Supporting Conceptual Learning with Online Homework
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Introduction
During the first two years of the SEI, new recitation materials were developed that emphasized conceptual understanding. More conceptual exam questions were also developed. However, we saw the need to develop homework questions that allow students to practice these ideas. Thus a set of 25 new homework questions (one per week) were written and incorporated into the weekly CHEM 1111 and 1131 WebAssign online homework assignments.

Recitation Materials

Solubility Equilibrium Homework Question

Assessment Questions

Randomization Array for Homework Question

Message Boards for Question 1

Some results and comments:
- Created Spring 2008
- Used in four semesters of CHEM 1131 with 1546 students
- Difficulty: only 27% correct on first attempt
- "Multiple select" questions tend to be difficult for students; each statement is a T/F question.

Concept:
- Which statement best describes the content of the glass on the left?
  a) There is a solid in the beaker.
  b) There is a liquid in the beaker.
  c) There is a solid in the beaker that has dissolved in water.
  d) There is a solid that has not dissolved in water.
- Then, the solid in beaker A then dissolved in water to form excess MX2.
- Which of the following describes the situation after the solid has dissolved and excess MX2 has been added to beaker B?
  a) The concentration of MX2 in beaker A is greater than in beaker B.
  b) The concentration of MX2 in beaker A is less than in beaker B.
  c) The concentration of MX2 in beaker A is equal to in beaker B.

Day 1

Final Exam:
- Which of the following is correctly written for the relationship between the reactants and products in the reaction Mg + \( \text{aq} \) to form excess Mg2+
  a) \( \text{Mg} + \text{aq} \rightarrow \text{Mg}^{2+} \)
  b) \( \text{Mg} + \text{aq} \rightarrow \text{Mg} + \text{aq} \)
  c) \( \text{Mg} + \text{aq} + \text{aq} \rightarrow \text{Mg}^{2+} \)

Exam 3:
- In the experiment shown below, the same amount of \( \text{NO}_2 \) was added to two different amounts of \( \text{H}_2 \).
- Which of the following statements is true about the experiment?
  a) The solubility of \( \text{NO}_2 \) in water increases as the amount of \( \text{H}_2 \) increases.
  b) The solubility of \( \text{NO}_2 \) in water decreases as the amount of \( \text{H}_2 \) increases.

Exam 2:
- Which of the following is incorrectly written for the relationship between the reactants and products in the reaction Fe + \( \text{aq} \) to form excess Fe2+
  a) \( \text{Fe} + \text{aq} \rightarrow \text{Fe}^{2+} \)
  b) \( \text{Fe} + \text{aq} \rightarrow \text{Fe} + \text{aq} \)
  c) \( \text{Fe} + \text{aq} + \text{aq} \rightarrow \text{Fe}^{2+} \)