

# Thermo. Titr. Application Note No. H-019

<b>Title:</b>	<b>Determination of Chlorine in Household Bleaches</b>
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<b>Scope:</b>	Determination of chlorine in household bleaches
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<b>Principle:</b>	<p>Aliquots of household bleach solution are titrated directly against standard sodium thiosulfate solution without an iodometric intermediate step to a thermometrically determined endpoint.</p> $\text{ClO}^- + \text{H}_2\text{O} + 2e \leftrightarrow \text{Cl}^- + 2\text{OH}^-$ $2\text{S}_2\text{O}_3^{2-} \leftrightarrow \text{S}_4\text{O}_6^{2-} + 2e$ $2\text{S}_2\text{O}_3^{2-} + \text{ClO}^- + \text{H}_2\text{O} \leftrightarrow \text{S}_4\text{O}_6^{2-} + \text{Cl}^- + 2\text{OH}^-$
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<b>Reagents:</b>	Standard 1mol/L Na <sub>2</sub> S <sub>2</sub> O <sub>3</sub> solution
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<b>Method:</b>	<p>Basic Experimental Parameters:</p> <table> <tr> <td>Data rate (per second)</td> <td>10</td> </tr> <tr> <td>Titrant delivery rate (mL/min.)</td> <td>1</td> </tr> <tr> <td>No. of exothermic endpoints</td> <td>1</td> </tr> <tr> <td>Data smoothing factor</td> <td>40</td> </tr> </table> <p>Procedure: <u>Either</u> take a direct 2.5mL aliquot of bleach solution and add 25mL H<sub>2</sub>O, <u>or</u> dilute 1:10 and take a 25mL aliquot. Titrate directly with 1mol/L Na<sub>2</sub>S<sub>2</sub>O<sub>3</sub> solution to a single exothermic endpoint</p>	Data rate (per second)	10	Titrant delivery rate (mL/min.)	1	No. of exothermic endpoints	1	Data smoothing factor	40
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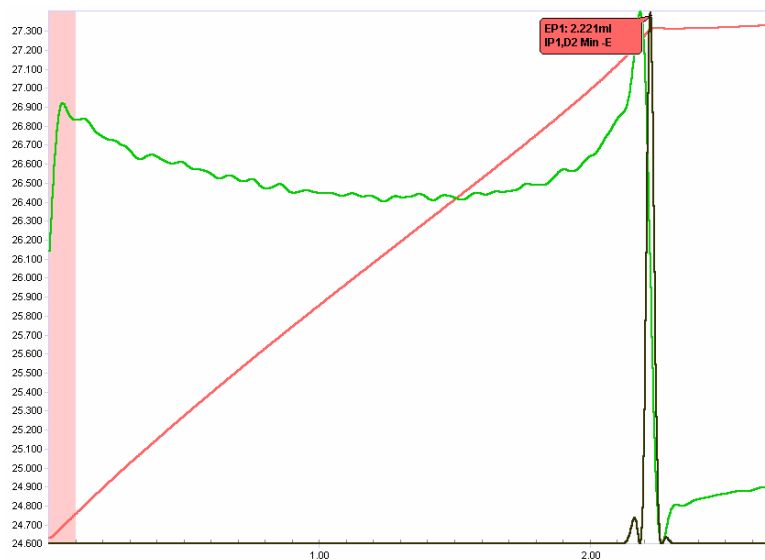
<b>Results:</b>	Analysis of bleaches		
		Chlorine measured as...	
		Available chlorine, %w/v	NaOCl, g/L
	Household bleach Mean (n=5)	3.8±0.005	39.5±0.05
	Outdoor bleach Mean (n=8)	3.0±0.007	31.8±0.08

**Calculation:**

$$\%Cl_2 \text{ mass / vol} = \frac{((\text{titre} - \text{blank}) \times M \text{ Na}_2\text{S}_2\text{O}_3 \times \text{FW Cl}) \times 100}{(\text{sample vol.}, \text{ mL} \times 1000)}$$

$$\text{NaOCl g / L} = \frac{((\text{titre} - \text{blank}) \times M \text{ Na}_2\text{S}_2\text{O}_3 \times \text{FW NaOCl})}{(\text{sample vol.}, \text{ mL} \times 2)}$$

**Thermometric Titration Plot:**



**Legend:**

Red = solution temperature curve

Green = first derivative curve

Black = second derivative curve