Thin layer chromatography of the unknown analgesic assignment

Thin Layer Chromatography of the Unknown Analgesic Jessica Bajao*, Phoebe Abalos, Kevin Antiga, Carmelus Aseneta 3-Biology 2 College of Science, University of Santo Tomas, Manila, Philippines Abstract The group used five different analgesics in this experiment: aspirin, acetaminophen, ibuprofen, caffeine, and mefenamic acid. Six analgesics were spotted on the TLC plate including the unknown. After the development of the TLC plate, it was placed under ultraviolet light for the spots resulted to be traced.

The distance from the origin to the solvent front and the distances from the origin to the center of each spot formed were measured to calculate for the retention factor. The resulted retention factor of the unknown is 0. 71 which is similar to ibuprofen which also has a retention factor of 0. 71. Using thin layer chromatography, we identified the unknown analgesic to be ibuprofen. Introduction [9] The history of chromatography begins during the mid-19th century. Chromatography literally meant color writing which was primarily used for the separation of plant pigments such as xanthopyll.

New types of chromatography were developed during the 19th century (and before) the first true chromatography is attributed to the Russian botanist, Mikhail Semyonovich Tsvet. He separated plant pigments with the used of columns of calcium carbonate during his research for chloropyll during the first decade if the 20th century. [9] During the 1940s and 1950s, chromatography became developed substantially as a result of the work of Archer John Porter Martin and Richard Laurence Millington Synge.

They established basic techniques and principles of partition chromatography method: Paper chromatography, gas chromatography, and

the high performance liquid chromatography. Technology has advanced rapidly since then. The main principles of Tsvet’s chromatography could be applied in many different ways, researchers found. Thus, using this as baseline, the improved the techniques of chromatography, allowing the separation of increasingly similar molecules. [2] Chromatography is a collective term for the separation of mixtures in a set of laboratory techniques.

It involves a mixture dissolved in a mobile phase passing through a stationary phase which separated the analyte from the other molecules in the mixture. [1] In other words, chromatography is the process of separating mixtures into their constituents by a preferred adsorption by a solid for example column of silica, a strip of filter paper, or by a gel. [8] Repeated absorption or desorption acts takes place during the movement of the sample to the stationary bed which determine the rates. The time spent in a column is directly proportional to the affinity a molecule has for the stationary phase. 8] Chromatography has several reasons which make it special. One is that it can separate complex mixtures with great precision. Chromatography can purify basically any soluble or volatile substance with the right adsorbent material, carrier fluid, and operating conditions. Another is that chromatography can be used to separate delicate products since it does not undergo any severe conditions. Therefore, the use of chromatography is best fitted in the field of biotechnology, specifically in separating mixtures of protein. [5] Chromatographic techniques are quite necessary in the analysis of modern day food and drugs. 6] A few of the widely popular techniques are gas chromatography (GC) which uses an inert

gas as the mobile phase instead of a liquid solvent, and high performance liquid chromatography (HPLC) which is an improved column chromatography which is aided by gravity . [5] Thin layer chromatography (TLC), which also is a gas chromatography, is an analytical technique to determine the components of a mixture. [7] TLC also supports the identity of a compound in a mixture by comparing the Rf of a compound is compared with the Rf of a known compound. Results and Discussion

The standards used were (1) aspirin, (2) acetaminophen, (3) ibuprofen, (4) caffeine and (5) mefenamic acid. The measured distance from the origin to the solvent front was 63 cm. Analgesic| Distance from the origin to the center of the spot (x)| Aspirin| 39 cm| Acetaminophen| 32 cm| Ibuprofen| 45 cm| Caffeine| 14. 5 cm| Mefenamic Acid| 44 cm| Unknown| 44. 5 cm| Table 1. The group’s data of the distances of each analgesic, including the unknown from the origin to the center of the spot formed. Analgesic| Solution| Refraction factor| Aspirin| 39 cm63 cm| 0. 62|

Acetaminophen| 32 cm63 cm| 0. 51| Ibuprofen| 45 cm63 cm| 0. 71| Caffeine| 14. 5 cm63 cm| 0. 23| Mefenamic Acid| 44 cm63 cm| 0. 70| Unknown| 44. 5 cm63 cm| 0. 71| Table 2. The group’s result in computing for the refraction factor and the solutions. The table shows that the refraction factor of Ibuprofen is the same as the unknown. Figure 1. The TLC plate of commercial analgesics. The characteristic that the unknown exhibits is the same as ibuprofen. Both exhibited a kidney-shape. Based on the results, the group the group therefore concludes that the unknown is ibuprofen. Experimental

The developing chamber was prepared by the group using a 200 mL beaker with filter paper shaped along the inside of the beaker leaving a small arc. Approximately 10 mL solvent system (25: 1: 1EtAc: EtOH: HAc) was prepared in the beaker. Aluminum foil was used to cover the beaker. The preparation of the TLC plate was the drawing of line across of the origin measuring 1 cm from the bottom and the solvent front which is . 5 cm from the top. The bottom line is called the origin and the line on the top is called the solvent front. On the origin, five dots were drawn equidistantly.

A capillary tube was used in spotting samples on the TLC plate. The five analgesics were spotted 5 times on the numbers 1, 2, 3, 4, 5 with aspirin, acetaminophen, ibuprofen, caffeine and mefenamic acid respectively. Lastly spotted was the unknown A which was assign to our group. In developing the TLC plate inside the developing chamber, the group placed the TLC plate in a manner where the solvent system does not reach the plate’s origin. With the plate inside, capillary action would be observed starting from the most bottom part working its way up to the solvent front.

The plate was taken out when it reached the solvent front then it was air dried. The dried plate was placed under a UV chamber. The glowing spots were traced very lightly by a pencil. Finally, the group calculated for the refraction factor by getting the distances from the origin to the center of each spots, our “ x” and the distance from the origin to the solvent front, our “ y” given the formula Rf = xy . References [1] http://dictionary. reference. com/browse/chromatography [2] http://en. wikipedia. org/wiki/Chromatography 3] http://www. chemistry. sjsu. edu/straus/TLC %20htms/TLCoverview. htm [4] http://itech. pjc. edu/tgrow/2211L/tlc_instr.

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