De Anza College **SLO ARCHIVE**

Student Learning Outcomes for CHEM 1B

General Chemistry

Team Members:

Team Leader:
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Other members:

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Additional team members/notes about team:

Ram Subramaniam, Cinzia Muzzi, Gary Fisher,

Additional Notes:

Outcomes:

Outcome 1 Phase I: Statement

Demonstrate a knowledge of intermolecular forces.

Outcome 1 Phase II: Assessment Strategy Used:

Assessment Quarter: Spring 2010
Assessors: Ram Subramaniam
Assessment Tools: *No tools assigned*.
Sections being assessed: 01, 02

Outcome 1 Phase III: Reflect & Enhance

Number of people involved in Phase III: 6

Changes:

Methods:
The following questions from the final exam were used to assess this particular outcome:Questions used:1. The following questions pertain to intermolecular forces.a. What is meant by polarizability?b. Which of the following atoms would you expect to be most polarizable: O, S, Se or Te? Explain. c. Put the following molecules in increasing

order (lowest to highest) of polarizability: GeCl4, CH4, SiCl4, SiH4, and GeBr4. d. Arrange the above substances from lowest boiling point to highest boiling point. 2. What is the strongest intermolecular force in each of the following:a. CH3Cl: b. CH3CH3: c. NH3: d. CH3OH: e. Cl2:

Findings and Conclusions:
Assessment results:Section 1 Average: 7.6/10 Standard Deviation: 2.4/10 Median: 7.8/10 Section 2Average: 7.8/10Standard Deviation: 2.2/10Median: 8/10

Enhancement (Planned Actions)
Part I:
The national success rate in chemistry (based on data from nsf.gov and acs.org) is between 65-70%. The assessment data of the outcomes for this chemistry class indicates that the performance of De Anza College chemistry students is above the national average.

Part II:
Based on the two sections that were assessed, we noted that the success rate of students meeting or exceeding the national average is greater in this class than in Chem 1A, the pre-requisite for this class. The minimum performance standard that students are expected to meet in order to be admitted to Chem 1B is a C in Chem 1A. It seems that students meeting this standard are adequately prepared to tackle the challenges of this class.It was also interesting to note that, this particular class has an exceptionally well-developed laboratory program, which is perfectly aligned with the lecture. Even though the various outcomes were assessed in lecture, our contention is that the experimental demonstration of the lecture objectives through processes of self-discovery in the laboratory provides for a much stronger understanding and retention of the theories discussed in the lecture. In the next round of assessment, we will evaluate the outcomes in the laboratory program.This class also serves as a model for the kinds of developmental activities that we should engage in, in our other chemistry classes.

Outcome 2 Phase I: Statement

Evaluate the principles of molecular kinetics.

Outcome 2 Phase II: Assessment Strategy Used:

Assessment Quarter: Spring 2010
Assessors: Ram Subramaniam
Assessment Tools: *No tools assigned*.
Sections being assessed: 01, 02

Outcome 2 Phase III: Reflect & Enhance

Number of people involved in Phase III: 6

Changes:

Methods:
The following questions from the final exam were used to assess this outcome:Questions

used:1. Consider the following hypothetical aqueous reaction: A(aq) ⇒ B(aq). The following table is the moles of A measured at various times. The reaction volume is 100.0 mlTime (min) Moles of A0 0.06510 0.05120 0.04230 0.03640 0.031(a) Calculate the number of moles of B at each time in the table, assuming there are no molecules of B at time 0.(b) Calculate the average rate of disappearance of A for each 10-minute interval, in units of M/s.2. Experiments show that each of the following reactions is second order overall:Reaction 1: NO2(g) + CO(g) ⇒ NO(g) + CO2(g)Reaction 2: NO(g) + O3(g) ⇒ NO2(g) + O2(g)a. When [NO2] in reaction 1 is doubled, the rate quadruples (becomes 4 times). Write the rate law for this reaction. b. When the [NO] in reaction 2 is doubled, the rate doubles. Write the rate law for this reaction. c. In reaction 1, the initial [NO2] is twice the initial [CO]. What is the ratio of the initial rate of reaction to the rate at 50% completion?

Findings and Conclusions:
Assessment results:Section 1 Average: 6.4/10 Standard Deviation: 3.6/10 Median: 6.5/10 Section 2Average: 6.5/10Standard Deviation: 3.3/10Median: 7/10

Enhancement (Planned Actions)
Part I:

Part II:

Outcome 3 Phase I: Statement

Apply principles of chemical equilibrium to chemical reactions.

Outcome 3 Phase II: Assessment Strategy Used:

Assessment Quarter: Spring 2010
Assessors: Ram Subramaniam
Assessment Tools: *No tools assigned*.
Sections being assessed: 01, 02

Outcome 3 Phase III: Reflect & Enhance

Number of people involved in Phase III: 6

Changes:

Methods:
The following question from the final exam were used to assess this outcome:Questions used:Consider the decomposition of phosphorous pentachloride:PCl5(g) PCl3(g) + Cl2(g) KC = 1.80 at 250°Ca. If 0.300 M PCl5 is placed in a 500-ml container at 250°C, what are the equilibrium concentrations of PCl5, PCl3, and Cl2?b. Suppose to the above mixture at equilibrium, you add 0.100 moles of Cl2(g) (inside the 500-ml container), what are the new equilibrium concentrations of PCl5, PCl3, and Cl2?

Findings and Conclusions:
Assessment results:Section 1 Average: 8.2/10 Standard Deviation: 2.8/10 Median: 10/10

Section 2Average: 8/10Standard Deviation: 3/10Median: 10/10

Enhancement (Planned Actions)
Part I:

Part II:

Outcome 4 Phase I: Statement

Apply the second and third laws of thermodynamics to chemical reactions.

Outcome 4 Phase II: Assessment Strategy Used:

Assessment Quarter: Spring 2010
Assessors: Ram Subramaniam
Assessment Tools: *No tools assigned*.
Sections being assessed: 01, 02

Outcome 4 Phase III: Reflect & Enhance

Number of people involved in Phase III: 6

Changes:

Methods:
The following questions from the final exam were used to assess this outcome.Questions used:1. Given the following two equations: $\Delta G° = \Delta H° – T\Delta S°$ and $\Delta G° = -RT\ln K$; and assumption that $\Delta H°$ and $\Delta S°$ are constants over a wide range of temperatures (all the symbols have the usual meanings). If K1 is the equilibrium constant at a temperature T1 and K2 is the equilibrium constant at a temperature T2, show that: 2. What is the standard molar entropy (in) of condensation of water at 100°C? A useful generalization known as Troutan's rule states that for many liquids at their normal boiling points, the standards molar entropy of vaporization has a value of about 87 J-mol-1K-1. The enthalpy of vaporization of water is 40.67 kJ/mol. a. Given that water vaporizes at 100°C, what is the value for the standard molar entropy of vaporization for water?b. According to Troutan's rule: for many liquids at their normal boiling points, the standard molar entropy of vaporization is about 87 J-mol-1K-1? Does the value calculated in part (a) agree with Troutan's rule. Explain why or why not.

Findings and Conclusions:
Assessment results:Section 1 Average: 7.6/10 Standard Deviation: 3.3/10 Median: 10/10
Section 2Average: 7.7/10Standard Deviation: 2.7/10Median: 9/10

Enhancement (Planned Actions)
Part I:

Part II:

SLO Created: 02/10/2010 Last Modified: 05/19/2011