

Addressing Disposal of Cooking Oil in the Local Community



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Part I: Overview of Workplace



Kemin is an ingredient supplier with a diverse range of products including in the areas of human health, animal health, pet food, textiles, crop technologies, aquaculture, animal vaccines and others. It was founded in 1961 by the Nelson family, and has since grown into a multinational company with over 500 ingredients serving customers in 120 countries.

Part II: Workplace Focus

The Specialty Crop Improvement (SCI) team breeds, selects, grows, harvests and extracts plants, used by Kemin as raw materials. The phytochemical extraction team (a division of SCI) chemically analyzes plant samples with different genetic backgrounds to determine their active levels. The extractions and chemical analyses involve using solvents specifically tailored to the chemical of interest.

Part III: Introduce the Problem

Improper disposal of cooking oil in a community can pollute local water sources and ecosystems and damage sewer systems. It is also known that cooking oil can be recycled into biofuels and to make soap. The City of Des Moines needs a plan to spread awareness about cooking oil disposal including a plan to recycle it. The plans would be presented to a team of local scientists for feedback.

Part IV: Standards, Driving and Essential Questions

Overall Driving Question: What can the local community in the City of Des Moines do to reduce or mitigate the impact of improper disposal of cooking oil?

Underlying Questions

- How pervasive is the issue of improper disposal of cooking oil in the local community?
- What about the chemical structure of cooking oil makes it a problem when disposed of improperly?
- Why are some substances soluble in other substances?
- What needs to be changed in cooking oil in order to recycle and repurpose it?
- What is the most effective way to disseminate information to the community?

Part IV: Standards, Driving and Essential Questions

Tentative Schedule by Week

Week	Activities
1	<ul style="list-style-type: none">• Introduction of Problem• Lessons on differences in chemical structure and resulting differences in solubility• Lab Activity to demonstrate differences in solubility
2	<ul style="list-style-type: none">• Lessons on problems with improper disposal of cooking oil• Guided inquiry into extent of problem in local community (student generated research)• Driving Question: How pervasive is the issue of improper disposal of cooking oil in the local community?• Consultation with extern hosts and local community members
3	<ul style="list-style-type: none">• Lessons on structure of soap molecules and the connection to their function (solubility)• Lab activity where students create soap from recycled cooking oil• Start of solution generation by students
4	<ul style="list-style-type: none">• Solution idea generation• Testing of solution ideas• Further consultations with extern hosts and community members on likely solutions.• Creation of plan to address problem
5	<ul style="list-style-type: none">• Refining of plan to address problem• Student-driven activities to make plan more effective• Intermittent student reflection on progress
6	<ul style="list-style-type: none">• Presentation of plan to extern host and community members

Part IV: Standards, Driving and Essential Questions

Learning Targets Addressed:

- Use a model (graphical, mathematical and/or diagrammatical) to infer the relationship between measurable properties and the structure of a substance
- Distinguish between substances based on the characteristic properties of the substance.
- Plan an investigation to determine the measurable properties of substances.

(All learning targets taken from the Des Moines Public Schools Chemistry Curriculum Overview which can be found at

<http://science.dmschools.org/high-school.html>)

Part IV: Standards, Driving and Essential Questions

Learning Targets Addressed:

- Conduct an investigation to determine the measurable properties of substances.
- Evaluate data to relate measurable properties to structure and behavior of particles.
- Apply the concepts of molarity and stoichiometry to determine the amount of reactant or product. *Optional depending on depth of project and placement in academic year.

(All learning targets taken from the Des Moines Public Schools Chemistry Curriculum Overview which can be found at

<http://science.dmschools.org/high-school.html>)

Part V: Extern Host Role

Audience for Final Project

- Individuals employed by the extern host are experts in waste disposal, solubility of chemicals, and are residents of the Des Moines Metro Area.
 - Increases authenticity of project.

Contact at Kemin:

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Team

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Part V: Extern Host Role

Source of Intermittent Feedback

- Feedback from the extern host and community members would likely center on, but is not limited to, the following topics.
 - The feasibility of a recycling plan.
 - The accuracy of scientific information in a public relations campaign.
 - Improvements to a recycling method.
 - Improvements to the design of scientific tests.

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Part VI: Student Learning

Student choice in the project might include, but is not limited to, the following.

- Students can make decisions about how to best educate the public.
 - Target audience
 - Best way to reach an audience.
 - Cost of different strategies.

- Students can choose to to design tests to:
 - Evaluate different recycling methods.
 - Evaluate different aspects of a public relations campaign.
 - Evaluate different soap recipes using waste oil.

Part VI: Student Learning

Student choice in the project might include, but is not limited to, the following.

- Students would make decisions about what data to gather.
 - Figure out how much oil is being generated.
 - Figure out the amount of damage to sewer systems from oil.
 - Consumer ratings of different recycled soap products.

Part VI: Student Learning

Student and Team Reflection

- Implemented throughout project to evaluate progress.
- Aided by feedback from experts, stakeholder groups, peers, and teacher.