

The Freshman Chemistry Toolbox is a series of worksheets and activities designed to assist instructors of freshman general chemistry to accomplish the following tasks:

- 1) Teach chemistry concepts to students by leading them through a written analysis and interpretation of data.
- 2) Train students to write explanations of chemical concepts.

These activities have been tested in previous freshman chemistry class and can be completed with 10-20 minutes during a lecture period. They are intended to be supplements to lectures by the instructor. The response of students who have used the worksheets throughout the semester is overwhelmingly positive. There are several variations on the way these activities can be incorporated; in the past students have worked in pairs or groups to generate responses. These activities DO NOT have to be graded and can be incentivized by using their completion as an indication of attendance. Other variations on the implementation are possible.

This toolbox was assembled with two primary motivations. First, it is a response to a demand expressed by chemistry department faculty: students in chemistry should begin their training to write in chemistry discipline in their freshman year. Second, it is acknowledged that writing within a discipline reinforces concepts, teaches critical thinking, and enables students to communicate their understanding.¹

The toolbox currently covers topics including:

Matter and Measurement
Atoms, Molecules, and Ions
Stoichiometry
Reactions in Aqueous Solutions
Thermochemistry
Electronic Structure
Periodic Properties of the Elements
Chemical Bonding
Molecular Geometry
Bond Theory
Gases

The next phase of development will provide resources for the following topics:

Intermolecular Forces
Structures of Solids
Properties of Solutions
Chemical Kinetics
Equilibria
Electrochemistry
Nuclear chemistry

¹ Bean, John C. *Engaging Ideas*; Jossey-Bass Publishers: San Francisco, 1996.