Electrolytic Cell (KI)

Purpose

To demonstrate the reaction that occurs in an electrolytic cell through a change in the color of a solution.

Materials

1M KI	Phenolphthalein
Graphite Electrodes	Petri Dish
Alligator Clips	9-V battery

Procedure

1. Pour 1M KI solution into petri dish so that the bottom is covered by the solution.
2. Add 6-10 drops of phenolphthalein to the petri dish and gently swirl to mix.
3. Connect the graphite electrodes to each terminal of the 9-V battery with the alligator clips.
4. Immerse the electrodes in the KI solution and observe the color changes.

Additional Information

1. At the Anode, the solution will turn a yellow-brown color. This is a result of the iodide anion (I^-) oxidizing to I_2. The color change is from the formation of triiodide ions (I_3^-).
2. At the Cathode, the solution will turn a pink color from the formation of OH^- and the solution around the electrode will bubble as H_2 gas is formed.
3. The overall reactions are as follows:

		$E°_{red}$ (V)
Anode	$2\ I^- \rightarrow I_2 + 2\ e^-$	+0.54
Cathode	$2\ H_2O + 2\ e^- \rightarrow 2\ OH^- + H_2$	- 0.42

Disposal

After the demonstration, the solution can be poured down the sink with excess water.

Reference

Shakhashiri, B. Z. In *Chemical Demonstrations: A Handbook for Teachers of Chemistry*; The University of Wisconsin Press: 1992; Vol. 4, p 174-180.