

Table 1. Oxidation rules for atoms and ions

1. An atom in its elemental state is always assigned an oxidation state of zero.
2. Monoatomic ions have oxidation states equal to their charges, since they have clearly lost or gained a definite number of electrons.
3. Fluorine in a compound always has an oxidation state of -1.
4. Hydrogen, when covalently bonded to non-metals, has an oxidation state of +1. In BH_3 , SiH_4 , and metal hydrides, such as NaH , hydrogen has an oxidation state of -1.
5. Oxygen in a compound usually has an oxidation state of -2, since it needs two electrons to fill its valence shell. Exceptions to this rule include oxygen bonded to fluorine, and oxygen in a peroxide ($\text{R} - \text{O} - \text{O} - \text{R}$, where R stands for either H or C), when the oxidation state of oxygen is -1.

Acid/base reactions do not involve oxidation state changes. There are several ways to define both acids and bases, depending on the complexity required, and for this experiment, we will choose the most straight-forward definitions. Arrhenius described an acid as a substance that produces H^+ in solution and a base as a substance that produces OH^- in solution. Examples are the strong acid and base, HCl (equation 1) and NaOH (equation 2), respectively:



In water, protons (H^+) are strongly associated with water molecules to form hydronium ions (equation 3). Depending on the situation, you will see both $\text{H}^+ (\text{aq})$ and $\text{H}_3\text{O}^+ (\text{aq})$ used to represent the hydronium ion in solution.



Indicators, which are one color in acidic solutions and undergo a chemical reaction to exhibit another color in basic solution, are used to show whether solutions are acidic or basic. You will use two common acid base indicators in this experiment, phenolphthalein and bromothymol blue. While you will not use it in this experiment, pH is another way to express acidity and basicity. pH, usually with numbers between 1 and 14, gives a numerical indication of whether a solution is acidic, neutral, or basic and quantitates the extent to which a solution is either acidic or basic. The lower the number, the more acidic a solution is, and the higher the number, the more basic it is.

Procedure

Record all qualitative observations in your notebook as you perform each of the following experiments. This is an experiment of observations so be thorough. Generally, qualitative observations involve any of your five basic senses: sight, smell, sound, taste, and touch, but in chemistry we usually omit taste as an option and this experiment does NOT include the sense of taste. Your observations will be used to determine products of your experiments and conclusions related to the reactions. Have fun!

Answers Key To Chemistry 1211 Lab Manual

Eduardo Zayas-Bazàn, Emeritus



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web you mean with a microcontroller the impedance note about analog sources probably means that if the sources are higher than 2.5k the input on the pic will start to load them down you usually want a source impedance to be at least ten times smaller than the load impedance so that it is not disturbed by the load impedance

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