

The scenario

Subject	Detection of alcohols by chromate(VI) method
Length	3,04 min.
Main objectives	Learning of the primary alcohol detection reaction
Detailed objectives	<p>Observation of changes occurring during the reaction</p> <p>Learning equation notation of the reaction of alcohol with potassium chromate(VI) in an acidic environment.</p> <p>Learning and understanding of the electron balance of oxidation-reduction reactions.</p> <p>Understanding the oxidation reaction of primary and secondary alcohols.</p>
Structure and description of experiments:	
Introduction	<p>Description: Chromates (VI) are often used to detect alcohols in aqueous solutions. This reaction is one of the simplest and fastest ways to detect alcohol in aqueous solutions. Chromates (VI) are typically used to detect primary short-chain alcohols such as methanol, ethanol, and propanol and secondary alcohols such as propan-2-ol. This reaction is very sensitive and can detect small amounts of alcohol.</p>
Main subject	Description: Detection of ethanol by potassium chromate(VI). Primary alcohol oxidation.
Experiment	<p>Equipment: test tube, Pasteur pipettes, water wash bottle, water bath.</p> <p>Reagents: ethanol, 2M sulfuric (VI) acid solution, potassium chromate (VI) solution</p> <p>Precautions: work with gloves and protective glasses!</p> <p>Description: Add about 2 ml of potassium chromate(VI) solution to the test tube. Then add 5 drops of 2M sulfuric (VI) acid. Mix the contents of the tube carefully (by gently shaking) and then add about 2 ml of ethanol. Then place the test tube in a beaker with hot water, removing the test tube from time to time and stirring its contents.</p> <p>Questions:</p> <ol style="list-style-type: none"> 1. Write down the changes taking place in the test tube. 2. What causes the color of the contents of the tube to change? 3. Write the equation of the reaction that took place in the test tube. Indicate which substance is the oxidant and which is the reducing agent in the above reaction. 4. What application can this reaction have? <p>Conclusions:</p> <p>The solution in the test tube changed its color from orange, characteristic of dichromates(VI), to green-blue, characteristic of chromium(III) salts. In the above reaction, ethanol plays the role of the reducing agent, which is oxidized to acetic acid, while the function of the oxidant is potassium dichromate(VI), which is reduced to chromium(III) salts.</p> $3\text{CH}_3\text{CH}_2\text{OH} + 2\text{K}_2\text{Cr}_2\text{O}_7 + 8\text{H}_2\text{SO}_4 \rightarrow 3\text{CH}_3\text{COOH} + 2\text{Cr}_2(\text{SO}_4)_3 + 2\text{K}_2\text{SO}_4 + 11\text{H}_2\text{O}$

Primary alcohols oxidize to carboxylic acids and secondary alcohols to ketones.

Fun fact: The reaction you performed was a "brealyser test", in this way the sobriety of drivers was checked. Changes that take place in the breathalyzer, specifically in the tube behind the mouthpiece, indicate the potential alcohol content in the exhaled air - if the color of the compound filling the tube changes from yellow to green.

Level: High School