From the Chemistry Professor: Lesson Plan Outline for Reactions in Aqueous Solutions

Are you in the middle of Chemistry 1 and stumbling with Reactions in Aqueous Solutions? Are your students not GETTING it? This article describes the breakdown of specific lessons that can help students be much more successful with this topic.

In my many years of teaching General Chemistry, I have found that the topic of chemical reactions in aqueous solution is especially difficult for many students. Years ago I decided that one of the reasons that students have such a hard time with this subject is that textbooks do not do a good enough job explaining it, so I wrote my own!

What's wrong with the textbooks? The way I see it, people who write textbooks find this subject so automatic that they forget there are some topics that have to be broken down into simpler steps. In a word, Reactions in Aqueous Solutions is just too hard in the normal Chemistry 1 course. Too many students stumble, and even give up. I see it as my job, my calling, even, to lead my students to success in Chem 1 and forward to their educational goal.

What's better in my version? I have worked through this topic with my students over many years. I've taught from any number of different textbooks and found none of them broke the subject into the most workable pieces. So I have now refined them into understandable enough steps and made each as accessible as possible.

A series of lessons as designed below describes the teaching plan that introduces this subject in my General Chemistry course in installments. This plan follows the ones that cover classes of compounds, writing and balancing chemical equations, types of chemical reactions, and chemical nomenclature, so prior knowledge of these topics is required. Here is an outline of the lesson topics.

AR1: Introduction and Outline
AR2: Molecular and Ionic Equations
AR3: Ionic Electrolytes: Dissociation
AR4: Acid Ionization, Arrhenius Acids
AR5: Bases in Water, Arrhenius Bases
AR6: An Overview of Electrolytes
AR7: Converting a Molecular Equation for a Double Replacement Reaction to an Ionic Equation
AR8: Review and Practice on Converting a Molecular Equation for a Double Replacement Reaction to an Ionic Equation
AR9: Precipitation Reactions
AR10: Acids and Bases as Reactants in Precipitation Reactions
AR11: Predicting the Products of Precipitation Reactions and the Solubility Rules
AR12: Review and Practice on Predicting the Products of Precipitation Reactions and the Solubility Rules

AR13: Acid-Base Neutralization Reactions
AR14: Reactions Involving Molecular Bases
AR15: Predicting the Products of Acid-Base Reactions
AR16: Review and Practice on Predicting the Products of Acid-Base Reactions
AR17: Reactions in Which One Reactant or Product is a Gas
AR18: Driving Forces: Why Do These Reactions Occur?
AR19: Oxidation and Reduction, Half Reactions
AR20: Recognizing Redox Reactions: Oxidation Numbers
AR21: Single Replacement Reactions
AR22: The Activity Series
AR23: Other Redox Reactions
AR24: Balancing Redox Equations by the Ion-Electron Method, Acidic Solution
AR25: Balancing Redox Equations by the Ion-Electron Method, Basic Solution
AR26: Chapter Self-Test Problem Set

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