

Application Note

Determination of potassium sulfite

Industry	Chemicals
Instrument	Automatic potentiometric titrator
Measurement method	Potentiometric titration / Oxidation-reduction titration
Standards	

1. Scope

This Application Note describes an example of measuring potassium sulfite in a washing solution. Back titration was applied as the measurement method. In this method, an iodine solution is added to the sample, and excess iodine is titrated with sodium thiosulfate.

- Reaction of potassium sulfite with iodine

$$I_2 + K_2SO_3 + H_2O \rightarrow 2KI + H_2SO_4$$
- Reaction of iodine with sodium thiosulfate

$$I_2 + 2Na_2S_2O_3 \rightarrow 2NaI + Na_2S_4O_6$$

2. Post-measurement procedure

When storing the electrode, seal the electrolyte filling port in the combined platinum electrode with a rubber stopper.

3. Apparatus

Main unit	Automatic potentiometric titrator (preamplifier STD)
Electrode	Combined platinum electrode (Internal solution 3.3 mol/L potassium chloride solution) Glass electrode
Temperature compensation electrode	

4. Reagents

Titrant	0.05 mol/L Sodium thiosulfate
Additive reagents	0.1% Phenolphthalein ethanol solution, Nitric acid (1+1), 0.05 mol/L Iodine solution, 20 % Potassium iodide solution, Acetic acid

5. Procedure

- 1) Introduce the sample into a 200 mL Erlenmeyer flask, and measure the weight of the sample.
- 2) Add 50 mL of pure water and 2 drops of the 1 % phenolphthalein solution.
- 3) Add nitric acid (1 + 1) until the red color disappears.
- 4) Add exactly 10 mL of the 0.05 mol/L iodine solution.
- 5) Add 10 mL of a 20 % Potassium iodide solution and 5 mL of acetic acid.
- 6) Stir the solution gently, then seal the flask, and leave it in the dark for 5 minutes.
- 7) Using pure water, rinse the entire content of the Erlenmeyer flask and drain it into a 200 mL beaker.
- 8) Titrate with a 0.05 mol/L sodium thiosulfate solution.

Note: Perform a separate blank test under the same conditions as during sample measurement.

6. Calculation

$$\text{Potassium sulfite (wt\%)} = (\text{BL1} - \text{EP1}) / 1000 \times 0.05 \times \text{TF} \times 158.26 / 2 / \text{S} \times 100$$

EP1	Titration volume (mL)
BL1	Titration volume (mL) for a blank test = 19.1923
TF	Titration factor = 0.9785
S	Weight of sample introduced (g)

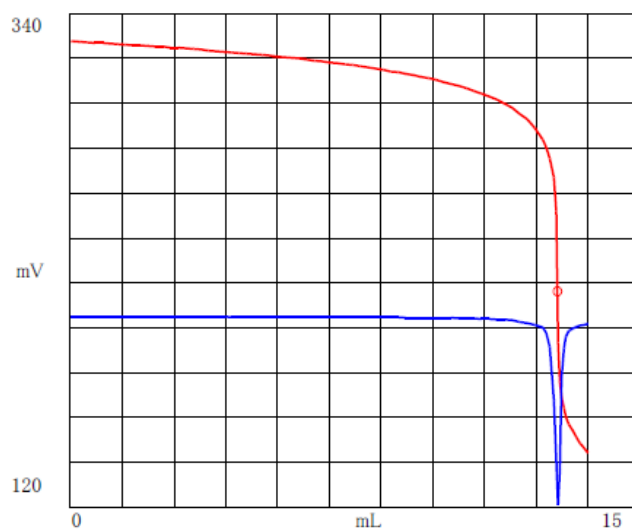
7. Example

— Parameter —

<u><Titr. Mode></u>	Auto Int.	<u><Ctrl. Para.></u>	
<u><Titr. Form></u>	EP Stop	Number of EP	1
		End Sense	Auto
<u><Titr. Para.></u>		Gain	1
Max Volume	30 (mL)	Data Sampling	Auto
Channel/Unit(Ctrl.)	Ch1, mV	Ctrl. Speed	Standard
Wait Time	0 (s)	Other Control	Standard
Titration Type Check	No Check	Stirrer Speed	4
		Auto Int. Mode	Standard

(The above condition is an example. The setting condition depends on the model.)

— Example of titration curve —



— Measurement results —

Table 1 Measurement result

	Sample (g)	Titration (mL)	potassium sulfite (%)
1	5.1132	12.8557	0.480
2	5.1151	12.9818	0.470
3	5.1234	12.9621	0.471
4	5.1225	12.9461	0.472
5	5.1137	12.9481	0.473
Average	-	-	0.473
SD	-	-	0.004
RSD (%)	-	-	0.822