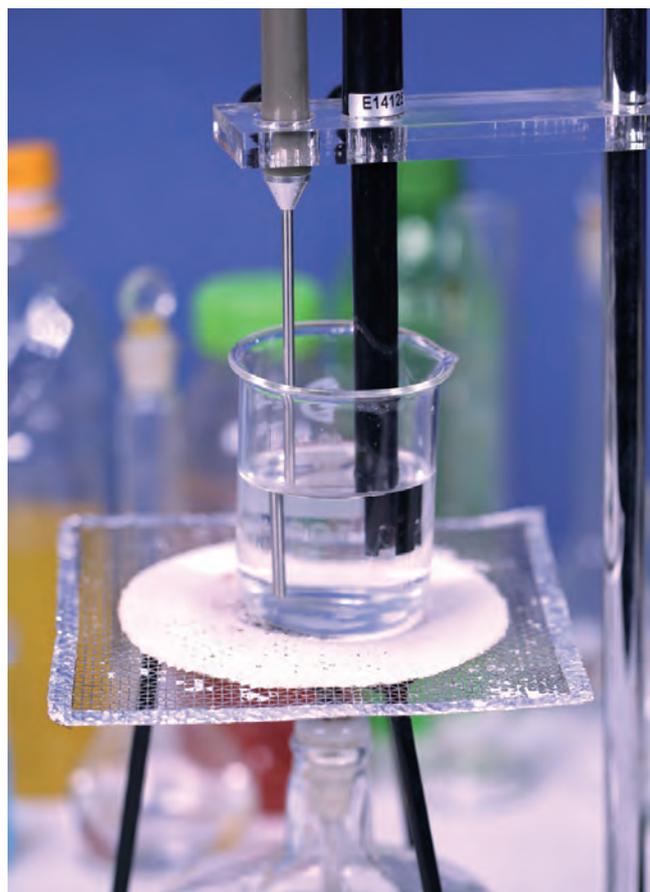


General Sensors

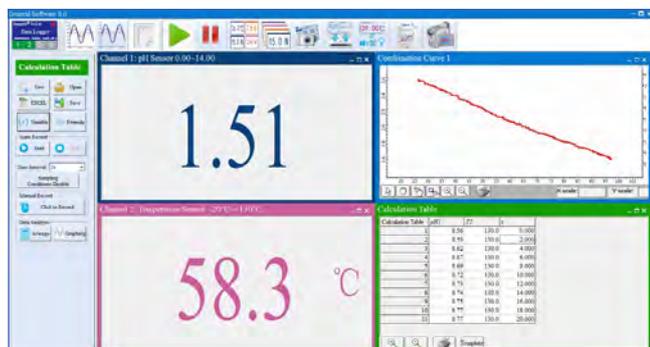
General science sensors can be used either for Physics experiments, or Chemistry experiments, and also can be used for Biology experiments, including temperature, pressure, current, voltage, micro-current, multi-range current sensor, etc. The above Physics sensors provide new experiment methods for Biology and Chemistry experiments, having significant role in enhancing experiment quantification and efficiency.

Temperature Sensor in Chemistry Experiment:

The temperature sensor can be used in experiments of Neutralization heat, heat of solution from acetic acid ionization equilibrium constant measurement, etc.



Study on the affect of temperature on of acetic acid ionization equilibrium constant, (results as below)



Neutralization heat experiment (NaOH + HCl) (above) and experiment results (below)



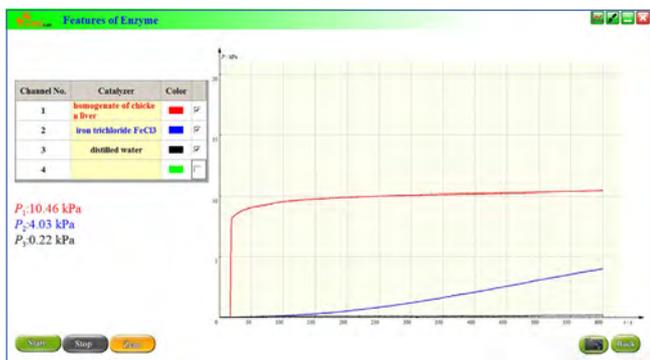
Heat of solution experiment (NaOH)

Relative Pressure Sensor in Biology and Chemistry Experiments:

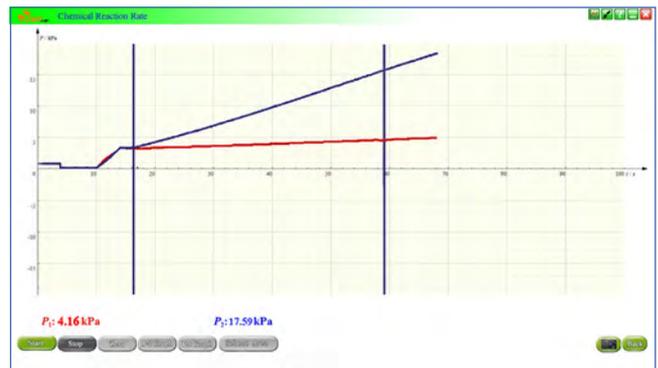
- The comparison of the chemical reaction rate
- Characteristics of the enzyme
- Verification of the permeation
- Study on the water absorption and transportation in transpiration



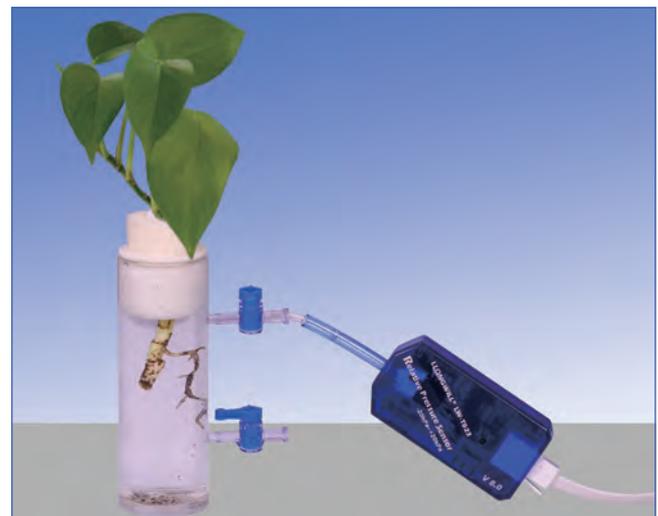
Experiment of characteristics of the enzyme (above) and the results (below)



Experiment of chemical reaction rate comparison (above) and the results (below)



Experiment of water absorption and transportation in transpiration (right) and the results (above)



Electricity Sensors in the Application of Chemistry Experiments:

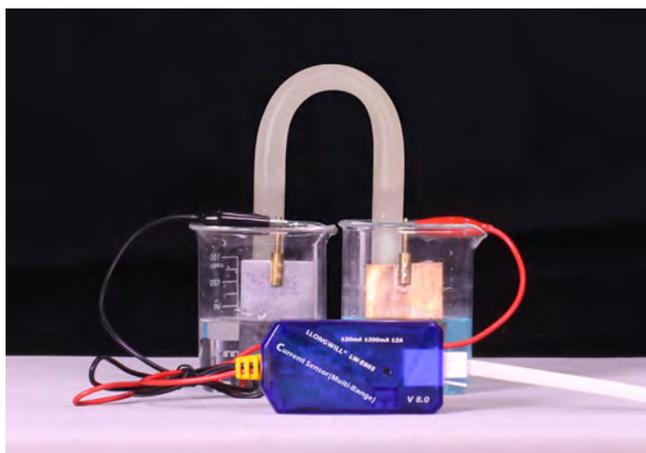
Many chemical reactions can be described as ion activities. Therefore, the electrical measurements are required to support chemical research, and thus produce an important branch of chemistry - electrochemistry. High school chemistry experiment, in part, is related to the content of electrochemistry, which contains the primary cell, electrolytic cell and molten potassium nitrate conducting and other experiments. Electricity sensors can give effective support to the above experiments.

Experiment Example I- Study on Primary Cell:

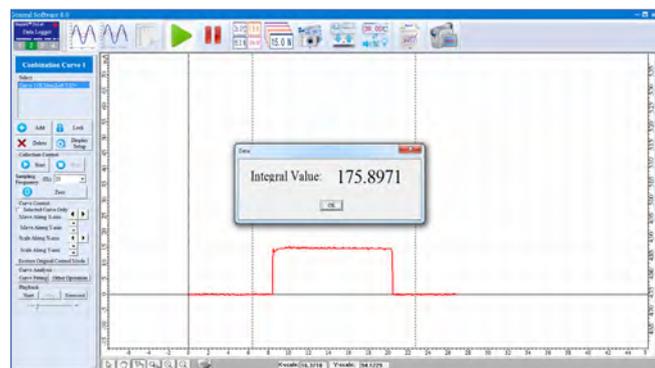
► **Principles:** The primary cell is a device which converts chemical energy into electric energy. In the copper-zinc primary cell, zinc atom loses two electrons, and the electrons flow from the negative electrode (zinc) to the positive electrode (copper), forming current.

► **Apparatus and Reagents:**

Data logger, multi-range current sensor, distilled water, copper-zinc primary cell, filter paper, 0.1mol / L HCl.



The effect of the distance between two electrodes to the primary cell, the results as below



Experiment Example II - Study on Molten Potassium Nitrate:

► **Principles:** Normal state of potassium nitrate has no electrical conductivity. But after being heated to a molten state, its chemical bonds will be broken and free particles with conductivity (K^+ and NO_3^-) will be produced. Potassium nitrate melting point is $334\text{ }^\circ\text{C}$, and it will be decomposed meanwhile oxygen will be released if above $400\text{ }^\circ\text{C}$.

► **Apparatus and Reagents:**

Data logger, current sensor, temperature sensor, crucible, alcohol lamp, graphite electrode, potassium nitrate (solid), wire, general supply etc. (see image right).



Experiment results of Study on the conductivity of molten potassium nitrate (below)

