

PEER INSTRUCTION IN SCIENCE

By: Natalie Karam | CHEM 165SH with Dr. Morgan Hawker | Health Careers Opportunity Program/Louis Stokes Alliance for Minority Participation

ABSTRACT

I am enrolled in CHEM 165SH in the Chemistry Honors Program, which is a science communication class. For my service, I worked with the Health Careers Opportunity Program and Louis Stokes Alliance for Minority Participation (HCOP/LSAMP) at Fresno State to provide over 35 hours of tutoring to any students in CHEM 1A/1B and Math 75. Typically, I went over students' study guides with them and provided more example problems that they could do.

COMMUNITY IMPACT

My service targeted students in general chemistry courses and calculus. While I do not know how their actual grades were impacted, I can note how I felt they did during the sessions we had. For instance, most of them seemed to learn best from doing practice problems, both alongside me and, eventually, on their own (rather than me just explaining the material to them). Thus, all the notes I have from tutoring are practice problems I did with different students (as seen in both figures to the right). What I appreciated, however, was when students were honest with me; it was a great help when they asked me to re-explain a topic or go over additional examples if they did not fully understand it after my initial explanation. This allowed me to adapt my teaching style to each student until they could grasp the material. Moreover, the most significant accomplishment I felt, as a tutor, was when students would have their "lightbulb" moment—when everything they were learning finally started to make sense. This happened a couple of times, and I was glad to see them be able to solve problems on their own. I hope this translated to their grades, and that they were able to do well on their future exams.

Math 75 and CHEM 1A/1B
Free Online Tutoring

With Fresno State Chemistry Honors Student
Natalie Karam
nat13karam@mail.fresnostate.edu

Monday 1:00 - 2:30 pm
Join Zoom Meeting
<https://fresnostate.zoom.us/j/86440932325?pwd=Y9JlN2MuSk00aUJGbnNFbUJlZGZlOQ==>
ID: 864 4093 2325
Passcode: 856564

Wednesday 4:00 - 5:30 pm
Join Zoom Meeting
<https://fresnostate.zoom.us/j/8154925161?pwd=aHBLbTA5dG9mZWVlZD05MmMyZz09>
ID: 815 4925 161
Passcode: 376637

WHAT I LEARNED

This tutoring service taught me several lessons. For one, I was able to refine my science communication skills. I had to learn to take what I understood from my chemistry and math courses and put it in words that other students could also understand. Also, the topics my students were learning are what I still use in my upper-division chemistry classes. Thus, this not only helped me review the material, but it also helped me understand some topics that I struggled with when I first took those classes (hello again, molecular orbitals) as I had to research new ways to explain the topics. Finally, becoming a tutor gave me a new perspective on the tutoring community. The work these organizations do, like HCOP/LSAMP, is truly remarkable. I have learned that tutoring is not easy; you may understand the material, but being able to explain it to someone is an entirely different story. I only got a glimpse of this over the semester, but I truly appreciate the tutoring community for everything they do for students.

Oxidation = \uparrow in oxidation state (lose e^-)
Reduction = \downarrow in oxidation state (gain e^-)

Assigning oxidation states

- Free elements
 - Have oxidation states of 0
 - Ex: Na, Cl_2 , H_2 , O_2 , etc.
- Monatomic ions
 - Have oxidation states equal to their charge
 - Ex: $V^{3+} = +3$, $Fe^{2+} = +2$, etc.
- Compounds
 - Sum of oxidation states of all atoms in a compound is 0
 - Ex: $NaCl \rightarrow (+1) + (-1) = 0$; $H_2O \rightarrow 2(+1) + (-2) = 0$
 $+1 \quad -1 \qquad \qquad 2(+1) \quad -2$

Practice Problems

$Cr(NO_2)_2 + (NH_4)_2SO_4 \rightarrow CrSO_4(aq) + NH_4NO_2(aq)$

$+2 \quad NO_2^- \quad \quad NH_4^+ \quad SO_4^{2-}$

$x + 2(-1) = 0 \quad 2(+1) + (-2) = 0$

$x = +2$

To predict the products: Pair cation from one reactant w/ anion from the other reactant (and vice versa)

- Ex: $Cr^{2+} \quad SO_4^{2-} \Rightarrow CrSO_4$

$HCl \rightarrow H^+ + Cl^-$ (strong acid, completely dissociates)
 HF (weak acid, does not completely dissociate)

Practice 4

Titration Calculation

A 10.00 mL sample of HCl was titrated w/ 12.54 mL of 0.100M NaOH to reach the end point. What is the concentration of HCl in M?

10.0 mL HCl
M = ?
 $V_{EP} = 12.54 \text{ mL}$
0.100M NaOH

$HCl + NaOH \rightarrow NaCl + H_2O$

$12.54 \text{ mL NaOH} \times \frac{1 \text{ L}}{1000 \text{ mL}} = 0.01254 \text{ L NaOH}$

$M = \frac{\text{mol}}{L}$ $0.100 \text{ M NaOH} = \frac{x}{0.01254 \text{ L}}$

$x = 0.001254 \text{ mol NaOH}$

$0.001254 \text{ mol NaOH} \times \frac{1 \text{ mol HCl}}{1 \text{ mol NaOH}} = 0.001254 \text{ mol HCl}$

$M = \frac{0.001254 \text{ mol HCl}}{0.0100 \text{ L HCl}} \Rightarrow 0.1254 \text{ M HCl}$