

Synchronous Online General Chemistry Designed for Frequent Feedback and Collaboration



DUE 1140914
1625233

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Weekly Course Design (W to Tu)

Background

Students in General Chemistry courses at open enrollment institutions often have a wide breadth of college and course readiness skills and overall confidence in those. This online course was designed to provide continuous feedback from instructor, peers, and electronic platforms to help bridge some of these learning gaps.

Peer Support				Growth Mindset with Feedback		
Guided Inquiry	Process Focused			Spaced retrieval practice	Interleaved Practice	
Announcements Video	Weekly Bonus Question Slide	Video pre-Lecture with embedded quiz (W, F, M)	Weekly Team Google Slides (due W)	Peer-Led-Team-Learning (PLTL) (Tu)	Weekly Online Homework (Due F)	Weekly Quiz (Due F)

- Bonus Question: Student prepare google slide on assigned chemical application concept, add to Team slides
- Lecture video: Focus on key terminology and process (even chemical capitol between students)
 - Video structure: Lecture – quiz question – answer and discussion of common error, repeat
- Team Google Slides (W, F, M): 5-6 students per team, Student roles
 - POGIL activities and guided problem solving with extension problems between days
 - Team and individual accountability
 - Daily feedback on slide notes during and after each class
- Need more study but initial outcomes very positive. very high student evaluations, high percent A and B, lower percent DFW

Course Structure

- College General Chemistry I
- MWF Synchronous online class (70 students, 12 teams), Microsoft Teams
- Tu Synchronous online PLTL, Microsoft Teams
- Canvas course management
- Smartworks online homework
- Kaltura video and quizzing

Unit Test Structure

- Online, open book/note, open for 3-4 days
- Parts A and B timed multiple choice, one answer no feedback
 - Student turn in written journal of work
- Part C open response
- 24 hours after close, new version of Parts A and B open for retake with 5 attempts, correct answers indicated

W 9/23: Consider the starting materials shown in the box below (8 molecules of NH_3 and 5 molecules of O_2). You are going to mimic a reaction by moving the atoms for form only NO and H_2O molecules until you can't form any more. One rule, the reaction only has the right energy to form these products or to leave a starting molecule unreacted, no other products can be formed.

F 2/26: Complete the following questions. Show the Math set up and answer.

In titration, one chemical with known concentration is carefully added from a buret to another chemical with unknown concentration but known volume until the reaction is complete (see picture). Often the reaction can be monitored by color indicators and/or conductivity. In acid-base titration, the color indicators change color when the solution transitions from excess acid in the flask to excess base. If done properly, the middle picture with very slight color can be obtained where the volume of base added is very very close to the stoichiometric amount of base needed (very very small amount). We can then use this data to calculate the moles of acid in the flask. With the moles of acid and the volume of the acid, we can calculate the concentration (M) of the acid.

$$2 \text{HCl (aq)} + \text{Ba(OH)}_2 \text{(aq)} \rightarrow \text{BaCl}_2 \text{(aq)} + 2 \text{H}_2\text{O (l)}$$

25.00 mL of 0.02345 M Ba(OH)_2 solution

12.50 mL of Ba(OH)_2 (aq) 1.000 L Ba(OH)_2 0.02345 mol/L

12.50 mL of Ba(OH)_2 (aq) 1.1 Solution 0.02345 mole 1 L Solution

77 mL HCl (aq) 77 mol HCl (aq)

We found the moles of HCl in 25.00 mL of HCl (aq) solution

- Instructor moves between slides, uses typing and voice/video for feedback
- After class: additional feedback
- Student leave comments and respond to comments
- Icon movement visible

Feasibility Survey on Testing Feedback (44 consented students)

- 75% reported completing all three unit exam feedback assignments, 14% completed some of the 3, 11% completed non of the three
- Of those who completed feedback:
 - only 1 student reported guessing until correct
 - 98% reported a combination of reworking the problems, remembering answers, and guessing
 - On a scale from not at all useful (1) to very useful (5): median response was 4, 73% reported 4 or 5
 - Representative student response: I found them useful because I got to see what I got wrong and then got a second chance to figure out why my answer was incorrect and work through the problem

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