

DECREASE IN SURFACE TENSION DUE TO THE PRESENCE OF SURFACTANTS

Determination of surface tension

Introduction

Surfactants are widely used excipients due to their ability to gradually decrease surface/interfacial tension with increasing concentration. All surfactants are characterized by an amphiphilic character (they contain hydrophilic as well as hydrophobic part). It is possible to divide them according to the ability of their hydrophilic group to dissociate in an aqueous medium into:

- Ionic
 - Cationic
 - Anionic
 - Amphoteric
- Non-ionic

The aim of the task is to compare the surface tension of three surfactant solutions. For the preparation of solution three different types – anionic sodium lauryl sulphate, cationic cetyltrimethylammonium bromide and non-ionic Polysorbate 80 were used. For the evaluation of the surface tension the Wilhelmy plate method will be used.

Materials and equipment

Materials:

Surfactants – sodium lauryl sulphate, cetyltrimethylammonium bromide and Polysorbate 80, ultrapure water tempered to 20 °C

Equipment and utensils:

Volumetric flask with the volume of 250 mL (3x), watch glass/weighing boat (3x), beakers, analytical scales, tensiometer Krüss K100 with plate probe, thermometer, stirrer

Procedure:

1. Prepare one water solution of each surfactant with the concentration of 1g/L. For the solution preparation use ultrapure water tempered to 20 °C

2. Place approximately 70 mL of the solution in the glass cup the Krüss K100 tensiometer, add stirrer and place the cup into the tensiometer. Press the STIR button on the control panel.
3. Switch on the thermostat connected to the tensiometer. Wait till the temperature of the solution is 25 °C.
4. Carefully remove the probe (plate) from the case. Several times heat and cool the plate evenly.
5. Place the probe to the tensiometer.
6. After reaching the desired temperature of the solution (25 °C), stop the stirring (press button STIR) and move upward the cup with sample using the control panel ((↑,↓). The surface of the sample should be approximately 1-2 mm under the measuring probe (plate).
7. Set the required parameters using Krüss Laboratory Desktop software (PC) and start the measurement – ask your lector for help.
8. After the measurement is finished, it is necessary to clean the plate carefully using ultrapure water and again evenly heat it shortly several times.

Discussion:

Utilization of surfactants in pharmaceutical technology

Conclusion

Evaluate the effectiveness of individual surfactants with respect to their ability to reduce the surface tension of water.