

## **Alternative Activity 4.2**

### **Description**

In this activity the students will read about a scale-up activity that failed and then attempt to explain why it failed in the form of a memo to their supervisor.

### **Objective**

The objective is to require students to use their understanding of rate normalization to identify an incorrect assumption that was used in a calculation and to suggest a means of rectifying the situation.

### **Lesson Plan**

1. Display the slide giving the instructions and go over what they will be doing.
2. Display the slide describing the attempted scale-up to the class and give them time to read it.
3. Working individually, have them write a list of the possible reasons why the scale-up turned out as it did.
4. Once they have had time to list 2 to 4 possible reasons, have them form small groups of 2 to 4 and discuss their lists.
5. After they have had 5 minutes to discuss, tell them to start writing their memos.
6. Give them another 5 minutes to write their memos and then survey the class to find out what they identified as the cause for the problem.
7. Have a few volunteers read their memos, leading to the point that the reaction had been improperly normalized (see the sample memo).
8. Encourage out of the box ideas and point out that there isn't one "correct" answer.

### **Variations**

The activity could be performed without writing memos, or it could be expanded to include a mini-lecture on how to write a technical memo. The activity could be modified to incorporate a brain-storming session to attempt to identify possible remedies.

### **Tips and Suggestions**

Conduct the activity in a manner that will not embarrass students who don't come up with a good reason for the failed scale up. Similarly, ensure that suggestions for fixing the problem are not ridiculed.