DVC Instructional Course SLO, Complete Assessment History

Course: CHEM-120, General College Chemistry I

Contact: Mary Ulrich, last reported by mulrich, entered Jan 4, 2012 by rburns, most recently assessed 2010/11 *(awaiting approval)*

Goal: The purpose of this course is to...

An introduction to the fundamentals of chemistry including the topics: atomic theory, chemical reactions, bonding, structure, stoichiometry, gases, solutions, redox, thermochemistry, equilibrium, and acid-base chemistry.

Outcome #1 *cycle 1*, reported by Tish Young, edited on Mar 3, 2011 by LBorowsk *(approved)*				assessed in 2008/09
Outcome: Students completing the course will be able to develop and demonstrate appropriate chemical laboratory techniques. Perform a titration to determine the concentration of an unknown component.	**Assessment method:** a. the quantitative results of a titration for potassium hydrogen phthalate. b. keeping a lab notebook with sufficient detail.	**Criteria:** a. 40% of the students will measure the true value of the KHP (using a normalized value for the molarity of NaOH) within 1% of the true value. 70% will get within 5% or the true value. b. 80% of students will keep notebooks with sufficient detail.	**Analysis:** a. 59% of students in two sections (n=41) and 29% of students in another instructor's two sections (n=38) got results within 1% (44% overall). 89% of students in all four sections (n=79) were within 5%. b. all assessed notebook criteria were above 90% compliance.	**Plan:** a. The sections with low achievement at the 1% level were found to have a distribution of results with an average bias of +2.5%, pointing to an underlying systematic problem. Instructors discovered and corrected several stockroom errors during the course of this project. There is concern that insufficient manpower and experience in the stockroom workforce is diminishing the quality of support. b. Goals were met.

Outcome #2 *cycle 1*, reported by Tish Young, edited on Mar 3, 2011 by LBorowsk *(approved)*				assessed in 2008/09
Outcome: Students completing the course will be able to develop chemical problem solving skills as applied to chemical equilibrium.	**Assessment method:** a. Students will experimentally determine an equilibrium constant in the laboratory. b. Common question on an exam.	**Criteria:** a. 70% of the students should be able to correctly set up the ICE table for the FeSCN2+ equilibrium. 50% should be able to correctly solve for the equilibirum constant. b. 50% of the students will be able to correctly solve a straight-forwardly stated, but moderately complex, equilibrium problem. 70% should be able to score 70% or better on the scoring rubric for the question.	**Analysis:** a. 92% of students in four sections (n=71) could set up the ICE table. 89% could solve for the equilibrium constant. b. Of students in four sections (n=75), 53% solved the problem for full credit. 68% received at 7/10 or better on the grading rubric, and 25% scored 2/10 or less on the grading rubric.	**Plan:** a. Goals were met. b. Goals were nearly met. Only 68% (rather than 70%) could get most of the problem correct, although 25% were unable to make meaningful progress. This is a challenging topic in Chem 120; weaker students will need more support and practice.

Outcome #3 *cycle 1*, reported by Tish Young, edited on Mar 3, 2011 by LBorowsk *(approved)*				assessed in 2008/09
Outcome: Students completing the course will be able to explain and illustrate bonding in various compounds	**Assessment method:** a. In the laboratory, groups of students will complete a worksheet (Lewis structures, electron arrangements, VSEPR shapes and polarity) with access to reference materials and model kits. T b. Common exam question.	**Criteria:** a. Five structures were chosen as representative of the whole set and graded at 4 points each, for a total of 20 points. 75% of students will achieve 15 points (75%) or better. b. 75% of students will answer a straightforward question correctly, and 50% of students will answer more difficult questions correctly on topics relating to Lewis structures.	**Analysis:** a. 86% of students in four sections (n=74) scored 15 points (75%) or more on the laboratory worksheet. The lowest score of any student was 10 points (50%). b. Of students in four sections (n=75) taking common exam questions: 75% could choose the correct geometry of ICl3. 55% could identify the bond angles in SF4, and 57% could correctly rank the bond length and strength in HONH2 relative to nitrate. In a six-part question concerning allocating electron pairs and identifying hybridization and bond angles, students averaged 45% of the total credit, with many scores being very low.	**Plan:** a. Goals were met. b. Goals were mostly met. Students dealt well with a straightforward question. More complicated geometries (which were not covered in the previous course) met with less success. Students also found it difficult to compare bond length and strength of two two structure, one of which contained resonance. More practice in these areas may be useful. The fourth question concerned hybridization. This topic had recently been moved to Chem 120, following a reorganization of the curriculum. Instructors should plan to allocate more time to this topic.

Outcome #4 *cycle 1*, reported by mulrich, edited on Jan 4, 2012 by rburns				never assessed
Outcome: Students completing the course will be able to develop chemical problem solving skills as applied to thermochemistry.	**Assessment method:** a. Students will experimentally determine enthalpy changes in the laboratory. b. Comparable questions on an exam (Hess's Law) with grading rubric.	**Criteria:** a. 70% of the students will be able to correctly calculate an enthalpy change from laboratory data. b, 70% of the students will be able to solve a straightforward but moderately complex Hess's Law problem.	**Analysis:**	**Plan:**

Outcome #5 *cycle 1*, reported by mulrich, edited on Jan 4, 2012 by rburns				never assessed
Outcome: Students completing the course will be able to to construct and balance net ionic equations (Spring 2011)	**Assessment method:**	**Criteria:**	**Analysis:**	**Plan:**

Outcome #6 *cycle 1*, reported by mulrich, edited on Jan 4, 2012 by rburns				assessed in 2010/11
Outcome: Students completing the course will be able to construct, process, and interpret computer-generated graphs correctly.	**Assessment method:** a. Collect and graph data for the thermochemistry experiment using Logger Pro software. b. Create a trend-line froom graphs oon Logger Pro or Excel software, Use the trend-line to calculate the desired variable.	**Criteria:** a. 90% of the students will be able to collect and graph the desired data. b.80% of the students will correctly create the trend-line. 70% will use it appropriately in the calculation.	**Analysis:** Spring 2011. a. 100% of the students (N=75) collected and graphed the data in lab. However, not all of the students turned in the lab. b. 95% of the students who turned in the lab created the trend-line and used it correctly.	**Plan:** Goals were met for both a and b. Students use of both computers and the Logger Pro software has improved over the past few years. They are more adept with the computers, but also the chemistry faculty has developed detailed instructions for the use of the software and subsequent calculations.

Outcome #7 *cycle 1*, reported by mulrich, edited on Jan 4, 2012 by rburns				assessed in 2010/11
Outcome: Students completing the course will be able to construct and balance net ionic equations.	**Assessment method:** a. In the laboratory students will complete a worksheet in which molecular, ionic and net ionic equations will be written to explain laboratory observations. b.Common or similar exam questions.	**Criteria:** a. Five equations representing a range of difficulty were selected for assessment. 70% ot the students will accurately complete 4 of the 5. b. 70% of the students will answer a precipitation reaction correctly; 50% of the students will be able to write a net ionic equation for a more complex reaction.	**Analysis:** Spring 2011. a. Statistics were collected for 2 sections (N=50). 60% had 4 or more totally correct. b. Statistics were collected for 3 sections (N=75). In one section 50% of the students got both equations correct. In another section 60% got the precipitation reaction correct, while 43% got the more difficult one. In a third section students average 55% correct for two more difficult reaction.	**Plan:** The department will discuss thesde results in the Spring 2012 semester. It is anticipated that additional worksheets and/or on-line problems will be developed.

Outcome #8 *cycle 1*, reported by mulrich, edited on Jan 4, 2012 by rburns				assessed in 2010/11
Outcome: Students completing the course will be able to develop problem solving skills as applied to thermochemistry.	**Assessment method:** a. Students will experimentally determine enthalpy changes in the laboratory. b. Comparable question on an exam (Hess's Law) with grading rubric.	**Criteria:** a. 70% of the students will be able to correctly calculate enthalpy change from laboratory data. b. 70% of the students will be able to correctly solve a moderately complex Hess's Law problem.	**Analysis:** Spring 2011. a. 85% of the students who turned in lab reports correctly calculated the enthalpy change (N = 75). b. 63% (N=122) of the students solved the problem correctly with no errors. An additional 7% solved the problem with only minor errors.	**Plan:** a. Goal met. b. Goal met.