

The scenario

Subject	Redox reactions - Redox reactions may occur or not depending on the conditions
Length	4:16
Main objectives	Check how two isolated reactants are “harmless”, but constitute a real danger when they are mixed
Detailed objectives	
Structure and description of experiments:	
1. Introduction	Description: The motivation for doing this experiment is to physically observe a redox reaction in the presence of copper
2. Main subject	Description: What reactions occur when HCl and H ₂ O ₂ are placed separately with Cu? What happens when they are mixed in the presence of Cu?
Part 1	
Experiment 1 (0:44)	<p>(0:40), Tools: Cu wires, HCl, H₂O₂</p> <p>Description: In three containers, place a copper wire. In the first of them pour hydrochloric acid solution. In the second pour hydrochloric acid and hydrogen peroxide. In the third pour hydrogen peroxide.</p> <p>Copper belongs to the less active metals within the oxidation scale, so it is not attacked by acids through their hydrogen cations. Nor is copper oxidized by hydrogen peroxide in a neutral medium. When mixing hydrochloric acid and hydrogen peroxide, an effect is produced “devastating”: we promote an acid medium for the oxidizing action of water oxygenated and cause the formation of elemental chlorine -in the reaction between water oxygenated and chloride ions, which is a very strong oxidant. This explains the oxidation of copper in the second flask and not in the first and third ones. Due precisely to the formation of chlorine, special care must be taken with the second flask: the emanation of chlorine gas can be tremendously harmful due to its irritating and toxic effect on the respiratory tract. Indispensable the safety measures and work in the fume hood.</p> <p>Questions: Why are vapors generated during the reaction? - The hydrochloric acid catalyzes an exothermic decomposition of hydrogen peroxide into oxygen and water. Why does the mixture turn blue when mixing peroxide and hydrochloric acid? – Due to the redox reaction that occurs between HCl and H₂O₂, where copper is being oxidized because of this reaction</p> <p>Conclusions: The copper wire does not undergo an apparent physical change with HCl and H₂O₂ separately, but when they are mixed and a redox reaction occurs, the copper begins to oxidize and the solution turns blue, demonstrating the reaction</p>

3. Summary, evaluation and notes	<p>Application: Redox reactions are used in the electroplating process to apply a thin layer of a substance to an item. Gold-plated jewellery is made using an electroplating process.</p> <p>Electrolysis, which is dependent on redox processes, is used to purify metals.</p> <p>Level: primary school (ISCED 2 / 6th, 8th grade)</p>
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