

Thermo. Titr. Application Note No. H-030

Title: Determination of Chlorite by Direct Titration with Thiosulfate

Scope: Determination of chlorite by direct thermometric titration with standard sodium thiosulfate solution. The procedure was applied originally to the determination of chlorite in hide treatment solutions

Principle: An aliquot of solution is acidified with acetic acid and titrated with standard sodium thiosulphate solution to an exothermic endpoint.

$$[\text{ClO}_2^- + 4\text{H}^+ + 3\text{e} \leftrightarrow \text{Cl}^- + 2\text{H}_2\text{O}] \times 2$$
$$\underline{[\text{S}_2\text{O}_3^{2-} \leftrightarrow \text{S}_4\text{O}_6^{2-} + 2\text{e}] \times 3}$$
$$2\text{ClO}_2^- + 8\text{H}^+ + 3\text{S}_2\text{O}_3^{2-} \leftrightarrow 2\text{Cl}^- + 3\text{S}_4\text{O}_6^{2-} + 4\text{H}_2\text{O}$$

Reagents: 0.5mol/L Na₂S₂O₃
Glacial acetic acid

Method: Basic Experimental Parameters:

Titration delivery rate (mL/min.)	2
No. of exothermic endpoints	1
Data smoothing factor	60
Stirring speed (802 stirrer)	5
Delay before start (secs.)	3

Pipette 20.00 mL of hide treatment solution into a 140 mL titration beaker equipped with a spinning. Add 5mL glacial acetic acid, and titrate to a single exothermic endpoint.

Example Results:

4.95 ± 0.03 g/L NaClO₂ (n=8)

Calculation:

$$\text{NaClO}_2 \text{ g/L} = \frac{((\text{titre, mL} - \text{offset, mL}) \times M \text{Na}_2\text{S}_2\text{O}_3 \times \text{FW NaClO}_2 \times 3)}{(\text{aliquot, mL} \times 2)}$$

EXAMPLE :

$$\text{NaClO}_2 \text{ g/L} = \frac{((1.482 - 0.030) \times 0.500 \times 90.44 \times 3)}{(20 \times 2)}$$

Thermometric Titration Plot:
Legend:

Red = solution temperature curve

Green = first derivative curve (used to set autostop function, indicates reaction rate)

Black = second derivative curve (used to locate titration endpoint)

