Spinach chromatography lab answers

Share this: Facebook Twitter Reddit LinkedIn WhatsApp The purpose of this experiment was to separate and isolate the various photosynthetic pigments found on spinach leaves and get them using paper chromatography. The aim was also to determine the relative amount of chlorophyll a and chlorophyll b from their absorption spectra. Fresh spinach leaves were used to separate photosynthetic pigments and then measure their absorption and the relationship between chlorophyll a and chlorophyll b. In addition to the paper chromatography method, another method called spectrophotometry was used to measure the light absorption of each pigment. The retention (Rf) value for each pigment and the concentrations of chlorophyll a and b were calculated and all results were inserted into the tables. The ratio of chlorophyll a to chlorophyll b was also calculated and the result was 2,6:1, which is fairly close to the expected result. Get Help With Your Essay If you need help with writing your essay, our professional essay writing service is here to help! Learn more Introduction: You should provide some information about the plant pigment chromatography experiment before analysis. Spinach was used in this experiment and is a member of the Chenopodiaceae family. It comes from the leaves of the winter plant that evolved in the fertile crescent of the Middle East. Winter annuals are plant species that grow in the coolness of autumn and grow in the trunk until cold weather and short days of winter come to reduce their growth. In spring, winter plants grow steadily until the combination of environmental factors encourage them to be reproductive (frisk) at the stage of their life. The frisk of spinach begins mainly, depending on the day, and the ancestral forms of this plant crop frisk too quickly, with less than 14 hours of light per day. This allows the seeds of this crop to grow before the advent of intense heat in the summer in the Middle East. The seeds then remain latency and after its development, it could grow only with the advent of cool, wet weather during the fall. Modern forms of these plant crops have been chosen to produce energetic and strong leafy vegetables that are no longer adaptable to different environments and seasons, but some of its ancestral properties remain. Many varieties of spinach also still produce vegetable yields, s underoised in autumn and harvested in autumn, winter or spring. However, many varieties of spinach also grow, planted in spring and produce a rich harvest before the long summer days cause frisku. Most modern European varieties do not start to frisk before the day's duration reaches 16 hours (during the day in Northwest Washington at the summer solstice). Although it is still difficult to grow seeds of spinach when planted in warm soil, the seeds grow much easier than these ancestral varieties. As far as photosynthesis is it is a normal mode in which green plants obtain the carbon and oxygen needed for feeding. Plants that use photosynthesis are able to convert carbon dioxide into the atmosphere of the carbon compounds necessary for their development. Photosynthetic function requires the presence of oxygen and solar energy. Priestley made his first observations of the photosynthesis phenomenon in 1771. He first noticed that green plants cleaned the air that was contaminated with animal breathing. Priestley's observations were continued by Jan Ingenhousz (1730-1799), who was a Dutchman. Nicolas de Saussure showed in 1804 that the weight of oxygen expelled along with the weight of plants during photosynthesis is greater than the weight of carbon dioxide absorbed. In the 20th century, the phenomenon of photosynthesis was studied on each side (biochemical, chemical, physiological, etc.). In 1941, experiments were carried out on radioactive isotopes for the first time and studies of complex series of different reactions. Today, the mechanism of photosynthesis is usually when water dissolves and transfers carbon dioxide into cells and chloroplastos leaves. Light energy absorbed by chlorophyll (hv) in data-water (photolysis): H_2O h.v [H] + 1 / 2 O_2. Oxygen is released and the hydrogen atom binds to various enzymes. Hydrogen is then supplied with carbon dioxide in reactions: CO_2 + [H] (CL_2O) x. In the second stage of the reaction solar energy is not required, so these reactions are called dark. Starch is one of the first compounds formed. It is transferred to other places of plants at night, when stopping the phenomenon of photosynthesis. Several pigments are involved in biological reactions. The colours associated with photosynthesis and encountered leaves and other parts of organisms are called photosynthetic pigments. The most important of these are chlorophyls. Chlorophyll is common to all plants, mainly cyanite and several bacteria. Organisms that do not contain chlorophyll cannot take photosynthesis and are condemned to death. The main types of chlorophyll are chlorophyll and chlorophyll b, which differ slightly in their structure. Chlorophyll absorbs radiation at two ends of the visible spectrum (i.e. red and blue). 1.1 Chlorophyll, plants use other colors that absorb radiation with intermediate wavelengths. In this way, it may be better to use solar energy. These colors are called additional colors. Among the additional pigments are chlorophyll b and carotenoids, which absorb photons in blue and blue and appear with yellow or orange color. Xanthophyllines are additional colours derived from carotenoids, such as beta-carotene, which is the dominant carotenoid in carrots. Fykovillines (phycocyanin and phycoerythrin) is an additional dominant alkaline bacteria and red algae. Pigments are produced by dye, absorbent, i.e. by removing parts of the spectrum and reflecting or moving the remaining parts. Any color with a specific molecular structure is tuned to color wavelength, just as the radio can be adjusted to a certain radio frequency to capture some brands. Frequency or frequency, or determine the colors that are absorbed by a stronger pigment molecule. Chromatography is the separation of mixtures of compounds into clean ingredients and their quantification is the main theme of chemical laboratory work. Only in this way can scientists properly analyze the purity of both chemicals and composition mixtures with different content. Chromatography principles as used today are the starting point for botanist Michael Tswett (1872 - 1919). In 1906, he published a procedure involving the separation and isolation of yellow and green leaves by chromatographic absorption. Methods: First, the leaf extract was prepared by weighing 3 g of fresh spinach. The spinach was then cut into small pieces and placed in a water, while 15 ml of ice cold acetone and a clean sand sprinkle were added. Then all the ingredients were chopped together for a minute. The mixture was then transferred to a 50 ml tube with a stopper and shaken for 10 seconds before being placed in a refrigerator or ice bar for 10 minutes. Then, using a Pasteur pipette, some dark upper layer (which included pigments) was transferred to a small stopper. During the preparation of chromatography paper, a line approximately 3 cm from the bottom should be drawn to the width of the chromatography paper. Then, 10 streak applications for pigment extract along the line were made using a capillary tube. The chromatography paper was then placed in a balanced chromatography jar and left there for 30 to 45 minutes in dark or dim light or until the separation of 5 bands is visible. The chromatogram was then removed from the jar and held with a corner until dry. The distance from origin to the front of the solvent and the centre of each band was then measured. During elution and spectrophotometry, a spectrophotometer was used, which is a machine that measures the light absorption of the solution in a given wave lens. At first, the spectrophotometer was left for at least 10 minutes to warm up, and then the wavelength was set at 400 nm. After marking five kkuvetu (0,1, 2, 3, 4), five chromatogram bands were cut and placed in the respective kuwait. Cuvette number one contains the first explosion corresponding to chlorophyll b. Cuvette number two included a second band corresponding to chlorophyll a. Cuvette number 3 contains the third and fourth bands corresponding to violaxantin and lutein respectively and finally cuvette number four contained and corresponded to beta-carotene. But before the bands were placed in the barns, they must first be cut into small pieces to fit them. Then in each cuvette were placed 4 ml of acetone (also zero cuvette number), and then each tube was corked. Pigments were left to elusive for five minutes, and occasionally the tubes were swirled. Then the stripes of paper were removed with the spit. The spectrophotometer was then calibrated and absorption at each wavelength from 400 to 700 nm was read and all results were at the end of the table. Then a schedule with all the results was sketched. Finally, the separation of the components was measured with the retention value (Rf). The distance transferred to the dissolved Rf = the distance transferred from origin thereafter, the concentrations of chlorophyll a and chlorophyll b are measured using the beer-Lambert equation, which reads as follows: $A = acL$ and then the ratio between these two pigments was also measured. Results: Figure 1: Describes the retention value, which can be defined as the ratio between the distance transferred to the dissolved solution and the distance that the solvent moves over the paper. In this case, both distances shall be measured from the common base of origin or use, which is the place where the sample is initially spotted on paper. Find out UKEssays.com help you! Our academic experts are ready and waiting to help with any writing project you may have. From simple essay plans, to complete dissertations, you can guarantee we have a service perfect for meeting your needs. See our services From the top table can be determined that chlorophyll b has a lower retention value, which means that traveled at a smaller distance than other pigments on the chromatogram. On the other hand, B carotene traveled at the greatest distance, on the contrary, with other pigments in the chromatogram. Graph of absorption spectrum of different pigments: Figure 2: describes the absorption of four different pigments (chlorophyll b, chlorophyll a, violaxanthin and lutein and B carotene) at different wavelengths between 400 and 700 nm. In the upper graph, the differences in absorption between 4 different pigments can be determined. It is clear that chlorophyll has the greatest absorption of all pigments. On the contrary, B carotene has the lowest absorption of all pigments. However, all pigments decrease between wavelengths from 500 to 620 nm. The concentrations of chlorophyll a and b were calculated using the beer-lambert equation and the ratio of chlorophyll a to chlorophyll b is 2,6: 1 according to the highest information. Discussion: This experiment has shown the isolation of photosynthetic pigments using chromatography on paper. First, the leaf extract was prepared by crushing a few sheets of acetone, and part of the top part of the extract of the sheet was added to the chromatography paper. the paper was left in balance in the chromatography jar for some time until the pigments were divided into different bands. The chromatogram bands were then cut and inserted into various quatés with acetone. After the chromatogram bands were removed from the cakes, the absorption of each pigment at different wavelengths (400 to 700) was determined using a spectrophotometer. When all the practical work was completed, the retention value (Rf) was calculated and the results were inserted into the table. The calculation of the pigment retention value was carried out to read more easily the results of the chromatography document, as it is a scientific method for comparing the distance transferred by the dissolved substance and the distance transferred by the solvent front. According to the results, it has been noticed that chlorophyll b had the lowest retention value and chlorophyll a had the second lowest retention value, which means that the lowest retention value is, the lowest distance from the baseline pigment is on the chromatogram. The absorption of each pigment that was isolated from spinach leaves was shown in a graph that showed that chlorophyll had the highest absorption of all pigments. Chlorophyll b came with a second higher absorption unlike other pigments and violaxanthin, lutein and B carotene came last with lower absorption. This means that less light managed to pass through chlorophyll a and b pigments. The concentration of chlorophyll a and chlorophyll b of the two pigments was then calculated so that their ratio could also be calculated. Finally, the ratio seems to be 2.6: 1, which is pretty close to the ratio expected to accumulate. Each plant has a special ratio to its pigments and does not change, but different plants do not have the same relationship. Sometimes minor errors can be made in experimental processes and affect the accuracy of the final results. In this experiment, it is possible that incorrect quantities of acetone were used to influence the results. There is also another way to make a mistake when reading the results on the spectrophotometer screen or using chromatography paper incorrectly, adding a leaf extract to it that could completely change the results of the experiment. In addition, this may be why people sometimes get different results while repeating the same experiment several times. To sum up, the inferaion of this process is that the results are sufficiently accurate because they do not seem to have large variations of similar experiments done earlier on the subject. Overall, the ratio between chlorophyll and chlorophyll b appears to be always around 3:1, which is not much further from 2.6:1, which is the ratio between the two chlorophylls found before the end of this experiment. Share this: Facebook Twitter Reddit LinkedIn WhatsApp WhatsApp