

## ARDEI HARM PREVENTION WORKSHEET

### Reviewed for the Separations ARDEI Problem (H<sub>2</sub>S Separation)

#### GENERAL TOPIC/CONTENT

1. What is the technical content of the question?

The technical content provided to the student includes information on H<sub>2</sub>S, technical OSHA requirements, and mass balance and VLE data.

2. What is the ARDEI content of the question?

The student will be provided content about the worker hazards, environmental and health impacts, and regulations of H<sub>2</sub>S and demographic data for chemical plant locations.

3. What are students being asked to do?

The student will perform separations calculations and analyze how the relationship between chemical plant locations and demographics disproportionately affects surrounding marginalized communities.

4. Are the students being asked to do something related to the ARDEI content, or is the ARDEI content simply providing context/background but not related to answering the question?

The student is explicitly being asked to analyze the relationship between their solved technical data (H<sub>2</sub>S removal) to current demographic data.

#### RESOURCES

1. What technical resources is this question based on?

This problem is modified from Wankat 12.D2., with references from OSHA and Bureau of Labor Statistic

- a. Are those resources cited?

Yes

- b. Do students have easy and free access to those resources if needed?

Yes – this is a required textbook and copies are available in the library, and the other links are free

2. What ARDEI resources is this question based on?

Review on H<sub>2</sub>S regulation and census data (Social Explorer)

- a. What did you need to learn about or find to create this question?

Required a review article, news article, census data, and chemical plant locations

- b. Where did you find those resources/what or who created that content?

Websites and journal articles based on national and local data

- i. Are the resources from those are affected by the issue being described?

Yes – the review article and Social Explorer link are included, and instructions to use the census data tool

- ii. Or are the resources from those who study and publish on the issue being described?

- c. Are those resources cited?

Yes

- d. Do students have easy and free access to those resources if they were curious, wanted more information, or if needed for the question?

Yes

3. What technical resources do students need to answer the question?

Students require mass balance equations, vapor-liquid equilibrium data and regulation statistics.

- a. Are those resources explicitly stated or do students need to find them themselves?

The McCabe-Thiele Diagram is provided, equations will be found in the textbook or class notes, and relevant statistics are given.

- b. Do students have easy and free access to those resources?

Yes, the resources are given and the links are free

4. What ARDEI resources do students need to answer the question?

Review article and Social Explorer

- a. Are those resources explicitly stated or do students need to find them themselves?

Yes, the review article and census data are linked

- b. Do students have easy and free access to those resources?

Yes, Northwestern provides access to both resources

## ARDEI POSITIONALITY AND PREVENTING HARM

1. Whose (as in what community's) position is being explained/uplifted?

Marginalized communities affected by chemical plant environmental consequences – specifically for Black, Indigenous, People of Color and LatinX.

2. How does your identity relate to those of the community in question?

As a personal exercise, it is important understand your positionality and bias when writing these problems and what systemic inequities you may be reinforcing as a result. If your background is not that of the POC affected by the issue, this is a good opportunity when with the class to acknowledge your positionality and explain that these problems are an effort to encourage ARDEI discussion in context of their work, as you are with your own.

3. What is the potential of this question to cause harm to students reading it?

Aspects of this problem (locations, consequences) may be triggering for a student based on individual experiences, so this problem provides only information that is strictly necessary to explain the problem. The problem does not include information related to violent or personal experiences that may become triggering.

4. What is the potential of this question to cause harm to students (to themselves, instructor, or other students) through answering it?

Students are mostly asked specific questions about technical data and processes not likely to cause harm, however, the context of part (e) can be a potential source of harm to the student answering. For example, answering this problem could be a reminder for a family member who has had negative health consequences as a result of chemical plant emission violations and may find the exercise triggering. While you cannot predict your students' personal experiences, you can encourage an understanding culture for students that may have difficulty completing this problem, such as with a rubric adapted for these potential situations.

Additionally, this question could also prompt discussion that leads to harm of a student studying with peers. In this situation, an open communication line can be helpful to address these situations confidentially in a safe environment for the student.

The open-ended nature of part (e) can also be an opportunity of harm to the instructors and TAs grading the work. For example, a student may perpetuate stereotypes of community members living near chemical plants. Should this situation arise in a written assignment such as this, you should check with your TAs that may have been harmed as a result of reading the response. It is also recommended to address the situation with the student by going over community guidelines and explaining the potential for harm. To prevent additional harm, instructors and TAs should never share homework grades or answers between students, per FERPA regulations.

5. What is the purpose of the question/discussion/exercise?

The purpose of this problem is to use chemical engineering fundamentals to solve an environmentally relevant separations problem and to contextualize hazardous wastes with surrounding demographics.

6. Are you confirming (or pushing back against) stereotypical attitudes and beliefs?

This problem pushes back against the stereotypical belief that chemical engineering education must be only technical without understanding the impacts of hazardous waste on the surrounding demographics. This problem as written does not introduce or reinforce any stereotypes about community members of the surrounding chemical plant.

7. Are there places for students to confront their own assumptions and biases prior to working with others?

This problem does not require any group work, but it is important to be mindful that these discussions may be brought up in peer study groups. Creating a classroom culture following ARDEI community guidelines includes making space for student self-reflection prior to assigning these problems.

8. Does the choice of problem/exercise and related reading materials and resources uphold, affirm, sustain (or reject) systemic inequities?

The choice of problem and related materials rejects systemic inequities by amplifying experiences from marginalized communities.

9. Does the choice of technology for solving/working on the exercise uphold, affirm, sustain (or reject) systemic inequities?

The chosen technologies reject systemic inequities through independent correlation between racial and economic demographics and chemical plant geographical locations.

10. Does the assessment of the work uphold, affirm, sustain (or reject) systemic inequities?

The assessment of the work rejects systemic inequities by accommodating various acceptable answers for open-ended questions.