



## Halley's Comet and Cholera

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John Green reviews Halley's Comet, a celestial bo...

*Designing Assessments  
around Open-Access Tools*

*'Chemical Reviews'*

*An introduction to  
safety data sheets*

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# Background



**CHEM 101**  
&  
**ENSC 101**



# Let's Talk About

- Identifying Learning Outcomes
- How we use Online Tools
- 'Chemical Reviews' Example

# Learning Outcomes

**Locate** relevant safety data sheets

**Analyze** the chemical using



**Review** the chemical for a public audience



## Scientific Method

Introduction  
Materials  
Methods  
Results  
Discussion  
Conclusion

## DAsH\* Process

Data Collection  
  
Data Analysis  
  
Data Presentation

## Bloom's Taxonomy

Remember  
Understand  
Apply  
Analyze  
Evaluate  
Create

Homework 10: 'Chemical Reviews'  
Time on task: 2 hours  
**Goal: Assess the Safety of Chemical**

Learning Objectives:

- **Investigate** a chemical using MSDS and <https://www.chemhat.org/en>
- **Assess** a chemical using a SWOT-style Analysis
- **Write** a review of the chemical for a public audience

Background:

*Because everything is made of chemicals, and the dose is the poison it is our job to determine how much and where chemicals can be safely used. This is a complex task because of different ways chemicals interact with living and environmental systems. To help us catalogs of chemical and physical data are available online in the form of Safety Data Sheets (SDS), but we must take time to understand how to interpret them. Though no chemical is inherently 'bad' they may be easily mishandled and have devastating consequences meaning we must learn to judge how much of a chemical can be tolerated and where they are safe to use. In this assignment you will assess a chemical and discuss how the chemical is used, identify environmental impacts, and identify if it is good for a specific use or location. The writeup will be directed towards a public or general audience.*

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### 1. DATA COLLECTION COMPONENT (30 minutes)

#### Step 1: Identify a chemical and search it on google

*If you need some inspiration you can choose a chemical from the course, one listed on food or cosmetics packaging, or cleaning agents.*

#### Step 2: Access the chemical's Safety Data Sheet (SDS or MSDS for Material Safety Data Sheet)

### 2. DATA ANALYSIS COMPONENT (1 hour)

#### Step 3: Examine the Safety Data Sheet

- a) Answer the following question using the information in the corresponding section
  - I. What is the chemical used for (Section 1)?
  - II. What should you do when handling the chemical (Section 7 an 8)?
  - III. Is the chemical harmful to the environment (Section 12)?
  - IV. Is the chemical considered hazardous waste (Section 13)?

#### Step 4: Connect the data in the safety data sheet

- a) Go to [ChemHAT](https://www.chemhat.org/en)
- b) Enter the name of your chemical.

*If you have having trouble you can use the CAS#, an identifying number found in section 2 of the safety data sheet*

- c) Use the questions in the ChemHat analysis to guide your evaluation of the chemical.
  - I. How does this chemical affect our health?
  - II. How does the chemical affect the environment?
  - III. How do we get exposed to the chemical?
  - IV. How do we protect ourselves from exposure to the chemical?

### 3. DATA PRESENTATION COMPONENT (30 minutes)

#### Step 5: Evaluate the safety of the chemical

Writeup your evaluation of the chemical highlighting its strengths, weaknesses, and potential alternatives.

In a 100 - 200 word review address the following questions.

- What the chemical is used for
- How it can be handled safely
- How it is a danger to the environment
- If there is a known alternative



Stronger effect /  
evidence



Weaker effect /  
evidence

## Phenol

CAS: 108-95-2

### How can this chemical affect my health?

#### ■ Acute (Short Term) Effects [Data sources](#)



**Toxic to Humans & Animals** – Can be fatal on contact, ingestion or inhalation for humans and other mammals.



**Irritates the Skin** – Can cause irritation or serious damage to the skin.



**Irritates the Eyes** – Can cause irritation or serious damage to the eye.

#### ■ Chronic (Long Term) Effects [Data sources](#)



**Brain/Nervous System Harm** – Can cause damage to the nervous system including the brain.



**Cancer** – Can cause or increase the risk of cancer.



**Gene Damage** – Can cause or increase the rate of mutations, which are changes in genetic material in cells.



**Other Health Effects** – Can cause serious damage on contact or ingestion.



**Endocrine Disruption** – Can interfere with hormone communication between cells which controls metabolism, development, growth, reproduction and behavior (the endocrine system).



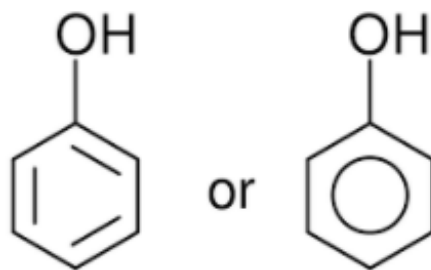
**Reproductive Harm** – Can disrupt the male or female reproductive systems, changing sexual development, behavior or functions, decreasing fertility, or resulting in loss of the fetus during pregnancy.

# Example Assignment

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August 12th, 2020

## Phenol

Phenol is a chemical used to make plastics and was used historically to clean surfaces and tools in hospitals. It is good at cleaning because the chemical is toxic both to humans and in aquatic environments. When handling it is important to store tightly sealed and the chemical can typically be detected by its odor. Phenol is a hazardous waste and must be disposed of properly. When using phenol gloves, protective clothing, and a respirator are recommended. This chemical is recommended for specialty use and not in the home or outdoors. Alternative chemicals are suggested for industrial use when possible.



4 / 5 Stars

Link: MSDS for [Phenol](#)

# Grading

Item	Points	Comments
Data Collection: Cited Source	2	Cited safety data sheet with working link or PDF
Data Analysis: Factual Content	4	Write up addresses safety, use, and disposal of the chemical
Data Presentation: Written Review	4	Student reviews the chemical so that it could be used by a general audience
Total	10	