

1 Honors Chemistry

2 27 October 2014

3 Antioxidants And Free Radicals

4 The human body is prone to many harmful diseases, but what if there was a way  
5 to prevent some of them. Free radicals are a cause for many diseases the body can obtain;  
6 antioxidants are the solution. Antioxidants are able to prevent free radicals from forming  
7 and cure diseases. Antioxidants may also be involved in bond breaking or the formation  
8 of molecules.

9 In the Antioxidants and Free Radical article, free radicals are defined as atoms  
10 with an odd number of electrons and form when oxygen interacts with certain molecules  
11 (“Antioxidants”). Cells may not work properly or die if free radicals react with DNA, the  
12 cell membrane or other cellular units (“Antioxidants”). Some examples of free radicals  
13 are cigarette smoke, ozone, and radiation (“ncbi”). To keep free radicals from occurring  
14 and causing these problems, the human body uses antioxidants as a defense  
15 (“Antioxidants”). Antioxidants are molecules that can fight off free radicals and destroy  
16 the chain reaction that the free radicals start before important molecules are damaged  
17 (“Antioxidants”). Three examples of antioxidants are Vitamin E, Vitamin C, and Beta-  
18 Carotene. As stated above, free radicals have an odd number of electrons making them  
19 dangerous to the human body. Intaking antioxidants can stop free radicals from forming  
20 by giving the extra electron(s) that the free radicals are missing, or they can break the free  
21 radical down so that it is harmless (“Probing”). Without antioxidants, different parts of  
22 the body could become ill or even die.

1 Free radicals can cause many diseases or illnesses in the human body that can be  
2 cured by antioxidants. One example of the diseases is Cancer. Free radicals cause cancer  
3 by damaging DNA and causing cells to mutate into cancerous cells (“cancer”). Free  
4 radicals are caused by chemicals and toxins your body takes in. Chemicals, toxins,  
5 carcinogens, high acidity, and low oxygenation are all the pieces you need to cause  
6 cancer (“cancer”). Antioxidants are able to eliminate the free radicals that cause cancer.

7 The reaction of antioxidants and free radicals in cancer can be connected to bond  
8 breaking and the formation of molecules. The antioxidant is stable enough to give a free  
9 electron to the unstable free radical and reduce its damage (“ncbi”). The Antioxidant  
10 Defense System article states “Antioxidants act as radical scavenger, hydrogen donor,  
11 electron donor, peroxide decomposer, singlet oxygen quencher, enzyme inhibitor,  
12 synergist, and metal-chelating agents”(“ncbi”). There are two actions antioxidants use,  
13 one is bond breaking or chain breaking. This is when the antioxidants gives the free  
14 radical an electron to stabilize it (“ncbi”). Mechanisms of Action of Antioxidants article  
15 states “the second action antioxidants involves the removal of ROS/reactive nitrogen  
16 species initiators”. In this mechanism the antioxidants quench the free radicals of  
17 anything they need (“ncbi”). This can cause the geometric shape of the free radicals by  
18 adding the electrons and changing the VSPER shape of the molecules. To conclude; free  
19 radicals are harmful toxins and chemicals that can cause illnesses in the human body.  
20 Antioxidants are able to fix these free radicals by adding an electron that is missing to  
21 stabilize the unstable free radical, thus preventing damage to the cells.

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## Citations

- 1  
2  
3 <http://www.rice.edu/~jenky/sports/antiox.html>
- 4 "Antioxidants and Free Radicals." *Antioxidants and Free Radicals*. N.p., n.d. Web. 30  
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7 [http://news.psu.edu/story/141171/2008/08/18/research/probing-question-how-do-  
8 antioxidants-work](http://news.psu.edu/story/141171/2008/08/18/research/probing-question-how-do-antioxidants-work)
- 9 "Probing Question: How Do Antioxidants Work? | Penn State University." *Probing  
10 Question: How Do Antioxidants Work? | Penn State University*. N.p., n.d. Web. 30  
11 Oct. 2014.
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13 <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3249911/>
- 14 Lobo, V., A. Patil, A. Phatak, and N. Chandra. "Abstract." *National Center for  
15 Biotechnology Information*. U.S. National Library of Medicine, 29 Dec. 0005. Web. 30  
16 Oct. 2014.
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18 <http://www.cancerfightingstrategies.com/antioxidants-for-cancer.html>
- 19 "Cancer Fighting Strategies." *Antioxidants for Cancer*. N.p., n.d. Web. 31 Oct. 2014.  
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## Work Sample Evaluation

**Subject Area:** Chemistry

**Task Title:** Atoms, Molecules, Bonding, and Beyond

**Student Work Sample Title:** Antioxidants and Free Radicals

The document was scored using the *CCR Task Bank Rubric*. The final scores are indicated in the following chart.

Scoring Criteria	Insufficient Evidence	Developing	Progressing	Accomplished	Exceeds
Research and Investigation			X		
Ideas and Content			X		
Reading and Analysis			X		
Communication				X	
Organization			X		
Accuracy			X		

**Annotations:** The following evidence from the work sample and the reviewer’s comments support the scores above. Page and line numbers refer to the original work sample.

Scoring Criteria	Page #	Line #	Commentary about the work sample
<b>Research and Investigation:</b> <i>Locating resources independently and/or identifying information within provided texts</i>	3		The work sample provides four references, but they are all obtained from the Internet.
	1-2		The student refers to several “articles” from “ncbi.” These are not separate articles, but merely sections from the Lobo, et al. article.
<b>Ideas and Content:</b> <i>Presenting a thesis and understanding concepts</i>	1	5-6	An appropriate thesis is provided and backed up with the text that follows it. However, to be an accomplished thesis, the statement should include more detail about the antioxidants and free radicals.
	1	12-13	The student demonstrates a simplistic understanding of free radicals.
<b>Reading and Analysis:</b> <i>Evaluating sources and selecting evidence to support the central idea</i>	1-2		There is an incorporation of references within the text of the document; however, there is very little evidence of informational analysis on the part of the student.
	2	10-12	A quote is provided to list various roles antioxidants play in the body; however, no supporting discussion follows the quote to enrich the text being presented by the writer.
	2	14-18	The student uses a quote and then further explains the quote in order to include additional information.
<b>Communication:</b> <i>Using subject-appropriate language and considering audience</i>	1-2		The grammar and language use in the work sample was generally correct, thus causing the reader to put more trust in the validity of the arguments presented in the text.
	2	18-19	Appropriate language is integrated throughout the entire text. Even when discussing layman terms such as illness, the writer uses appropriate language such as “toxins and chemicals”.
<b>Organization:</b> <i>Structuring main ideas and supporting information</i>	1-2		Transitions are used throughout the entire article to make reading easier. Examples provided below:
	1	9, 13-14, 18, etc.	Prepositional phrases used at the beginning of sentences ease the transition from sentence to sentence. “As stated above” and “To conclude”.
	2	17-18	Discussion of VSEPR and molecular geometry are appropriate to the topic at hand and are supported by previously mentioned information.
	2	18-21	The conclusion comes abruptly and adds little to the work sample.
<b>Accuracy:</b> <i>Attending to detail, grammar, spelling, conventions, citations, and formatting</i>	1-2		In-text citations refer to article titles instead of authors.
	3		The Citations page is incorrectly formatted and 3 out of 4 times does not list authors. The third source lists “Abstract” as the title of the article and does not list the name of the journal, <i>Pharmacognosy Review</i> .