

Final

CHEM 3211K - Organic Chemistry I

2016-2017

Course Description

Introduces the chemistry of organic compounds including aliphatic and aromatic hydrocarbons, stereochemistry, monofunctional compounds and some polyfunctional compounds. Requires the illustration of techniques for synthesis, separation, purification and identification of organic compounds in the laboratory.

Program Outcomes/Goals

PO1

Acquire knowledge of chemistry

Students will acquire detailed, in-depth knowledge of chemistry and be able to integrate and apply these principles to solve complex scientific problems.

Student Learning Outcomes

SLO1

Name organic chemical species

Students will name and classify organic chemical species and functionalities.

Supported Initiatives

Standards (2)

SACSCOC 2012 Principles of Accreditation*: 3.3.1.1 educational programs, to include student learning outcomes

SACSCOC 2012 Principles of Accreditation*: 4.1 The institution evaluates success with respect to student achievement consistent with its mission. Criteria may include: enrollment data; retention, graduation, course completion, and job placement rates; state licensing examinations; student portfolios; or other means of demonstrating achievement of goals. (Student achievement)

General Education (1)

10: Science, Math, and Technology - Students will demonstrate the ability to evaluate observations, inferences, or relationships in works under investigation.

Institutional Priorities (0)

Strategic Initiatives (3)

Mission/Core Commitments: 1 Dalton State College provides a diverse student population with opportunities to acquire the knowledge and skills necessary to attain affordable baccalaureate degrees, associate degrees, and certificates and to reach their personal and professional goals.

Strategic Plan, 2016-2019 Goals: 2 Academic Excellence: Dalton State College will develop and maintain a culture of academic and teaching excellence among faculty and staff while creating optimal opportunities for student academic excellence.

University System of Georgia Strategic Plan Goals: 1 Commitment to Academic Excellence and Degree Completion: We will maximize our resources and strengthen educational partnerships to ensure that Georgians have a seamless educational system that is both affordable and of the highest quality.

Action Plans for Improvement

Action Plans for Improvement Description

Students did not meet the target for this learning outcome. Students had the most difficulty distinguishing between isomers. For this reason, more examples will be worked in class pertaining to types of isomers. To aid in the visualization of molecules, molecular model kits will be used during class and students will be asked to purchase their own kits for use outside class.

Due Date

Dec 01 2017

Status

Planned

Measures

M1

Pre/Post test questions on naming chemical species

There are 4 questions on the pre/post test concerning naming and classifying organic chemical species and functionalities. Question 4: What is the IUPAC name of the molecule below? Question 6: Which of the following has the highest priority according to sequence rules? Question 7: Are the two isomers below enantiomers, diastereomers, identical or structural isomers? Question 10: Is the indicated carbon atom in the structure of cocaine below 1°, 2°, 3°, or 4°?

Methodology

The same test is given at the beginning and end of the semester. The students should do substantially better on the post test than on the pretest.

Source of Evidence: Pre/post test

Target

Reduction in incorrect answers

| Target | Findings | Improvements Achieved from Previous Action Plans | Improvement Type | Status |
|--------|--|--|------------------|--------|
| | <p>There were 40 students in two combined sections of CHEM 3211K: Organic Chemistry I that met at the main campus of Dalton State College in Dalton, GA during the fall 2016 semester and completed both the pre-test and post-test. The results of the pre-test were as follows:</p> <p>Question 4: 11 students (27.50%) answered correctly and 29 (72.50%) answered incorrectly.</p> <p>Question 6: 4 students (10%) answered correctly and 36 (90%) answered incorrectly.</p> <p>Question 7: 5 students (12.5%)</p> | | | |

| Target | Findings | Improvements Achieved from Previous Action Plans | Improvement Type | Status |
|---|--|---|--|--------------------|
| <p>Incorrect answers will be reduced by 50% from pre-test to post-test.</p> | <p>answered correctly and 35 (87.5%) answered incorrectly. Question 10: 20 students (50%) answered correctly and 20 (50%) answered incorrectly. The results of the post-test were as follows: Question 4: 12 students (30%) answered correctly and 28 (70%) answered incorrectly. Question 6: 22 students (55%) answered correctly and 18 (45%) answered incorrectly. Question 7: 1 students (2.5%) answered correctly and 39 (97.5%) answered incorrectly. Question 10: 30 students</p> | <p>The previous action plan was to implement more practice problems in class on organic nomenclature to improve results. Because this is the first year we are using the pre/post tests, it is difficult to say what affect this action plan had since the questions used for assessment are different. However, it is clear from the findings that new examples and methods should be implemented to improve student learning.</p> | <p>Student Test Scores / Performance: Improved Performance</p> | <p>Not Met</p> |

| Target | Findings | Improvements Achieved from Previous Action Plans | Improvement Type | Status |
|--------|----------|--|------------------|--------|
|--------|----------|--|------------------|--------|

(75%) answered correctly and 10 (75%) answered incorrectly. The percentage reduction in incorrect answers from the pre-test to the post-test was 3.4% for question 4, 50.0% for question 6, and 50% for question 10. There was a percentage increase in wrong answers of 11.4% for question 7. Overall, the number of incorrect answers for all four questions combined was reduced from 120 to 95 or an overall reduction of 20.8% from the pre-test to the post-test.

Analysis of Finding and Evaluation Results

| Target | Findings | Improvements Achieved from Previous Action Plans | Improvement Type | Status |
|--------|--|--|------------------|--------|
| | <p>The most problematic question for students was question 7. Students often have trouble distinguishing between isomers. One of the main difficulties students have is in visualizing molecules in three dimensions. One thing that might help in this area may be the use of molecular model kits. Some models are used during class time, but it may be beneficial to ask the students to purchase their own kits or make some kits available for check-out. Students also had trouble with question 4. Students often have trouble translating a Newman structure into a bond line structure and if they can't do this correctly they won't be able to name the compound. More practice converting between types of structure notation may help with this problem. Question 10 was answered correctly more often than the other questions. Most students seemed to understand the difference between primary, secondary, tertiary, and quaternary carbons.</p> | | | |

SLO2

Identify chemical reactions

Students will define and identify chemical reactions with respect to general type of reaction and with respect to organic functional groups.

Supported Initiatives

Standards (2)

SACSCOC 2012 Principles of Accreditation*: 3.3.1.1 educational programs, to include student learning outcomes

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General Education (1)

9: Science, Math, and Technology - Students will utilize appropriate models, systematic methods, and concepts such as the scientific method to solve problems.

Institutional Priorities (0)

Strategic Initiatives (3)

Mission/Core Commitments: 1 Dalton State College provides a diverse student population with opportunities to acquire the knowledge and skills necessary to attain affordable baccalaureate degrees, associate degrees, and certificates and to reach their personal and professional goals.

Strategic Plan, 2016-2019 Goals: 2 Academic Excellence: Dalton State College will develop and maintain a culture of academic and teaching excellence among faculty and staff while creating optimal opportunities for student academic excellence.

University System of Georgia Strategic Plan Goals: 1 Commitment to Academic Excellence and Degree Completion: We will maximize our resources and strengthen educational partnerships to ensure that Georgians have a seamless educational system that is both affordable and of the highest quality.

Action Plans for Improvement

| Action Plans for Improvement Description | Due Date |
|--|-------------|
| Because the target of reducing wrong answers by 50% was not met, more examples of general types of reactions will be presented and a review sheet will be prepared to help improve students' ability to identify types of reactions. Online homework will also be continued. | Dec 01 2017 |
| | Status |
| | Planned |

Measures

M1

Pre/post test questions on identifying chemical reactions

There is one question on the pre/post test concerning identifying chemical reactions. Question 8: Is the reaction below an addition, a substitution, an elimination, or a rearrangement?

Methodology

The same test is given at the beginning and end of the semester. The students should do substantially better on the post test than on the pretest.

Source of Evidence: Pre/post test

Target

Reduction in incorrect answers

| Target | Findings | Improvements Achieved from Previous Action Plans | Improvement Type | Status |
|---|---|---|--|--------------------|
| <p>Incorrect answers will be reduced by 50% from pre-test to post-test.</p> | <p>There were 40 students in two combined sections of CHEM 3211K: Organic Chemistry I that met at the main campus of Dalton State College in Dalton, GA during the fall 2016 semester and completed both the pre-test and post-test. The results of the pre-test were as follows: Question 8: 17 students (42.50%) answered correctly and 23 (57.50%) answered incorrectly. The results of the post-test were as follows: Question 8: 15 students (37.50%) answered correctly and 25 (62.50%)</p> | <p>The previous action plan was to implement online homework. We are now using OWLv2 online learning system. It is difficult to assess what effect this action plan had on the current results since this is the first year we are using pre/post tests and the questions are different. It will be easier to determine the effect of online homework on student learning after another assessment cycle.</p> | <p>Student Test Scores / Performance: Improved Performance</p> | <p>Not Met</p> |

| Target | Findings | Improvements Achieved from Previous Action Plans | Improvement Type | Status |
|--------|----------|--|------------------|--------|
|--------|----------|--|------------------|--------|

answered incorrectly. There was a percentage increase in wrong answers of 8.7% for question 8.

Analysis of Finding and Evaluation Results

Instead of seeing a reduction in the number of incorrect answers, there was an increase of 8.7% incorrect answers. The target of reducing incorrect answers by 50% from the pre-test to post-test was not met. Question 8 tested student ability to distinguish between types of reactions. Students are exposed to many reactions in the course and this may cause confusion when trying to place reactions into general categories. More examples in class and a review sheet of general categories of reactions may help to address this problem.

SLO3

Understand chemical reactivity and structure

Students will understand the chemical reactivity and molecular structure of alkanes, alkenes, alkynes, and alkyl halides.

Supported Initiatives

Standards (2)

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General Education (1)

9: Science, Math, and Technology - Students will utilize appropriate models, systematic methods, and concepts such as the scientific method to solve problems.

Institutional Priorities (0)

Strategic Initiatives (3)

Mission/Core Commitments: 1 Dalton State College provides a diverse student population with opportunities to acquire the knowledge and skills necessary to attain affordable baccalaureate degrees, associate degrees, and certificates and to reach their personal and professional goals.

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Action Plans for Improvement

Action Plans for Improvement Description

Because the target of reducing wrong answers by 50% was not met, more examples of chemical reactivity and molecular structure of different functional groups will be presented in class.

Due Date

Dec 01 2017

Status

Planned

Measures

M1

Pre/post test questions on chemical reactivity and structure

There are three questions on the pre/post test concerning chemical reactivity and structure. Question 2: How many isomeric chloroalkanes have the molecular formula C_4H_9Cl ? Question 3: Which molecule in the pair shown below is the more stable? Question 5: Which of the following alkenes is the least stable?

Methodology

The same test is given at the beginning and end of the semester. The students should do substantially better on the post test than on the pretest.

Source of Evidence: Pre/post test

Target

Reduction in incorrect answers

| Target | Findings | Improvements Achieved from Previous Action Plans | Improvement Type | Status |
|--------|---|--|------------------|--------|
| | <p>There were 40 students in two combined sections of CHEM 3211K: Organic Chemistry I that met at the main campus of Dalton State College in Dalton, GA during the fall 2016 semester and completed both the pre-test and post-test. The results of the pre-test were as follows: Question 2: 16 students (40%) answered correctly and 24 (60%) answered incorrectly. Question 3: 16 students (40%) answered correctly and 24 (60%)</p> | | | |

| Target | Findings | Improvements Achieved from Previous Action Plans | Improvement Type | Status |
|---|---|---|--|----------------|
| <p>Incorrect answers will be reduced by 50% from pre-test to post-test.</p> | <p>answered incorrectly. Question 5: 3 students (7.5%) answered correctly and 37 (92.5%) answered incorrectly. The results of the post-test were as follows: Question 2: 20 students (50%) answered correctly and 20 (50%) answered incorrectly. Question 3: 25 students (62.50%) answered correctly and 5 (37.5%) answered incorrectly. Question 5: 18 students (45%) answered correctly and 22 (55%) answered incorrectly. The percentage reduction in incorrect answers from the pre-test to</p> | <p>The previous action plan was to assign more homework problems. It is difficult to assess what effect this plan had on the results since this is the first year we are using pre/post tests and the questions are different. Going forward, we will be able to draw better conclusion on whether or not our action plans are working.</p> | <p>Student Test Scores / Performance: Improved Performance</p> | <p>Not Met</p> |

| Target | Findings | Improvements Achieved from Previous Action Plans | Improvement Type | Status |
|--------|----------|--|------------------|--------|
|--------|----------|--|------------------|--------|

the post-test was 16.7% for question 2, 37.5% for question 6, and 40.5% for question 5. Overall, the number of incorrect answers for all four questions combined was reduced from 85 to 57 or an overall reduction of 32.9%.

Analysis of Finding and Evaluation Results

The target of reducing the percentage of incorrect answers by 50% from the pre-test to post-test was not met for any of these three questions testing students' understanding of molecular structure. More class time will be spent working example problems.

SLO4

Understand reaction mechanisms

Students will understand and describe reaction mechanisms with respect to electronic movement.

Supported Initiatives

Standards (2)

SACSCOC 2012 Principles of Accreditation*: 3.3.1.1 educational programs, to include student learning outcomes

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General Education (1)

9: Science, Math, and Technology - Students will utilize appropriate models, systematic methods, and concepts such as the scientific method to solve problems.

Institutional Priorities (0)

Strategic Initiatives (3)

Mission/Core Commitments: 1 Dalton State College provides a diverse student population with opportunities to acquire the knowledge and skills necessary to attain affordable baccalaureate degrees, associate degrees, and certificates and to reach their personal and professional goals.

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Action Plans for Improvement

Action Plans for Improvement Description

Because the target of reducing wrong answers by 50% was not met, more examples of reaction mechanisms will be presented in class. Online homework will also be continued.

Due Date

Dec 01 2017

Status

Planned

Measures

M1

Pre/post test questions on reaction mechanisms

There are two questions on the pre/post test concerning reaction mechanisms. Question 1: The following is a generic depiction of a reaction using the curved arrow formalism. Which of these statements is not correct for this reaction? Question 9: Consider the reaction below to answer the following question: The mechanism of this reaction is:

Methodology

The same test is given at the beginning and end of the semester. The students should do substantially better on the post test than on the pretest.

Source of Evidence: Pre/post test

Target

Reduction in incorrect answers

| Target | Findings | Improvements Achieved from Previous Action Plans | Improvement Type | Status |
|--------|----------|--|------------------|--------|
|--------|----------|--|------------------|--------|

There were 40 students in two combined sections of CHEM 3211K: Organic Chemistry I that met at the main campus of Dalton State College in Dalton, GA during the fall 2016 semester and completed both the pre-test and post-test. The results of the pre-test were as follows:
 Question 1:
 13 students (32.50%) answered correctly and 27

| Target | Findings | Improvements Achieved from Previous Action Plans | Improvement Type | Status |
|---|---|---|--|--------------------|
| <p>Incorrect answers will be reduced by 50% from pre-test to post-test.</p> | <p>(67.50%) answered incorrectly. Question 9: 8 students (20%) answered correctly and 32 (80%) answered incorrectly. The results of the post-test were as follows: Question 1: 28 students (70%) answered correctly and 12 (30%) answered incorrectly. Question 9: 11 students (27.50%) answered correctly and 29 (72.5%) answered incorrectly. The percentage reduction in incorrect answers from the pre-test to the post-test was 55.6% for question 1 and 9.4% for question 9. Overall, the number of</p> | <p>The previous action plan was to implement online homework. It is difficult to assess what impact that action plan had on these results because this is the first year we have used this pre/post test and the questions are different. In the future, we should be able to see if this action plan is making a difference.</p> | <p>Student Test Scores / Performance: Improved Performance</p> | <p>Not Met</p> |

| Target | Findings | Improvements Achieved from Previous Action Plans | Improvement Type | Status |
|--------|----------|--|------------------|--------|
|--------|----------|--|------------------|--------|

incorrect answers for all four questions combined was reduced from 59 to 41 or an overall reduction of 30.5%.

Analysis of Finding and Evaluation Results

The target of reducing the percentage of incorrect answers by 50% from the pre-test to post-test was not met for the two questions combined, but the target was met for question 1 alone. Question 9 tested students' ability to understand a reaction mechanism with respect to electronic movement. This question specifically addressed an elimination type reaction. More examples worked in class may help address this problem.

PO2

Acquire laboratory skills

Students will acquire laboratory skills necessary to answer questions of chemical relevance.

Student Learning Outcomes

SLO1

Gain knowledge in laboratory methodology

Students will gain knowledge and understanding in laboratory methodology including data observation, recording, analysis, and reporting.

Supported Initiatives

Standards (2)

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General Education (1)

9: Science, Math, and Technology - Students will utilize appropriate models, systematic methods, and concepts such as the scientific method to solve problems.

Institutional Priorities (0)

Strategic Initiatives (3)

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Action Plans for Improvement

Action Plans for Improvement Description

Because the target of "70% of students will achieve a grade of 85 or higher on the final formal laboratory report" was more than met and exceeded the target will be increased to "75% of students will achieve a grade of 85 or higher on the final formal laboratory report."

Due Date

Dec 01 2017

Status

Planned

Measures

M1

Final formal laboratory report

The final formal laboratory report in CHEM 3211K will be used to assess students' knowledge and understanding in laboratory methodology including data observation, recording, analysis, and reporting.

Methodology

By the end of the semester, students should be able to demonstrate knowledge and understanding in laboratory methodology including data observation, recording, analysis, and reporting in the form of a written laboratory report. Points on the formal laboratory report are awarded by section as follows: Cover page (5 points), Introduction and Purpose (10 points), Main reaction and mechanism (5 points), Table of Reactants and Products (10 points), Procedure (25 points), Results and Calculations (25 points), Conclusions (10 points), Questions (5 points), and References (5 points).

Source of Evidence: Written assignment

Target

A minimum of 70% of students will achieve a score of 85 points on their final formal laboratory report.

| Target | Findings | Improvements Achieved from Previous Action Plans | Improvement Type | Status |
|--------|---|--|--|------------|
| 70% | <p>There were 47 students in two combined sections of CHEM 3211K: Organic Chemistry I that met at the main campus of Dalton State College in Dalton, GA during the fall 2016 semester and completed the final formal laboratory report. The results were that 46 students (97.9%) earned a grade of 85 or higher on the final laboratory report. Only 1 student (2.1%) did not achieve a grade of 85 or higher on the final laboratory report. The class average was 90 on this assignment.</p> | <p>The previous action plan was to increase the target to "70% of students will achieve a grade of 85 or higher on the final formal laboratory report" because the previous target of "70% of students achieving a grade of 70 or higher on the final report" was far exceeded. This new target was also exceeded.</p> | <p>Student Test Scores / Performance: Improved Performance</p> | <p>Met</p> |

Analysis of Finding and Evaluation Results

| Target | Findings | Improvements Achieved from Previous Action Plans | Improvement Type | Status |
|--|----------|--|------------------|--------|
| The target for this learning outcome was exceeded. Students demonstrated knowledge and understanding in laboratory methodology by completing a final formal laboratory report. | | | | |

Attachments

[CHEM3211Fall2016syllabus.doc](#)

[CHEM3211PrePostTest.docx](#)

[LaboratoryNotebookandReports-2016.doc](#)
