in the correct format. Points for rough draft (16 x 4) = 64 points possible***

Criteria	Poor - 1	Fair - 2	Good - 3	Excellent - 4
<b>Organization</b>	<ul style="list-style-type: none"> <li>• Clutter, no definitive sections, all over the place</li> <li>• Missing sections</li> </ul>	<ul style="list-style-type: none"> <li>• No headings, but sectioned</li> <li>• Hard to follow, requires assistance</li> <li>• Missing sections</li> <li>• Obvious refinement/revision required</li> </ul>	<ul style="list-style-type: none"> <li>• All present but unclear</li> <li>• Must reread for clarity</li> <li>• Some evidence of refinement/revision</li> </ul>	<ul style="list-style-type: none"> <li>• Defined sections</li> <li>• Clear headings</li> <li>• Flows nicely to assist the reader without help</li> <li>• Finished product</li> </ul>
<b>Science content and literacy</b>	<ul style="list-style-type: none"> <li>• No analysis of science topic</li> <li>• No explanation</li> <li>• No science specific connection</li> <li>• No use of resources</li> </ul>	<ul style="list-style-type: none"> <li>• Poor explanation</li> <li>• Inaccurate science connection</li> <li>• Misinterprets the science</li> <li>• Minimal use of resources</li> </ul>	<ul style="list-style-type: none"> <li>• Adequate explanation</li> <li>• Science connection present but could be developed further</li> <li>• More than one resource present</li> </ul>	<ul style="list-style-type: none"> <li>• Concept fully and properly explained</li> <li>• Insight present</li> <li>• Science specific connection made</li> <li>• Content is accurate, comprehensive and well supported</li> <li>• Excellent use of resources</li> </ul>
<b>Level and difficulty of understanding and connections to prior learning</b>	<ul style="list-style-type: none"> <li>• Task difficulty not suitable for grade level/not related to science (too easy)</li> <li>• Superficial/irrelevant task</li> <li>• No connections made to class content</li> </ul>	<ul style="list-style-type: none"> <li>• Explanation describes minimal level of validity</li> <li>• Needs serious refinement/revision</li> <li>• Minimal connections made to class content</li> </ul>	<ul style="list-style-type: none"> <li>• Task difficulty could be increased or developed</li> <li>• Some level of understanding shown</li> <li>• Adequate connections made to class content</li> </ul>	<ul style="list-style-type: none"> <li>• Difficulty appropriate for grade level</li> <li>• Understanding present and apparent</li> <li>• Excellent understanding of how topic relates to class content and vice versa</li> </ul>
<b>Resources cited</b>	<ul style="list-style-type: none"> <li>• Less than 3 resources were cited and/or not in the correct format.</li> </ul>	<ul style="list-style-type: none"> <li>• Sources cited were questionable. Done in the correct format. Includes at least 4 sources.</li> </ul>	<ul style="list-style-type: none"> <li>• Minimum 5 sources were cited. Most up-to-date and relevant. At least one reference is not from the internet.</li> </ul>	<ul style="list-style-type: none"> <li>• All resources cited were up-to-date, relevant, and properly cited in MLA format. Two or more references were not directly from the Internet. <b>More than</b> the minimum number of sources were cited.</li> </ul>

Name(s) \_\_\_\_\_ Period(s) \_\_\_\_\_

Topic \_\_\_\_\_

### Rubric for Science Poster

Criteria	Poor - 1	Fair- 2	Good - 3	Excellent - 4	Comments
<b>Organization</b>	<ul style="list-style-type: none"> <li>• Clutter, no definitive sections, all over the place</li> <li>• Missing sections</li> </ul>	<ul style="list-style-type: none"> <li>• No headings, but sectioned</li> <li>• Hard to follow, requires assistance</li> <li>• Missing sections</li> <li>• Obvious refinement/revision required</li> </ul>	<ul style="list-style-type: none"> <li>• All present but unclear</li> <li>• Must reread for clarity</li> <li>• Some evidence of refinement/revision</li> </ul>	<ul style="list-style-type: none"> <li>• Defined sections</li> <li>• Clear headings</li> <li>• Flows nicely to assist the reader without help</li> <li>• Finished product</li> </ul>	
<b>Creativity and appearance</b>	<ul style="list-style-type: none"> <li>• Bland, no variability</li> <li>• No use of color or diagrams</li> <li>• Boring to look at, does not catch your attention</li> <li>• Interest, motivation, effort and time obviously absent</li> </ul>	<ul style="list-style-type: none"> <li>• Very little use of color or pictures but enough to engage and hold attention</li> </ul>	<ul style="list-style-type: none"> <li>• Some use of color, diagrams, etc.</li> <li>• Will engage but will not stimulate</li> </ul>	<ul style="list-style-type: none"> <li>• Visually stimulating</li> <li>• Aesthetically appealing use of color, diagrams and text</li> <li>• Interest, motivation, effort and time obviously present</li> </ul>	
<b>Science content and literacy</b>	<ul style="list-style-type: none"> <li>• No analysis of science topic</li> <li>• No explanation</li> <li>• No science specific connection</li> <li>• No use of resources</li> </ul>	<ul style="list-style-type: none"> <li>• Poor explanation</li> <li>• Inaccurate science connection</li> <li>• Misinterprets the science</li> <li>• Minimal use of resources</li> </ul>	<ul style="list-style-type: none"> <li>• Adequate explanation</li> <li>• Science connection present but could be developed further</li> <li>• More than one resource present</li> </ul>	<ul style="list-style-type: none"> <li>• Concept fully and properly explained</li> <li>• Insight present</li> <li>• Science specific connection made</li> <li>• Content is accurate, comprehensive and well supported</li> <li>• Excellent use of resources</li> </ul>	
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Total points possible from rubric= 20 x 5 = **100** for project

Total points earned \_\_\_\_\_ /**100**