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Organic Rainbow Worksheet

Questions

In this demonstration, the progress of the reaction between *tert*-butyl chloride and water is followed by adding an indicator and base to the reaction solution and observing the results.

1. What are some observations of the solution as the reaction proceeded?

2. Universal indicator, in solution, changes color based on the solution pH. Colors range from red, pH 4, orange, pH 5, yellow pH 6, green, pH 7, dark green, pH 8, blue, pH 9, and purple, pH 10. What do your observations tell you about changes that occurred in the solution?

3. When the *tert*-butyl chloride was added to the distilled water, the following reaction, called hydrolysis, occurred.

$$(CH_3)C\text{—}Cl(aq) + H_2O(l) \rightarrow (CH_3)_3C\text{—}OH(aq) + HCl(aq)$$

tert-butyl chloride — *tert*-butyl alcohol — hydrochloric acid

Universal indicator solution and sodium hydroxide solution were then added to the reaction mixture. Use this information to formulate an explanation for the color changes of the solution.

4. What would the color changes be if only universal indicator solution and *tert*-butyl chloride were added simultaneously to the solution?

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