

Research Reflection for *Auto-Ignition of Cooking Oils*

I explored a specific aspect of the phenomenon of fire in depth during an independent study course in my Fire Protection Engineering program. I love to cook, so naturally I wanted to learn more about how to avoid the dangers of cooking in the home. My ultimate goal was to compile existing information as well as advance knowledge that could help reduce the amount of residential deaths and damage from fire.

I began by researching causes of fires in the United States and concluded that although residential fires account for only a quarter of fire incidents annually, they contribute to an overwhelming three-quarters of all deaths and injuries from fires. Furthermore investigating causes of residential fires, I found that the leading cause is cooking fires originating in the kitchen, specifically on the stovetop. I obtained and interpreted data from records of the United States Fire Administration from 2003-2007 and the National Fire Protection Association to quantify my topic. Delving into a study conducted by the Consumer Products Safety Commission, I found that a majority of the stovetop fires began with the ignition of cooking oil. I therefore decided to investigate the ignition of grease fires with specific cooking oils. Specifically, I focused on the temperatures necessary for cooking oil to self-ignite, without an external flame present.

A key element of my research was in evaluating the information and data that has already been published. In beginning my research, my professor encouraged me to search through journals and publications for existing data and setups of past experiments. I discovered my sources by searching the University Library Research Port's extensive database. By specifically searching within engineering, fire and chemistry categories, I was able to access several databases including Springer and Compendex, which contain vast amounts of useful technical publications. I searched within these databases for key words including "ignition", "cooking oil" and "fire." These key word searches led me to articles from publications including *Fire Technology* and *Journal of Loss Prevention in the Process Industries*, which I was able to evaluate by reading the abstract or skimming the article. I selected sources based on the relevance to the auto-ignition of cooking oils as well as residential fires. I was able to find published data on documented auto-ignition temperatures for canola oil, which I later compared to experimental results in my report.

During my research process, I sought assistance from my professor who pointed me toward similar published experimental studies that would be relevant to the goal of my research. This expanded my search process to include ignition of performance fuels. By searching for a specific author and keyword in the Springer database, I found a specific experimental study which gave me a model for my experimental setup, which was also a part of my project. Although the fuels were different, the test setup was similar and I was able to model my experiments from this published source.

In my research, I learned valuable skills that I am able to apply to both the search for information and the presentation of information. In searching through databases, I learned how to

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expedite future search processes to locate specific information. I also learned how to create an organized report based on the structure of the publications which I searched through. The publications that I accessed through the databases in Research Port were all very professional and gave me excellent examples for the presentation of my experimental data and findings. Modeling my paper after published findings gave me an organized method of presenting my data and relating it to practical situations. The abstract, overview and introduction became the basis of my final organized research paper, leading the reader into the subsequent portions of the report in a logical manner. By learning to present information in an efficient manner, I am able to write useful laboratory reports in my laboratory classes in my academic career. This skill has also proven to be valuable in my internship at an architectural and engineering firm, where I often write organized engineering reports for clients. I plan on constantly improving and sharpening my writing and organization skills as well as research skills so that I will be efficient at analyzing and presenting engineering designs throughout my professional career.