**Title:** Critical Micelle Concentration

**Purpose:** To determine the concentration of NaDDBS at which micelle formation begins, a point known as the "critical micelle concentration."

**"Before Lab" questions and information:**

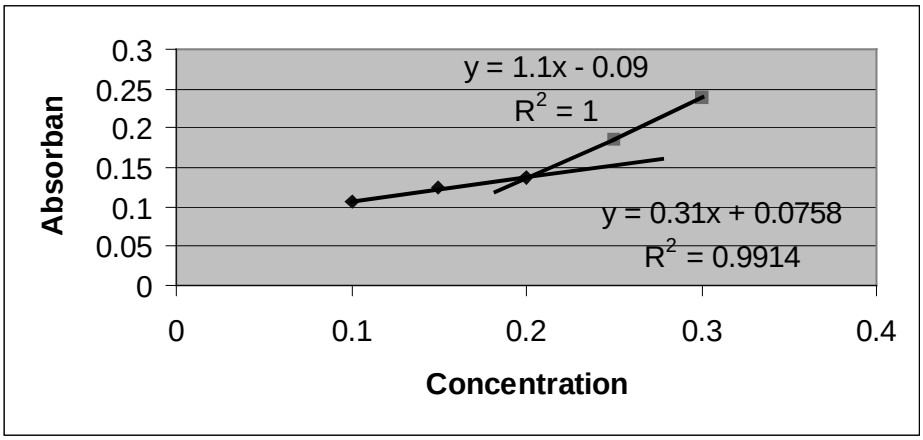
1.

| **Table 1** | | |
|---|---|---|
| **Volume of Substances for Desired Concentrations** | | |
| **Desired Concentration (mM)** | **Volume of NaDDBS (mL)** | **Volume of Water (mL)** |
| 0.005 | 0.01 | 99.99 |
| 0.01 | 0.02 | 99.98 |
| 0.05 | 0.10 | 99.90 |
| 0.10 | 0.20 | 99.80 |
| 0.25 | 0.50 | 99.50 |
| 0.50 | 1.00 | 99.00 |
| 1.00 | 2.00 | 98.00 |
| 2.00 | 4.00 | 96.00 |
| 3.00 | 6.00 | 94.00 |

2.
Glassware needed for transfer would be a pipette and a volumetric flask.

**Procedure:** 5 solutions of of NaDDBS with varying concentrations from 0.1 mM to 0.3 mM were prepared. 10 mL was transferred to an Erlenmeyer flask where 10 drops of a dye, PAN were added. The solutions were allowed to rest for 15 minutes with periodic stirring. The solutions were then transferred to a cuvette in which a Vernier calorimeter recorded the absorbance at 470 nm to LabPro on a laptop computer.

**After Lab:**
1.




By setting the equations equal to each other, the critical micelle concentration was found to have been 0.209 mM.
2. See attached for diagram. At the polar end of the micelle, there would be London forces and dipole-dipole forces. At the non-polar end of the micelle, there would be simply London forces.
3. See attached for diagram. The forces as with the regular single layer would be at the polar end of the micelle, there would be London forces and dipole-dipole forces. At the non-polar end of the micelle, there would be simply London forces.
4. NaDDBS interacts with the polarity of water, thus stretching the molecules farther apart. There is then less molecules per surface area, which reduces the surface tension because there is less molecules to support anything on water's surface.

**Error Analysis:** Firstly, it is very difficult to achieve the desired concentrations exactly with such small volumes and volumetric flasks. The solutions also did not show a great jump for the critical micelle concentration. Thus, it is believed that the suggested concentrations from 0.1 mM to 0.3 mM were too little to achieve the critical micelle concentration. The solution was supposed to have turned pink, but it instead yellow. LoggerPro also malfunctioned and would not allow us to add trendlines. The data had to be added to Microsoft Excel to add trendlines and might have affected the integrity of the results. Error could have also been found in the measuring of volume in such small volumes. While we used pipettes, the suction ends are quite poor and they leaked quite steadily. Volumetric flasks are also very difficult to use for exact measurements, so dilution concentrations are no exact.

**Conclusion:** The critical micelle concentration was found to have been at 0.209 mM by a series of absorbance measurements through a calorimeter.