

solvated by non- polar solvents. This concludes, larger the alkyl group, better the solvent (Bett, 2014). During the lab, the test tube containing the solvent and paper needs to be closed and not distributed during the formation of a chromatograph to prevent the solvent from evaporating as it rises the chromatograph. The mobile phase solvent will rise slowly up the paper by capillary action. It is important to be sure to get as much pigment as possible on the paper before carrying out the chromatography process because more pigment on the paper will give more accurate solutions. The separation of pigments and the distance covered by these pigments will depend on the type of leaf and the type of solvent. This will be controlled by the temperature as the experiment will be carried out in the room temperature. Since, the spinach leaf is green, the chromatograph will mainly have chlorophyll A and B.

Purpose:

The purpose of this experiment is to use paper chromatograph to separate a pigment into its individual components by using a mixture of spinach leaves and then studying the Rf values to show the results.

Materials

- Spinach leaves
- Isopropanol (solvent)
- Chromatography paper
- Paper clip
- Retort stand or test tube rack
- Test- tube clamp
- Cork stopper

Discussion:

For the chromatography lab, isopropanol was used as a solvent. The pigment called carotenoid was the most soluble. The least soluble pigment was the yellow-green, chlorophyll b. The results were obtained by looking at what pigment travelled farthest. This is because chlorophyll b is more polar and is therefore more strongly attracted to the polar surface of the non-polar solvent ("Plant life: Chromatography" n.d.). Since, carotenoid is the most soluble in alcohol and is non-polar, it was the farthest one on the chromatograph. While comparing the observations and Rf values with the classmates, it was noticed that there could be possible indeterminate errors. Indeterminate errors are errors that can be decreased but never eliminated and are caused by uncontrollable variables. In this lab, some possible indeterminate errors that can affect the data are contamination of chemicals used and properties of the mixture of spinach leaves. If the mixture obtained is too dilute, the results of the lab could be affected. Another possible error could be caused by not keeping a check of relative humidity. This could be resulted by not completely closing the test tube which could cause the paper to soak up the water vapour from atmosphere which affects the chemical composition of the paper ("Chromatography", n.d.). The lack of reliability reduces the accuracy of the results. The outcome of the chromatograph showed four different pigments. These were chlorophyll a (green), chlorophyll b (yellowish green), carotenoid (Orange) and xanthophyll (yellow). The dominating pigment was green even though it contained other pigments because it is made up of more green chlorophyll, which overpowers the other pigments to give the overall green colour. There could still possibly be additional pigments such as Betalains