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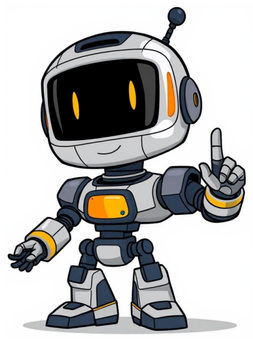

Vitamin C plays a crucial role as an antioxidant in cells, neutralizing oxidizing agents that could cause damage to other substances. Its oxidation reaction is key to the iodometric titration of ascorbic acid. The reaction equation: C6H8O6 + I2 → C6H6O6 + 2I- + 2H+ indicates a 1:1 ratio between vitamin C and iodine. To perform this titration, one must first prepare the sample by dissolving tablets in water or filtering fruit pulp. The use of starch as an indicator allows for the detection of the end-point, where the free iodine has reacted with all available vitamin C. To find the concentration of Vitamin C in a sample, we perform a titration with a standardized solution of iodine. The calibration titration involves dissolving a known amount of Vitamin C tablet in a solvent and then titrating it with iodine solution to determine its concentration. Materials Required: Vitamin C tablets (Nature Best brand) Tincture iodine antiseptic (2%) Starch (corn or potato) Beakers or clear bowls for mixing Graduated cylinder Electronic balance Spoons Long graduated pipette with bulb Fruit juice or any beverage with vitamin C Procedure: 1. Measure out exactly 100 mg of Vitamin C powder into a clear plastic cup or beaker. 2. Add 100 ml of water to the cup and dissolve the solution. 3. Prepare a starch solution by dissolving 1/2 a spoon of starch in 50 ml water. 4. Add 1 ml of starch solution to the Vitamin C solution. 5. Using a graduated pipette, draw 1-5 ml of Tincture iodine (2%) and slowly add it to the Vitamin C solution. 6. Swirl the container to mix and record how many milliliters of iodine solution are used to reach the blue end-point. To perform a reliable iodine titration for determining vitamin C content, it's essential to prepare and standardize a series of solutions accurately. The key steps involve creating an iodine solution by dissolving potassium iodide (KI) and potassium iodate (KIO3) in distilled water, while also adding 30 ml of 3 M sulfuric acid. This mixture is then diluted with distilled water to achieve the desired volume. Next, a vitamin C standard solution is prepared by dissolving ascorbic acid in distilled water and diluting it to a specific volume using a volumetric flask. To ensure accuracy, this process should be repeated multiple times. The iodine titration procedure involves adding 25 ml of the vitamin C standard solution to an Erlenmeyer flask followed by the addition of 10 drops of 1% starch indicator solution. The buret is then rinsed with a small volume of the iodine solution and filled, allowing for the initial and final volumes to be recorded. To diminish the amount of ascorbic acid (vitamin C) in a sample, start by adding 10 ml of ReaLemon into a 125 ml Erlenmeyer flask. Then, titrate until you have at least three measurements that agree within 0.1 ml of iodine solution. For other samples, such as vitamin C tablets, dissolve the tablet in ~100 ml distilled water and add distilled water to make 200 ml of solution in a volumetric flask. For fresh fruit juice, strain the juice through a coffee filter or cheesecloth to remove pulp and seeds, since they could get stuck in the glassware. Packaged fruit juice may also require straining. Fruits and vegetables can be blended with ~50 ml of distilled water, strained, washed with a few milliliters of distilled water, and then diluted to a final solution of 100 ml in a volumetric flask. Orange juice is an excellent source of Vitamin C. To calculate the amount of titrant used for each flask, take the measurements you obtained and average them. Determine how much titrant was required for your standard by using the iodometric titration method. For example, if you needed 6 ml of iodine solution to react a sample, then: 10 ml iodine solution / 0.250 g Vit C = 6 ml iodine solution / X ml Vit C 40 X = 6X = 0.15 g Vit C in that sample Remember to consider the volume of your sample when making other calculations, such as grams per liter. The free iodine will complex with starch to give a blue color, indicating the completion of vitamin C oxidation. The time taken for this reaction can be used to determine the rate of vitamin C oxidation. This method is known as the iodine-clock reaction. To perform this experiment, a set of four to five reactions are set up with increasing amounts of vitamin C, while keeping the amount of other reagents constant. A stopwatch is used to measure the time taken for the appearance of blue color in each case, and the data is recorded. Is th rate increasin or decreasin wit increasing concentration of Vitamin C? How wud teh temperatur impact th rate? Will it increasin or decreasin th speed of th reaction? Th changet in concentartion is (final concentartion - iniital concentartion) for each sampel. Wat is th final concentartion of Vitamin C for all th sampels? In PART B, whch of th three cases resultd in a straight line plot? Include all three graph with th lab report. What is th rate law for th reaction, zer, first or second? Write down th rate law equation. Calculate th rate constant, k from th slope of th straight-line plot.