Chemical Reactions: Observing chemical changes

by Tamsin Kelly,Dijana Townsend

Experiment Overview

This experiment is designed for students who may have no chemistry background at all, as their very first general chemistry laboratory experience (Semester 1). Previously we had commenced the laboratory program with emission spectroscopy based experiments which was quite theoretical and some students found the experience quite overwhelming. The purpose of this experiment was to ease the students into the laboratory program by introducing them to the concept that chemicals can undergo changes which we can observe in various different ways. We can represent the chemical changes that are occurring by writing a chemical reaction in the form reactants à products. The three types of chemical reactions observed in this experiment are:

1) deposition of metals based on metal reactivity

2) formation of a gas

3) precipitation reactions

The students also have the opportunity to become familiar with working in the laboratory environment.

Learning Experience

This experiment was run for the first time this year – and the feedback from both students and demonstrators was fantastic. Most students really enjoyed the laboratory and commented that they could observe the chemical changes and write a chemical equation to accurately describe the reactions that they had observed.

Aims and Objectives

1) Observe the reactions of magnesium, zinc, and copper in solutions of metal salts and identify the metals that are reactive;

2) Observe the reaction between a metal and hydrochloric acid;

3) Observe examples of precipitation reactions;

4) Understand some of the types of evidence that can be used to determine a chemical reaction has occurred;

5) Accurately record observations and write balanced chemical equations to represent the chemical reactions observed.

Level of Experiment

First year undergraduate - semester one

Keyword Descriptions of the Experiment

Domain
general chemistry

Specific Descriptors
chemical reactions, chemical observations, chemical equations

Course Context

The experiment is the first experiment undertaken in the first semester 1st year chemistry unit (Chemistry 1A). The objective of Chemistry 1A is to provide a unified introductory course in chemistry as a framework for future studies in chemistry and biochemistry. Topics covered in the unit include stoichiometry, atomic structure, periodic table, bonding, oxidation and reduction, acids and bases, precipitation reactions, titrations, phase diagrams, solutions, and gas laws.

This unit does not assume the students have any prior knowledge of chemistry. The experiment is undertaken in conjunction with a five hour stoichiometry lecture series. This lecture material is supplemented by the introductory material included in the experimental notes.

Prerequisite Knowledge and Skills

The experimental procedure is relatively simple and easily completed by students with no prior experience in chemistry.

Time Required to Complete

Prior to Lab: 30 minutes
In Laboratory: 2 hours
After Laboratory: 30 minutes to complete optional post-lab questions if time did not permit in the 2 hour laboratory session

Experiment History

This experiment was written for its first implementation this year by Dr Tamsin Kelly.

Dr Kelly took over the coordination and teaching of the first year Chemistry unit Chemistry 1A within the Faculty of Applied Science at the University of Canberra from 2010. Dijana Townsend is the Senior Tutor for Chemistry 1A who provides academic support in the unit. Dr Kelly and Dijana are submitting this experiment to ACELL on the behalf of the Faculty.

References

Chemistry 1A Laboratory and Tutorial Workbook, L1 Chemical Reactions: Observing chemical changes.