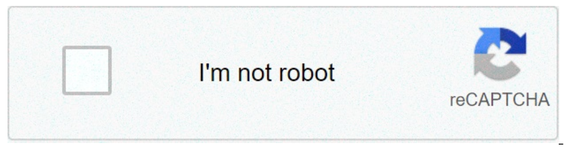

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Paper chromatography lab report observations

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Unsourced material may be challenged and removed.Find sources: "Paper chromatography" – news · newspapers · books · scholar · JSTOR (February 2008) (Learn how and when to remove this template message) Paper chromatographypaper chromatographyAcronymPCClassificationChromatographyAnalyteschromatography is a technique used for separation of the parts of a mixture of either gas or liquid solutionOther techniquesRelatedThin layer chromatography Paper chromatography is an analytical method used to separate coloured chemicals or substances.[1] Erwin Chargaff credits in Weintraub's history of the man the 1944 article by Consden, Gordon and Martin with sparking his discovery of Chargaff's rules, an important precursor to Watson and Crick's discovery of the double-helix structure of DNA,[2] for which they were awarded the Nobel Prize in Physiology or Medicine in 1962.[3][4] It is now primarily used as a teaching tool, having been replaced in the laboratory by other chromatography methods such as thin-layer chromatography (TLC). A paper chromatography variant, two-dimensional chromatography involves using two solvents and rotating the paper 90° in between. This is useful for separating complex mixtures of compounds having similar polarity, for example, amino acids. The setup has three components. The mobile phase is a solution that travels up the stationary phase, due to capillary action. The mobile phase is generally a mixture of non-polar organic solvent, while the stationary phase is polar inorganic solvent water. Here paper is used to support the stationary phase, water. Polar water molecules are held inside the void space of the cellulose network of the host paper. The difference between TLC and paper chromatography is that the stationary phase in TLC is a layer of adsorbent (usually silica gel, or aluminium oxide), and the stationary phase in paper chromatography is less absorbent paper. Rf value, solutes, and solvents The retention factor (Rf) may be defined as the ratio of the distance travelled by the solute to the distance travelled by the solvent. It is used in chromatography to quantify the amount of retardation of a sample in a stationary phase relative to a mobile phase.[5] Rf values are usually expressed as a fraction of two decimal places. If Rf value of a solution is zero, the solute remains in the stationary phase and thus it is immobile. If Rf value = 1 then the solute has no affinity for the stationary phase and travels with the solvent front. For example, if a compound travels 9.9 cm and the solvent front travels 12.7 cm, the Rf value = (9.9/12.7) = 0.779 or 0.78. Rf value depends on temperature and the solvent used in experiment, so several solvents offer several Rf values for the same mixture of compound. A solvent in chromatography is the liquid the paper is placed in, and the solute is the ink which is being separated. Pigments and polarity Paper chromatography is one method for testing the purity of compounds and identifying substances. Paper chromatography is a useful technique because it is relatively quick and requires only small quantities of material. Separations in paper chromatography involve the principle of partition. In paper chromatography, substances are distributed between a stationary phase and a mobile phase. The stationary phase is the water trapped between the cellulose fibers of the paper. The mobile phase is a developing solution that travels up the stationary phase, carrying the samples with it. Components of the sample will separate readily according to how strongly they adsorb onto the stationary phase versus how readily they dissolve in the mobile phase. When a colored chemical sample is placed on a filter paper, the colors separate from the sample by placing one end of the paper in a solvent. The solvent diffuses up the paper, dissolving the various molecules in the sample according to the polarities of the molecules and the solvent. If the sample contains more than one color, that means it must have more than one kind of molecule. Because of the different chemical structures of each kind of molecule, the chances are very high that each molecule will have at least a slightly different polarity, giving each molecule a different solubility in the solvent. The unequal solubility causes the various color molecules to leave solution at different places as the solvent continues to move up the paper. The more soluble a molecule is, the higher it will migrate up the paper. If a chemical is very non-polar it will not dissolve at all in a very polar solvent. This is the same for a very polar chemical and a very non-polar solvent. It is very important to note that when using water (a very polar substance) as a solvent, the more polar the color, the higher it will rise on the papers. Types Taxus baccata paper chromatography. Descending Development of the chromatogram is done by allowing the solvent to travel down the paper. Here, mobile phase is placed in solvent holder at the top. The spot is kept at the top and solvent flows down the paper from above. Ascending Here the solvent travels up the chromatographic paper. Both descending and ascending paper chromatography are used for the separation of organic and inorganic substances. The sample and solvent move upward. Ascending-descending This is the hybrid of both of the above techniques. The upper part of ascending chromatography can be folded over a rod in order to allow the paper to become descending after crossing the rod. Circular chromatography A circular filter paper is taken and the sample is deposited at the center of the paper. After drying the spot, the filter paper is tied horizontally on a Petri dish containing solvent, so that the wick of the paper is dipped in the solvent. The solvent rises through the wick and the components are separated into concentric rings. Two-dimensional In this technique a square or rectangular paper is used. Here the sample is applied to one of the corners and development is performed at a right angle to the direction of the first run. History of paper chromatography See also: Partition chromatography The discovery of paper chromatography in 1943 by Martin and Synge provided, for the first time, the means of surveying constituents of plants and for their separation and identification.[6] Erwin Chargaff credits in Weintraub's history of the man the 1944 article by Consden, Gordon and Martin.[3][4] There was an explosion of activity in this field after 1945.[6] References ^ "Paper chromatography | chemistry". Encyclopedia Britannica. Retrieved 2018-06-01. ^ McCarty, Maclyn (2003). "Discovering genes are made of DNA". Nature. 421 (6921): 406. Bibcode:2003Natur.421..406M. doi:10.1038/nature01398. PMID 12540908. 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Retrieved from " Thank you for your participation! Introduction The purpose of this experiment is to observe how chromatography can be used to separate mixtures of chemical substances. Chromatography serves mainly as a tool for the examination and separation of mixtures of chemical substances. Chromatography is using a flow of solvent or gas to cause the components of a mixture to migrate differently from a narrow starting point in a specific medium, in the case of this experiment, filter paper. It is used for the purification and isolation of various substances. A chromatographically pure substance is the result of the separation. Because purification of substances is required to determine their properties, chromatography is an indispensable tool in the sciences concerned with chemical substances and their reactions. Chromatography is also used to compare and describe chemical substances. The chromatographic sequence of sorbed substances is related to their atomic and molecular structures. A change in a chemical substance produced by a chemical or biological reaction often alters the solubility and migration rate. With this knowledge, alterations or changes can be detected in the substance. In all chromatographic separations, there is an important relationship between the solvent, the chromatography paper, and the mixture. For a particular mixture, the solvent and the paper must be chosen so the solubility is reversible and be selective for the components of the mixture. The main requirement, though, of the solvent is to dissolve the mixture needing to be separated. The porous paper used must also absorb the components of the mixtures selectively and reversibly. For the separation of a mixture, the substances making up the mixture must be evenly dispersed in a solution, a vapor, or a gas. Once all of the above criteria have been met, chromatography can be a simple tool for separating and comparing chemical mixtures. Hypothesis Paper can be used to separate mixed chemicals. Materials The materials used for this lab are paper, pencil, eraser, filter paper, test tube, rubber stopper, paper clip, metric ruler, black felt-tip pen, and a computer. Methods The first step of the method is to bend a paper clip so that it is straight with a hook at one end. Push the straight end of the paper clip into the bottom of the rubber stopper. Next, you hang a thin strip of filter paper on the hooked end of the paper clip. Insert the paper strip into the test tube. The paper should not touch the sides of the test tube and should almost touch the bottom of the test tube. Now you will remove the paper strip from the test tube. Draw a solid 5-mm-wide band about 25 mm from the bottom of the paper, using the black felt-tip pen. Use a pencil to draw a line across the paper strip 10 cm above the black band. Pour about 2 mL of water into the test tube. The water will act as a solvent. Put the filter paper back into the test tube with the bottom of the paper in the water and the black band above the water. Observe what happens as the liquid travels up the paper. Record the changes you see. When the solvent has reached the pencil line, remove the paper from the test tube. Measure how far the solvent traveled before the strip dries. Finally, let the strip dry on the desk. With the metric ruler, measure the distance from the starting point to the top edge of each color. Record this data in a data table. Calculate a ratio for each color by dividing the distance the color traveled by the distance the solvent traveled. Results The results of the experiment are shown in a chart and a graph. Color of Ink (listed in order) Distance each Color Traveled (mm) Distance Solvent Traveled (mm) Ratio Traveled (Distance color moved divided by distance solvent moved) Yellow 70 mm 111 mm .63 Pink 82 mm 111 mm .74 Red 101 mm 111 mm .91 Purple 110 mm 111 mm .99 Blue 111 mm 111 mm 1.0 Questions 1. How many colors separated from the black ink? Five colors separated from the black ink: yellow, pink, red, purple, and blue. 2. What served as the solvent for the ink? Water served as the solvent for the ink. As the solvent traveled up the paper, which color of ink appeared first? The color orange first appeared as the solvent traveled up the paper. 3. List the colors in order, from top to bottom, which separated from the black ink. The colors separated in this order, from top to bottom: blue, purple, red, pink, and then yellow. 4. In millimeters, how far did the solvent travel? The solvent traveled 111 mm. 5. From your results, what can you conclude is true about black ink? Black ink is a mixture of several different colors. 6. Why did the inks separate? The inks separated because the black ink was a mixture of different pigments with different molecular characteristics. These differences allow for different rates of absorption by the filter paper. 7. Why did some inks move a greater distance? The ink least readily absorbed by the paper would then travel the farthest from the starting mark. You can conclude from this information that the different pigments were absorbed at different rates. Error Analysis Possible errors could include inaccurate measurements of the distances traveled by the inks and mistakes when calculating the ratio traveled by the water and colors. If a longer test tube was used, a longer strip of filter paper could have been used. This may have changed the ratios. Another color may have been present, but not detected because of the filter paper length. Conclusion The proposed hypothesis was correct. The paper chromatography did show that black ink could be separated into various colors. The black ink gets its color from a mixture of various colored inks blended together. The first color of ink to appear on the filter paper was yellow followed by pink, red, purple then blue. The colors separated the way they did because of the differences in their molecular characteristics, specifically, their solubility in water and their rate of absorption by the paper. The most soluble and readily absorbed ink color was the yellow. The least soluble and least absorbable ink color was the blue. Owusu Asante United Care Roland Clinic, Gambia Posters & Accepted Abstracts: J Chromatogr Sep Tech Abstract : The technique helps in analyzing, identifying, purifying and quantifying unknown separable mixtures. The mobile phase is either a liquid or gas which moves the solvent through the stationary phase during the process. The stationary phase is a liquid or solid component that is fixed in a place for the procedure. Paper chromatography works majorly on capillary attractions. The capillary attraction which depends on adhesive and cohesive forces allows the mobile phase to move up the stationary phase due to created surface tension interaction from the forces. The major types are the paper chromatography, thin layer, gas chromatography, column chromatography, high performance liquid chromatography, paper chromatography and thin layer chromatography. There are several applications of paper chromatography and other main types of chromatography techniques. This technique is applicable in pharmaceutical industries, hospitals, forensic science, environmental science and manufacturing plants. This report describes the experiment conducted using paper chromatography to identify an unknown mixture. This will be done by comparing four known amino acids with the two unknown mixtures to identify the unknown mixtures. The experiment will also help to master the technique and analyze the movements made by both unknown mixtures and the known amino acids. Materials gloves, goggles, lab coat, filter paper, toothpick, ninhydrin solution, mixtures are to be identified. The laboratory procedures entail different steps that eventually lead to identification of the unknown mixtures. This procedure is divided majorly into stationary phase preparation, mobile phase preparation and chromatograph development. For the stationary phase preparation, the required markings are made on the paper for identification and creation of baseline. The baseline marks are the 1.7 cm from the shorter left edge and 1.0 cm from the bottom of longer edge. Known amino acid symbols are mark on the paper. Spotting of the known four amino acids and two unknown mixtures are then done using separate toothpicks which will help to prevent contamination. Mobile phase preparation was done by pouring 10 ml of solvent mixture in a 400 ml of Berzelius beaker while the chromatography development was done after the filter paper is already dried. Biography : Email:

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