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## **Active Release from an Antiperspirant Stick**

### **SilSurf® DMC-AP**

Objective: Silsurf DMC-AP is specifically designed to accelerate the rate of release of antiperspirant actives.

**Principle:** Antiperspirant compositions exist in either the active form, which provides functionality, or in a non-active form. The conversion from the non-active form to the active form is referred to as release. The concentration of active is measured by chloride titration, since the chloride ion is only found in the aqueous phase for active form. The percent release is calculated by the ratio of active divided by total times 100.

- Reagents:**
1. Silver Nitrate (0.05%N)
  2. 10% nitric Acid

- Apparatus:**
1. Constant temperature water bath.
  2. Lab stirrer with RPM reading
  3. 250 ml beaker
  4. Analytical Balance
  5. Weighing dish
  6. Spatula
  7. Filter paper (Whatman #4)
  8. Funnel
  9. Automatic Chloride titrator (Brinkman)
  10. Magnetic Stirrer
  11. Thermometer

**Procedure:**

1. Weigh 199 grams of DI water into a 250 ml beaker and heat to 37°C
2. Place the beaker in a constant temperature water bath and mix well at 250 RPM with an overhead mixer.
3. Weigh 1.1 gram of antiperspirant stick by shaving with a spatula from the surface of the stick.
4. Mix for 30 and proceed to step 6.
5. Repeat steps 1-3 three more times only this time mix for 60, 120 and 240 minutes
6. Filter through filter paper and collect liquid for chloride titration.
7. Add 15 mo of 10% nitric acid and mix well.
8. Analyze for chloride ion using the auto titrator

9. Calculate % chloride

$$\frac{\% \text{ Chloride titrated}}{\text{Theoretical \% Chloride}} \times 100 = \% \text{ Active}$$

**Antiperspirant Formulation**

The compositions of the present invention were evaluated for release in the following formulation;

<b>Material</b>	<b>Formula A</b>	<b>Formula B</b>	<b>Source</b>
<b>1. Reach AZP-908</b>	24.0	24.0	Reheis
<b>2. Silsurf D212-CG</b>	-	2.5	Siltech LLC
<b>3. Silsurf DMC-AP</b>	2.5	-	Siltech LLC
<b>4. Cyclomethicone (D5)</b>	30.0	30.0	Siltech LLC
<b>5 . Polydecane</b>	9.0	9.0	Fanning
<b>6. PPG14-butyl ether</b>	9.0	9.0	Jeen
<b>7. Hydrogenated Castor Oil</b>	2.5	2.5	Caschem
<b>8. PEG-8-Distearate</b>	1.0	1.0	Jeen
<b>9. Stearyl Alcohol</b>	18.0	18.0	Sassol
<b>10. Talc</b>	3.0	3.0	WCD
<b>11. Cabo-sil-MS</b>	0.5	0.5	Cabot
<b>12. Fragrance</b>	0.5	0.5	IFF
	100.0	100.0	

**Procedure:**

1. Part 1- Combine 1 and either 2 and 3 as specified. Mix well.
2. In a beaker heat 4 to 70°C, slowly add Part 1 followed by 10, 11, under good agitation.
3. In a separate beaker combine 5, 6, 7, 8, 9, and heat with mixing to 85°C
4. Cool to 60°C add 12.

**Release Data**

**Evaluated using the above procedure;**

<u>Example</u>	<u>30minutes</u>	<u>60minutes</u>	<u>120 minutes</u>	<u>240 minutes</u>
Formula A Silsurf® DMC-AP	96.2 %	96.5%	98.8%	-
Formula B Silsurf® D212-CG	43.0%	61.3%	80.5%	90.6%

Clearly the formula containing Silsurf® DMC-AP has better release.

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