Annotated Bibliography

EA30 – Spring 2017

April 23, 2017

1 Abstract

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2 Instructions

Please complete the annotated bibliography by the 17th of April.

2.1 Searching for Academic Sources

There are numerous electronic sources to evaluate and obtain academic sources of information. Usually, we consider peer reviewed articles to have the highest quality scholarship. As a rule of thumb, this is a good start, but there is also a great deal of variation between sources, even journal titles can vary in quality. Thus, it's best to evaluate a range of sources and appreciate the subtle differences in quality and prestige.

First, you should search CUC databases using key words, such as Pb and lead. I admit the lead is tricky, because it's not a useful term due it a double meaning. I suggest heavy metals or trace metals with the other key words, i.e. fate and transport, toxicity, etc, depending on the topic you selected.

Below are links to some useful databases:

- Web of Science
- JStore
- Google Scholar

2.2 Writing an Annotated Bibliography

After adding your citation to the Pb_literature.bib, using the BibTeX format, cite your reference using the syntax below. Then, write a concise annotation that summarizes the central theme and scope of the book or article. Include one or more sentences that (a) evaluate the authority or background of the author, (b) comment on the intended audience, (c) compare or contrast this work with another you have cited, or (d) explain how this work illuminates your bibliography topic.

2.3 Implementing in LaTeX

LaTeXis a software program used for desktop publishing. With an eye for detail, the program was developed to give the author a great deal of control. In contrast, Microsoft Word is designed to have lots of options, but these seem to get in the way of controlling the outcome.

LaTeXis an open source program and relies on specific formatting commands that begin with a backslash. For example to start a new section heading, we use `\section{section name}` and `\subsection{subsection name}` to create a subsection heading.

Below might be an example of what we are trying to accomplish using our Rstudio resources. The LaTeXcommand for the citation is `\bibentry{key}`, where key is identifies the citation based on the BibTeX citation entry as shown below.

However, we also need to add the citation to the *.bib file, in this case the file is called "Pb_literature.bib". Open the file. You can see each entry within the curly brackets. Also, it starts with the definition of the entry, e.g. article, book, conference proceedings. We can easily add the citation using the databases cited above. All you need to do is search for the citation manager or citation tool and select a citation format "bibtex". Copy and paste the bibtex format (try to put it in the correct location, i.e. alphabetic order). Note the "key" is the first word after the citation definition.

3 Industrial Sources (Khalil)

4 Use in Industry (except gasoline) (Claudia)

5 "Ethyl" gas and airplane fuels (Viraj)

Ethyl anti-knock gas. *American Oil & Gas Historical Society*, Dec 2016. URL `http://aoghs.org/products/tetraethyl-lead-gasoline/` .

The American Oil and Gas Historical Society offers official history of energy fuels for increasing public knowledge. Tetraethyl Lead was added to gasoline to prevent a common problem in engines before the 1930s called engine knock. Engine knock occurs when the air-fuel mixture in a cylinder about the piston prematurely detonates before the piston has risen to the maximum height. This premature detonation occurs because of the gasoline not being able to withstand the pressure. In the ideal internal combustion engine operation, the air-fuel mixture should only combust because of a spark created by the spark plug, not an increase in pressure. A gass ability to withstand pressure is defined by its octane rating. Adding tetraethyl lead to gasoline increase the octane rating, makes the fuel more resistant to combusting under pressure, and therefore prevents engine knock. In 1921, General Motors scientists discovered the anti-knock properties of tetraethyl lead. Three years later, the first signs that leaded gasolines contributed to lead poisoning occurred when workers at a gasoline treatment plant fell ill. In 1925, after minimal non-comprehensive studies, the U.S Surgeon General stated that there is no reason to prohibit the sale of leaded gasoline. The leaded gasoline industry used many manipulative techniques to hide the fact that lead was present in gasoline. They labelled the higher octane fuel ethyl gasoline, to avoid lead in the name. The word lead was never used in any advertisements for the fuel. Ultimately, in the late 1970s lead was phased out of gasoline and in 1986 a total ban was placed on leaded automobile gasoline. The invention of the catalytic converter in 1975, which required unleaded fuel, also accelerated the phasing out of lead from gasoline.

Aviation fuel jet a/jet a-1 — exxonmobil aviation. *ExxonMobil Aviation*. URL `https://www.exxonmobil.com/en/aviation/products-and-services/Products/Jet-A-Jet-A-1` .

Exxon Mobil is a manufacturer and an authority on fuels and energy products based in petroleum and natural gas. Jet Fuel is different from other fuel for two main reasons. The flash-point for jet fuel is much higher than other fuels. This is for safety reasons because jet fuel should not spontaneously combust because there is frequently a large volume of it near many people in the setting of a commercial airliner. When fuel gets extremely cold at low temperatures gas interacts with freezing water and forms a substance in the fuel called wax. This wax lowers the quality of the fuel. Since planes fly at high altitudes where it is extremely cold, airplanes add fuel to lower the freezing temperature of

the fuel as well. Jet fuel A and Jet fuel A1 are both unleaded kerosene. Jet Fuel is similar to diesel fuel and can be used in either compression ignition engines or turbine engines.The primary difference between the two is freeze point, the temperature at which wax crystals disappear in a laboratory test. Jet A, which is mainly used in the United States, must have a freeze point of minus 40C or below and does not typically contain static dissipator additive. Jet A-1 must have a freeze point of minus 47C or below and for locations outside the United States, this fuel normally contains static dissipator additive. There are other key differences between the manufacturing specification within the United States and Europe/Africa/Middle East/Australasia.Ultimately, jet fuel used by large commercial airliners and helicopters is not an issue in term of emitting lead into the atmosphere.

Aviation gasoline. *Federal Aviation Administration*, Mar 2017. URL `https://www.faa.gov/about/initiatives/avgas/` .

The Federal Aviation Administration (FAA) monitors fuel regulation and fuel use in planes. It is therefore a credible authority providing information about current use of Aviation Gas (avgas). The FAA shares the Environmental Protection Agency's (EPA) concerns about lead emissions from small aircraft. Owners and operators of more than 167,000 piston-engine aircraft operating in the United States rely on avgas to power their aircraft. Avgas is the only remaining lead-containing transportation fuel. The FAA has begun slowly taking steps to phase out leaded aviation fuel. Via the Piston Aviation Fuels Initiative (PAFI), the FAA has begun testing two unleaded fuel alternatives in 2016, and has said that all testing will be finished by the end of 2018. Some other sources said that they would have an alternative fuel by 2018. There is no guarantee that an alternative fuel will be approved by 2018.

L Galzigna, MV Ferraro, G Manani, and A Viola. Biochemical basis for the toxic effects of triethyl lead. *British journal of industrial medicine*, 30(2):129–133, 1973 .

This study by Galzigna et al. is published in the British Journal of Industrial Medicine. The paper speaks to the negative health effects that result from exposure to tetraethyl lead. This experiment tested the effects of tetraethyl lead on rats. The effects of tetraethyl lead are similar to general lead exposure. The primary negative health effect observed was reduced neuromuscular function.

Marie Lynn Miranda, Rebecca Anthopolos, and Douglas Hastings. A geospatial analysis of the effects of aviation gasoline on childhood blood lead levels. *Environmental health perspectives*, 119(10):1513, 2011 .

Miranda et al. at Duke University in 2011 found that kids living within 500 meters of an airport where leaded avgas is used have higher blood lead levels than other children, with elevated lead levels in blood found in kids as far as one kilometer away. The researchers estimate a significant association between potential exposure to lead emissions from avgas and blood lead levels

in children. The findings in this study place pressure on the FAA to look for replacing leaded gasoline in small piston engine planes.

David Rosner and Gerald Markowitz. A'gift of god'?: The public health controversy over leaded gasoline during the 1920s. *American Journal of Public Health*, 75(4):344–352, 1985 .

Author David Rosner is the Ronald H. Lauterstein Professor of Sociomedical Sciences and Professor of History in the Graduate School of Arts and Sciences at Columbia University. Rosner outlines the history of leaded gasoline and the rise of the petrochemicals industry in the mid 1920s to the increased public awareness of the negative health effects of leaded gasoline in the 1970s. Rosner compellingly focuses on many of the propaganda efforts undertaken by the leaded gas industry to sell their gas to people and mask the lead present in "Ethyl" gas.

Roddy Scheer and Doug Moss. Does the continued use of lead in aviation fuel endanger public health and the environment?, Aug 2012. URL `https://www.scientificamerican.com/article/lead-in-aviation-fuel/` .

In this article, Roddy Scheer and Doug Moss at the Scientific American investigate and synthesize a 2011 Duke University Study to show the impact of avgas on lead level. The EPA estimates that 16 million Americans live close to one of 22,000 airports where leaded avgas is routinely usedand three million children go to schools near these airports. While jet fuel used by large commercial airlines is unleaded, the fuel used by smaller passenger planes with piston engines is still leaded. This leaded gasoline is known as Aviation Gas or Avgas. Since the phase out of lead in automobile fuel in the 1970s, aviation fuel emerged as the largest source of lead emissions in the U.S. Aviation fuel accounts for half of the lead pollution in American skies, making it a real air quality issue.

Avgas. URL `http://www.shell.com/business-customers/aviation/aviation-fuel/avgas.html` .

Royal Dutch Shell Corporation produces Avgas and is an authority on its use. Crop spraying planes run on leaded avgas. This is a problem considering that lead emitting planes are operating with close proximity to the food humans consume. The 2011 Duke study cited above also speaks to the danger of proximity to the lead emmitting source.