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CHEM-124-L07 LAB CWID: 20324717

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Determination of Avogadro's Number

**Objective:**

The purpose of the lab was to use a molecular monolayer technique to calculate and determine Avogadro’s number, as well as the number of molecules and moles of stearic acid in the thin monolayer.

**Procedure:**

First, a large watchglass was measured to a precision of 0.1 cm. The surface area was calculated and recorded. From that, the number of molecules that would fit on the watchglass was calculated and recorded. The watchglass was then cleaned with soap and water, and carefully placed on a paper towel on the work area. A wash bottle filled with distilled water was used to fill the watchglass completely. Afterwards, a 1.5\*10-4g/ml solution of stearic acid was suctioned into a dropper pipet, and then slowly released into the center of the water surface until a clear lens formed and persisted on the water surface. The number of drops was recorded and the resulting data was used for further calculations.

**Specialized Chemical Technique:**

Proper safety precautions were taken during the creation of the monolayer while using a stearic acid solution and distilled water.

**Final Result:**

After measuring the diameter of the watchglass, which was 14.9 cm, it was used with a given value of the area of one stearic acid molecule, 0.21nm2, to calculate the amount of molecules in a monolayer, which was 8.3\*1016 molecules. During the first trial, the monolayer consisted of 17 drops of stearic acid. After calculations, this resulted in 1.24\*10-7 moles in the monolayer. Therefore, the calculated value for Avogadro’s number was 6.73\*1023 molecules/mol. After accounting for the other two trials, the average values for Avogadro’s number was calculated to be 7.74\*1023 molecules/mol.

**Conclusion:**

The average value for Avogadro’s number was 7.74\*1023 molecules/mol, which is very close to the actual value of Avogadro’s number, 6.022\*1023 molecules/mol. Therefore, the the experiment produced values that were fairly accurate and precise, however resulted in a slightly higher value as noted in the pre-experiment notes.

**Attachments:**

* Data Table
* Post Laboratory Assignment