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Potassium permanganate and oxalic acid reaction

Potassium permanganate and oxalic acid reaction order. Reaction between oxalic acid and potassium permanganate equation. The kinetics of the reaction between potassium permanganate and oxalic acid. Potassium permanganate and oxalic acid reaction rate. Rate of reaction of potassium permanganate and oxalic acid lab report. Activation energy of reaction between oxalic acid and potassium permanganate. Potassium permanganate and oxalic acid reaction equation. Potassium permanganate and oxalic acid reaction rate temperature. Studying the rate of the reaction of potassium permanganate and oxalic acid. Explain the reaction between oxalic acid and potassium permanganate. Classify the reaction between potassium permanganate and oxalic acid. Potassium permanganate and oxalic acid reaction rate temperature graph. Reaction between oxalic acid and potassium permanganate is endothermic or exothermic. Effect of temperature on rate of reaction between oxalic acid and potassium permanganate. Reaction between oxalic acid and acidified potassium permanganate. Investigating how surface area and concentration affect reaction rates, students use rhubarb sticks to reduce and decolourise potassium manganate(VII) solution. This experiment has two parts, examining the impact of surface area and concentration on the rate of reaction. The practical is suitable for younger students or those who don't need a detailed understanding of the reaction mechanism. While it can be challenging to relate the results back to the equation due to competing reactions, the experiment still works well as an alternative to hydrochloric acid and marble chips. All the practical work can be completed in one hour, and graphs can be plotted from the data. Alternatively, the practical and follow-up work can be split across two sessions. It's essential to discuss with students how this experiment is not a fair test. Additionally, caution students against consuming any substances in the lab, as they may be tempted to taste the rhubarb. If using rhubarb from home or someone's garden, ensure that the leaves are removed beforehand, as they contain far more oxalic acid and are harmful if ingested. To prepare a 2 dm3 beaker (or large jug) with about 500 cm3 of 1 M sulfuric acid, stir until crystals dissolve and add another 500 cm3 of the same acid. Mix well and label as IRRITANT. The solution should turn light purple; if not, dilute further with a little more water. Concentration is not crucial. For each experiment, approximately 300 cm3 of the solution will be needed. Adjust the volumes accordingly. Procedure: Investigating surface area and concentration effects on reactions Cut three 5 cm lengths of rhubarb: one whole piece, one cut in half lengthways, and another cut into four evenly-sized pieces. Measure 30 cm3 of acidified potassium manganate(VII) solution into a beaker. Pour the same quantity of water into another. Place the beakers on a white tile. 1. Put the entire 5 cm long piece of rhubarb in the potassium manganate(VII) and start the timer. Stir until the purple colour disappears, then stop the timer. 2. Repeat the experiment using the piece cut into two (use both halves). Rinse and dry the beaker. 3. Repeat again with the piece cut into four. For investigating concentration effects: Cut the stick of rhubarb widthways into thin slices (about 0.5 cm) and place them in a 250 cm3 beaker. Cover with distilled water, heat gently, and bring to the boil. Continue heating until the rhubarb falls apart, then turn off the Bunsen and let cool. When cool enough, filter or strain the mixture and keep the filtrate (liquid). Measure 30 cm3 of acidified potassium manganate(VII) solution into one beaker and water into another. Add one drop of the rhubarb filtrate to the potassium manganate(VII) solution and start the timer. Stop when the colour disappears. Repeat the experiment for two, three, four, five, and six drops of the rhubarb extract. Teaching notes: Rhubarb contains oxalic acid ($C_2H_2O_4$), which reacts with potassium manganate(VII) in acidic solutions to form carbon dioxide and water. To take the experiment further, we can boost the overall volume by adding more rhubarb extract drops. You might want to explore the consequences of this with your students. Additionally, it's essential to know that the reaction is self-sustaining due to the presence of Mn^{2+} ions, which could result in some puzzling patterns if the data is scrutinized too closely. This might lead students to try linking the findings to the equation, which could be challenging.