

Thermo. Titr. Application Note No. H-041

Title: Standardization of cetyl pyridinium chloride solutions

Scope: Standardization of cetyl pyridinium chloride solutions for use as a cationic surfactant titrant in the determination of anionic surfactants such as sodium lauryl ether sulfate.

Principle: A standard solution of pure sodium dodecyl sulfate (an anionic surfactant) is used to standardize cationic cetyl pyridinium chloride (CPC) solutions. The reaction is mildly exothermic.

Reagents: 0.7 mol/L cetyl pyridinium chloride (CPC) [FW=340.0] solution. Weigh 240 g CPC into a beaker. Add 125mL propan-2-ol, and make to approximately 700mL with DI water. Mix until dissolved, and transfer to a 1000mL volumetric flask, making to volume with DI water.

0.15 mol/L sodium dodecyl sulfate solution.

Note: The concentration of sodium dodecyl sulfate was chosen to match that of the CPC. If a 1 mol/L of CPC solution is used, then a 0.2 mol/L sodium dodecyl sulfate solution is appropriate.

Method: Basic Experimental Parameters:

Titration delivery rate (mL/min.)	2
No. of exothermic endpoints	1
Data smoothing factor	60
Stirring speed (802 stirrer)	10
Delay before start (secs.)	15

Pipette aliquots of 5, 10, 15 and 20mL of standard 0.15 mol/L sodium dodecyl sulfate solution into titration vessels, and add DI water to each vessel sufficient to make a final volume of 30mL. Titrate with the CPC solution to be standardized to a single exothermic endpoint.

Plot mmole of sodium dodecyl sulfate (x-axis) against mL of CPC solution (y-axis). Perform a linear regression, and determine the gradient and intercept of the line of best fit. The reciprocal of the gradient is the molarity of the CPC

solution, while the y-intercept is the method blank for this determination.

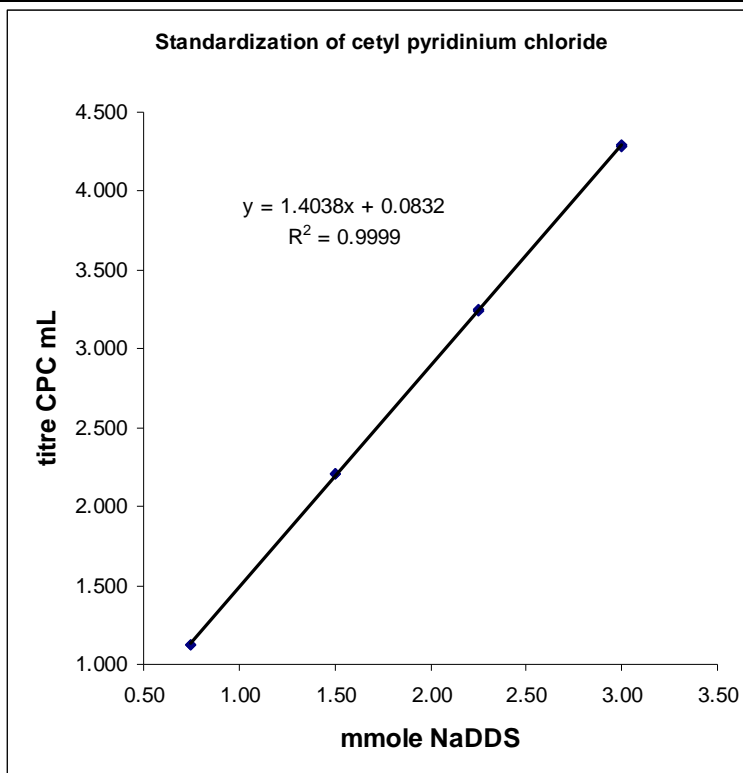
Note that separate “method blank” determinations should be performed for commercial samples of sodium lauryl (dodecyl) sulfate since the impure starting materials lead to impure products which can exhibit endpoint rounding on thermometric titration.

Results Standardization of ~0.7 mol/L CPC solution

mL NaDDS soln.	mmole NaDDS	mL CPC
5	0.75	1.123
10	1.50	2.205
15	2.25	3.246
20	3.00	4.292

gradient = 1.4038
 molarity = 1/gradient
 = 0.7124 mol/L

method blank =
 y-intercept = 0.0832



Thermometric Titration Plot:

Legend:

*Red = solution
temperature curve*

*Black =second derivative
curve*

