

AQUACOUNTER Application Sheet	COM series	DATA No. K9	1st edition
Organic Acid		Fractionation quantification of peracetic acid and hydrogen peroxide	

1. Measurement outline

Peracetic acid (CH₃COOOH) is used as an oxidizing agent, bleaching agent or bactericide. Peracetic acid decomposes to form acetic acid and oxygen, and it is assumed that bleaching and bactericidal effects are delivered by the oxygen generated in this reaction. Meanwhile, hydrogen peroxide (H₂O₂) works as an oxidizing or reducing agent depending on the subject it reacts with. It is used in a similar fashion to peracetic acid as a bactericide for containers in food industry. Due to the recent popularization of PET bottle for refreshing drinks, use of a mixture solution of peracetic acid, hydrogen peroxide and acetic acid is growing for the purpose of disinfecting the containers. This section introduces an example in which peracetic acid and hydrogen peroxide in the mixture solution of peracetic acid, hydrogen peroxide and acetic acid was quantified with fractionation by iodine titration method. Furthermore, patent is being applied for this measurement method (Japanese published unexamined application 6-130051). Thus please have necessary arrangement in using this method.

Fractionation titration of peracetic acid and hydrogen peroxide is conducted by the following procedure:

- (1) Approximately 2g of sample is collected and added with 100mL purified water.
- (2) 0.25mL of 1mol/L potassium iodide is added (Formula 1).
- (3) It is titrated with 0.1mol/L sodium thiosulfate to measure peracetic acid (Formula 3).
- (4) 10mL sulfuric acid (1+9) solution containing 0.2% ammonium molybdate is added (Formula 3).
- (5) It is titrated with 0.1mol/L sodium thiosulfate to measure hydrogen peroxide (Formula 3).



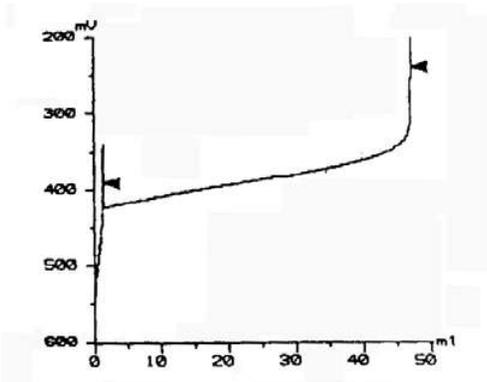
2. Reagents and Electrodes

(1) Reagents	Titrant	0.1mol/L sodium thiosulfate titrant
	Loading buffer	1mol/L potassium iodide Sulfuric acid (1+9) solution containing 0.2% ammonium molybdate
(2) Electrodes *standard accessory	Indicator electrode	Platinum electrode PT-301 (P/N D231244-A)
	Reference electrode	*Reference electrode RE-201

3. Measurement conditions example (for COM-1600S)

(1) Method	Auto	
(2) End Sens	300	
(3) Mode	1 (peracetic acid)	2 (hydrogen peroxide)
Pre Int	0	0
Del K	9	5
Del Sens	0	0
Int Time	1	1
Int Sens	3	3
Brt Speed	2	2
Pulse	40	40

4. Measurement example



Measurement results on peracetic acid

Sample No.	Sample volume (ml)	Titration value (mL)	Concentration (%)
1	2	1.358	0.2602
2	2	1.354	0.2595
3	2	1.362	0.2610
Avg.			0.2602 %
Std. Dev.			0.00075 %
C.V.			0.29 %

Measurement results on hydrogen peroxide

Sample No.	Sample volume (ml)	Titration value (mL)	Concentration (%)
1	2	46.170	3.956
2	2	46.125	3.952
3	2	46.162	3.956
Avg.			3.955 %
Std. Dev.			0.0021 %
C.V.			0.053 %

5. Outline

(1) Precautions in measurement

Caution is required since the quantity of potassium iodide added against the collection quantity of peracetic acid affects the measurement precision in this analysis method. If the added quantity of potassium iodide is large, it is affected by hydrogen peroxide and the concentration for peracetic acid becomes higher. Conversely, formed iodine will sublime if the concentration of potassium iodide is small, leading to the tendency for measurement result to be lower. Therefore, the optimal condition for KI/peracetic acid needs to be selected.

(2) Other measurement methods

The measurement method using potassium permanganate titration and iodine titration is another method for fractionation measurement of peracetic acid and hydrogen peroxide. In this method, 5mL sulfuric acid (1+2) and 50ml purified water are added to 1g of sample for titration with 0.02mol/L potassium permanganate titrant while keeping the titrated solution at 5°C to measure hydrogen peroxide. Then 2mL 1mol/L potassium iodide is added for titration with 0.1mol/L sodium thiosulfate titrant to measure peracetic acid. As a precaution for measurement with this method, it is important to keep the temperature of the titrated solution at 5°C or lower during titration. If the titration temperature is high, the measurement result for hydrogen peroxide will be higher. As a result, the measurement result for peracetic acid tends to be lower.

Key words

Fractionation quantification of peracetic acid and hydrogen peroxide, oxidation-reduction titration, iodine titration, potassium permanganate

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