

Alternative Activity 11.1

Description

In this activity the students will propose methods for measuring the residence time distribution at a popular nightclub.

Objective

The objective is to illustrate by analogy the use of step change and impulse stimuli for measuring residence time distributions.

Preparation

No materials other than the slides and this lesson plan are needed.

Lesson Plan

1. Form the class into groups.
2. Display the slide and explain the activity to them.
3. Give them time to brainstorm and then outline their method on paper
4. Call on each group and have them describe their approach
 - a. Some may propose a method that won't work
 - b. Some may propose a method that will work, but that isn't analogous to either step or impulse stimulus and response
 - c. Some will (hopefully) propose a method that is analogous to a step change stimulus and response
 - d. Some will (hopefully) propose a method that is analogous to an impulse change stimulus and response
5. As each group reports, allow the rest of the class to ask questions along with you
 - a. For (a) above, ask questions that will point out that their method is flawed
 - b. For (b) above, complement their originality and move on to the next group
 - c. For (c) and (d) above, draw out the analogy seeking to highlight where the analogy is good and where it breaks down.
6. If no one falls into category c or d, pick a group from a or b and ask questions that lead them to modify their method so it represents the missing analogy.

Variations

If the class is large enough, have them enact one of the methods they proposed and measure the RTD. You can use pieces of paper with different marks on them in place of invisible ink stamps.

After describing the activity, give them a few minutes to jot some ideas individually before forming them into groups

Tips and Suggestions

Be sure to explicitly point out how their methods are analogous to step change or impulse stimulus and response. For some it will be easier to grasp the concepts in the context of a nightclub than in the

context of a reactor simply because they have a better “feel” for the former. Once they have grasped the concepts in that context, you want to show them how it can translate directly to a reactor..