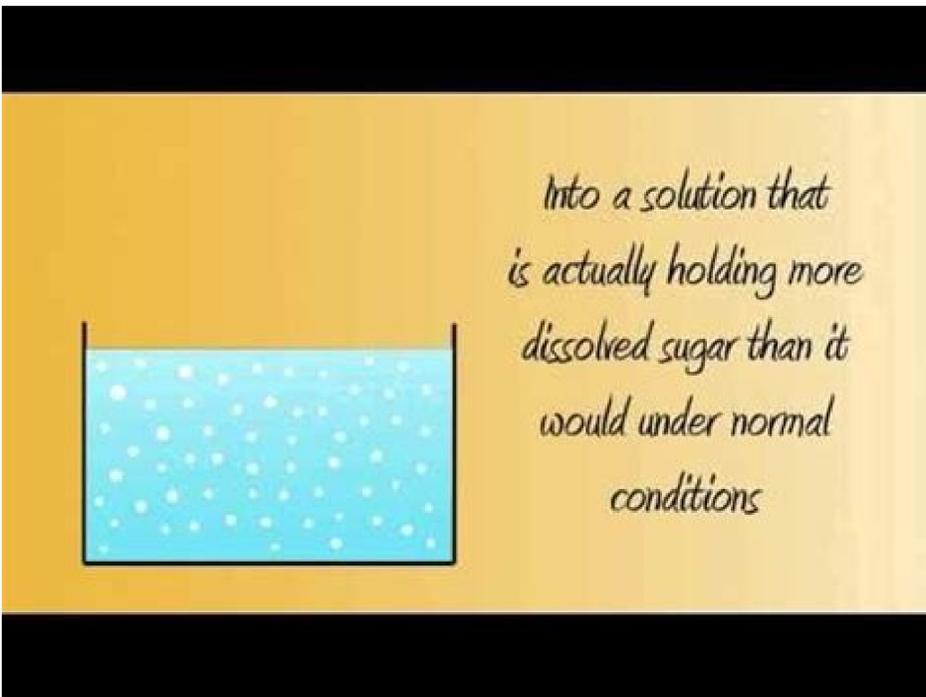
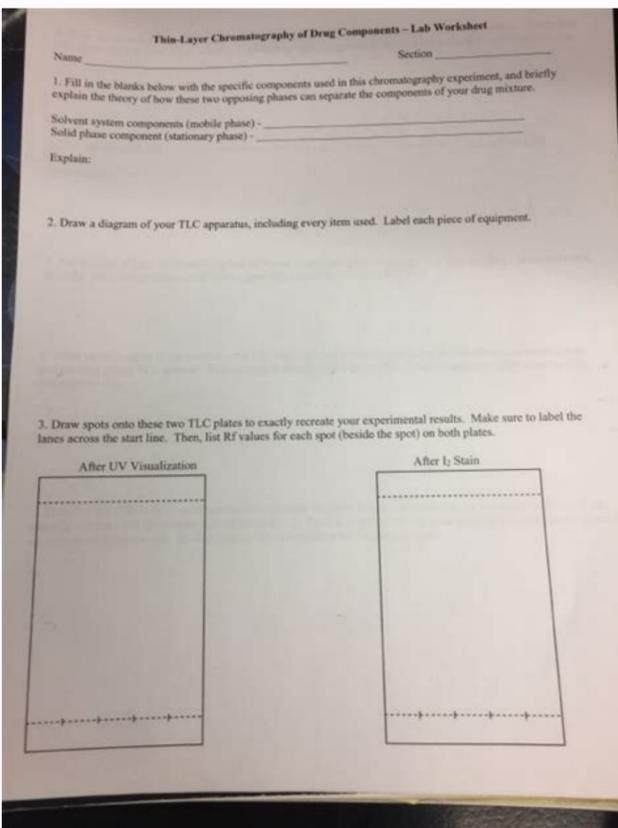


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Tlc chemistry thin layer chromatography worksheet answers answer



However, more polar molecules may interact more strongly by a variety of mechanisms including dipole-dipole interactions, coordination, and hydrogen bonding. The slide is removed from the chamber once the solvent front reaches a predetermined spot near the edge farthest from the point of spotting. Include your TLC plate with your lab worksheet, and label the pigments to the side of your plate. In this laboratory you will separate spinach pigments using thin layer chromatography (TLC). A UV lamp is the simplest way to visualize. Conversely, the adsorbent may be made to contain a small amount of a fluorescing substance. Organic compounds interact with adsorbents by a variety of interactions. Karina Santos June 16, 2020 Thin Layer Chromatography Purpose Thin Layer Chromatography (TLC) is a laboratory technique used to identify different compounds present within a mixture. If the compound is non-polar, it can only have weak 'Van der Waals' attractions for the adsorbent. Almost immediately, the solvent will begin to migrate up the plate. This adsorption/solution process continues along the length of the column. If there is a spot, it will probably show as a different color of fluorescence than the background, or as a darkened area on the adsorbent. They tend to form spots close to the starting, origin line of the TLC plate. This separation based on polarity will explain most of the chromatography encountered in this course. List them and describe their appearance. After all spots have been applied, and all spots are dry, the plate may be placed into the developing chamber and capped immediately to avoid loss of the solvent saturated atmosphere. You should make your pencil marks on the paper side (not on the side with the glossy finish). Each time make sure the spot never gets any larger than it did the first time. You will use this worksheet to record your answers to the In-Lab questions. Capillary action draws a developing solvent up the TLC plate. Polar compounds, on the other hand, will be slowed on their process through the plate by their strong interactions with the solid phase. Allow the tip of the drop at the end of the capillary to just touch the plate. They are also categorized according to their ability to move polar compounds through the chromatography column. Listed in decreasing polarity: Acetic Acid Water Methanol Acetone Ethyl acetate Diethyl ether Chloroform Methylene chloride Toluene Cyclohexane Petroleum ether For a typical separation, a variety of different combinations of solvent and adsorbent may be effective. However, the spots will not be visible unless they are colored materials. While the UV light is ON, the position of the visualized spots is sketched on the plate with a sharp pencil. This will insure a very concentrated spot at the start line and will give the most concentrated spots (nearly round) on development of the plate. There is no magic formula that will allow prediction of just the right set of conditions for any given separation. On the other hand, the spots will flow with the mobile phase because the compound is less polar compared to the other compound. Obtain a TLC plate and a developing chamber. Mixtures of compounds are very common in Organic Chemistry. Experiment 41. This complex will appear as a darker area on the slide. Figure 2 Download and print the following worksheet. (1) Rf = Distance spot traveled / Distance Solvent Traveled On this scale, TLC is only an analytical tool, albeit a very valuable one. Transfer the transparent green top layer using a Pasteur pipet to a clean 50 mL beaker. A few mL of the developing solvent is placed in a simple chamber, such as a 4-oz wide mouth jar. However, these combinations are only obtained by trial and error, based on experience. The spots would be visualized by UV (non-destructive) and then separately scraped from the glass plate. Safety Safety Data Sheet - NFPA3a-d Acetaminophen 3a Aspirin Acetylsalicylic Acid 3b Dichloromethane 3c Ethyl Alcohol 3d Health 2 1 2 3 Flammability 1 1 1 2 Conductivity 0 1 0 0 Other Hazards N/A 0 N/A 0 Table 1: Safety Data Sheet III. In the developing chamber, place a piece of filter paper to serve as a wick and about 10 mL of the TLC developing solvent (7:3 mixture of hexane:acetone). This visualization may be accomplished in a number of ways. Almost all compounds will form a weak colored complex with the I₂. Usually a mixture of compounds is present in the mobile phase. Naturally occurring materials are only rarely 100% pure. Nonpolar substances will also form spots that traveled a further distance compared to those that are slightly polar. As this solvent passes through the spot, the mixture will be dissolved and will begin to move with the solvent front. The most important rule of chromatography is that the more polar compounds will be absorbed most strongly on adsorbents (stationary phases), while non-polar compounds will be only very weakly absorbed. Adding a drop or two of pentane after evaporation will ensure better loading of the TLC plate. Perform only in a well ventilated hood. Question 4: The following items are not allowed in the labs: Backpacks Calculators Food and drink Question 5: The following items are required lab attire: Long pants, covered shoes Long pants, sleeveless shirts Shorts, tank tops Question 6: Table of physical constants CAUTION: Pentane is highly flammable. If the start line should ever touch the solvent directly, the TLC experiment is ruined since some or all of the sample will be dissolved into the solvent pool. Alternatively, visualization may be accomplished by reacting the developed plate with a chemical reagent. Be extra careful to keep the UV lamp pointed down at the bench top at all times. It involves the passage of a mobile phase across a stationary phase in a column. As the plate dries, you will notice a change in its appearance. Stopper the chamber to allow it to become saturated with solvent vapors. Obtain a TLC Plate of the appropriate size that can fit into the developing chamber. Evaporate the pentane by heating the beaker on a hot plate at a low heat setting (about 95°C) for a few minutes until only a few drops of liquid remain. This TLC technique usually requires only a few minutes for a complete analysis, and requires only about 10 microliters of the solution to be analyzed (a microliter is a millionth of a Liter (10⁻⁶ L, or 10⁻³ mL)). (You can easily find the answer to this question by searching on the Internet) Question 3: How could thin layer chromatography be used to aid in the identification of a compound? As soon as the mixture comes in contact with the stationary phase, some or all of the components of the mixture are adsorbed on it. 1 Briefly outline the procedure (bring your outline with you to the lab) 2 Answer all assigned questions. Figure 1 Trace a small pencil line about 1 cm from the bottom of the plate and another small pencil line 5 cm up the plate from that line. The developed slide is simply exposed to I₂ vapors in a chamber similar to the developing chamber for a few minutes. In a typical chromatography experiment, the non-polar compounds, since they are poorly absorbed, will be held least strongly and will move quickly through the plate. The extent of separation, measured by retention factor ("Rf") value differences, will depend on the relative solubilities and relative strengths of adsorption of the components of the mixture. Add 3 mL of spinach juice and 6 mL of pentane to a large stoppered test tube and shake vigorously for 1 minute. Spin the mixture in a centrifuge for 5 minutes, after which time a transparent green top layer should be visible. The liquid, mobile phase will be represented by the use of acetic acid. There are two phases: The stationary phase, which contains a solid and usually polar, and the mobile phase, which can be either a liquid or gas which can be a pure solvent or a mixture of solvents. 1 The TLC plates consist of a solid surface such as glass, metal or plastic with a thin adsorbent later on the surface and provides the stationary phase. This passage of the solvent front through the adsorbent is known as developing the plate. Again, the darkened areas are traced with a pencil before the I₂ evaporates and the color disappears. Iodine (I₂) is one of the easiest to use of the several common chemical visualizing agents. If a proper choice of mobile phase, stationary phase, solvent and other operating parameters was made, the mixture will be separated in the column and its various components will emerge at different times. Question 1: Which of the following pairs of compounds would be most easily separated by thin layer chromatography: n-octyl alcohol and 1-octene, hexadecane and octadecane, or chlorobenzene and bromobenzene? Allow at least 5-10 minutes (with occasional gentle shaking) for the chamber to equilibrate before the first plate is developed. To insure an atmosphere saturated with the developing solvent in the chamber, a piece of filter paper is also present to act as a wick and the chamber is kept capped except when adding or removing a TLC plate. If not, could you explain any observed discrepancies? Question 3: Where your Rf values comparable to those obtained by other students in the class? If the compound in question forms dark spots on the TLC plate, then it will stick to the stationary phase because it is polar. In Thin Layer Chromatography ("TLC"), a liquid solution is directly applied to a solid adsorbent. If the compound(s) fluoresce, shining a UV light on the plate may indicate the location of the separated spots. The plates would be larger and the amount of adsorbent would be increased, but the procedure would be the same. Questions Question 1: How many pigments were you able to visualize and identify? Justify your answer. However, the adsorbent will also reabsorb part or all of the mixture. If almost all of the solvent is accidentally evaporated, two or three drops of pentane may be added to redissolve the green residue. Use a microcapillary tube to load the extract onto the TLC plate. It is determined by the ratio traveled by the compound divided to the distance the solvent has traveled. 1 An Rf value can be enlarged by raising the polarity of the solvent, while it can also be decreased by increasing the polarity of the compound. 2 II. The separation of a mixture by passing it, in solution, over an adsorbent (such as Alumina or Silica Gel) is the basic idea of Chromatography. Turn OFF the UV lamp and carefully put it away. The plate must be visualized. When the developed plate is exposed to a UV lamp, most of the plate will fluoresce one color. Since different materials will be dissolved and reabsorbed at different rates, separation will take place. Wherever a spot is located there will be either a different color or less fluorescence. In the lab, silica gel will act as the solid, stationary phase and 99:1 ethyl acetate. The 'spots' are characterized by their Rf value, a measure of how far the spot traveled with that combination of adsorbent and solvent. Question 2: What is the Rf value for each of the pigments in your TLC plate? It is therefore desirable to have a simple, fast and efficient way to determine the purity of Organic mixtures. Listed in decreasing power of adsorption: Alumina Activated Charcoal Magnesium Silicate Silica Starch. Just as we have a variety of stationary phases to choose, we also have an even larger assortment of mobile phases (or, eluting solvents). Question 2: What pigments can you expect to find in the spinach? If samples of the separated materials were desired, the entire experiment could be scaled up to allow milligrams to be separated. Be sure the depth of solvent is no more than half of the distance from the end of a TLC plate to the 'start line' (no more than 0.5 cm). As more solvent comes by, the mixture will again go into solution, move further and be reabsorbed. Rf values will change when either of these factors is changed. Place the dry plate on the bench top and allow the UV light to shine on it. As additional mobile phase comes along, some or all of the mixture will dissolve and continue moving. CAUTION: Never allow UV light to shine on anyone's eyes! Permanent eye damage may result. A cap is kept in place at all times, except when adding or removing a plate. Most reactions produce more than one product. Blow lightly onto the plate after each drop is added to allow the solvent to evaporate. To compare the distances between each substance, a retention factor (Rf) is calculated for each spot. Once you have developed your plate, since most compounds are colorless, the location of the separated samples, or spots, is usually not apparent. With a very sharp pencil or other sharp instrument, draw an outline of each spot in the adsorbent. Chromatography is a very general phenomenon. Once the solvent reaches the top line on the plate, remove it and allow the plate to dry. The samples could be recovered from the adsorbent by extracting the scrapings with a pure solvent such as ether, and then carefully evaporating the solvent. A more polar compound will tend to strongly bind to the silica gel compared a compound less polar. The spots must be visualized.

03.05.2022 · Part One: Complete Stage 1 of the lab simulation at the link below. Eg water and oil , water and sand. Glow sticks contain two sets of chemicals that when combined, create a chemical reaction called Chemiluminescence. The stationary phase may be a column of adsorbent, a paper, a thin layer of adsorbent on a glass plate, etc.
03.05.2022 · Part One: Complete Stage 1 of the lab simulation at the link below. Eg water and oil , water and sand. Glow sticks contain two sets of chemicals that when combined, create a chemical reaction called Chemiluminescence. The stationary phase may be a column of adsorbent, a paper, a thin layer of adsorbent on a glass plate, etc.

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