



Application Note AN-PAN-1029

## 料灌装厂中的乙酸(PAA)

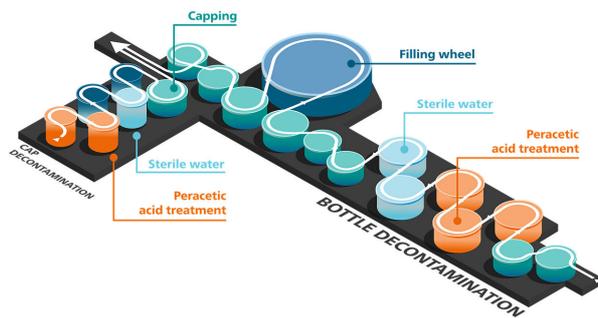
The food and beverage industry is built on strict rules that govern hygiene. All surfaces of materials that contact foods or beverages must be disinfected to ensure their bacteriological purity. Peracetic acid (PAA) is often used for rapid disinfection of polyethylene terephthalate (PET) bottles. Proper dosing of the acid must be observed while doing so: excess PAA affects taste and increases costs. Insufficient concentration, in turn, cannot ensure that surfaces are sufficiently clean.

The PAA concentration can be precisely

determined by using an online process analyzer configured specifically for photometric analyses. The analyzer sends an alarm signal to the control system if the peracetic acid concentration deviates from the specifications.

This Process Application Note details the online monitoring of peracetic acid levels in a beverage bottling facility using the Metrohm Process Analytics stainless-steel process analyzer, which ensures optimal disinfection efficacy and cost efficiency while adhering to stringent quality control standards.

## INTRODUCTION



**Figure 1.** Illustration of the aseptic treatment process of PET bottles in a bottling line.

Sanitary practices play a crucial role in the processing and handling of food and beverages, as fully hygienic conditions support longer shelf lives and food safety [1]. Unsanitary conditions in a beverage bottling facility can result in several undesirable outcomes. Contamination of a batch not only leads to product loss – it can potentially create a critical public health situation if not contained and resolved quickly. The company's image and sales can be damaged if the product is perceived as untrustworthy or tainted [2].

There are various methods for disinfecting a process line. These include high-heat treatments, specialized agents like electrolyzed water or ozone, and chemical sanitizers. Peracetic acid is favored over most other chemical sanitizers in the food and beverage industry for sanitizing new and recycled PET bottles [3]. The U.S. Food and Drug Administration (FDA) approves PAA as sufficiently harmless to allow direct contact with meat, vegetables, and fruits [4].

Peracetic acid ( $\text{CH}_3\text{CO}_3\text{H}$ ) is formed by the reaction between acetic acid ( $\text{CH}_3\text{COOH}$ ) and hydrogen peroxide ( $\text{H}_2\text{O}_2$ ) [3]. It is highly reactive and decomposes into harmless byproducts like water, oxygen, and acetic acid, which can be recycled. To stabilize PAA, it is typically maintained in a solution with an excess concentration of  $\text{H}_2\text{O}_2$ . At proper concentrations, PAA can sanitize bottles in less than 10 seconds at temperatures between 15–65 ° C.

Dosing of the disinfectant is controlled by regularly checking PAA concentration. Low PAA levels risk microbial contamination, while high levels increase chemical and rinse water usage, which may affect product taste.

While laboratory methods are time-consuming and require skilled technicians, online monitoring with process analyzers offers rapid results with minimal personnel oversight. Furthermore, positioning the analyzer within clean rooms minimizes contamination risks, which ensures greater reliability and efficiency. Metrohm process analyzers can handle peracetic acid samples with or without the presence of surfactants. They also degas samples before analysis to prevent bubble formation from H<sub>2</sub>O<sub>2</sub> that directly interferes with the measurement.

In this industry, preventing cross-contamination is essential; therefore, a stainless-steel process analyzer (Figure 2) is recommended to maintain a sanitary environment and ensure reliable monitoring of PAA in cleaning solutions.



**Figure 2.** A 2060 TI Ex Proof Process Analyzer, one of the Metrohm Process Analytics stainless-steel process analyzers.

## APPLICATION

A stainless-steel process analyzer, configured for photometric analyses at 470 nm, accurately

measures the intensity of the color formed by reactions between reagents and PAA.

**Table 1.** Parameter to monitor in a beverage bottling facility.

Parameter	Concentration [mg/L]
Peracetic acid (PAA)	0–3000

## REMARKS

Other online applications are available for the food and beverage industry. These include

alkalinity, salt (NaCl), chlorine (Cl<sub>2</sub>), hydrogen peroxide, iron, phosphate, and many more.

## CONCLUSION

Monitoring peracetic acid prior to beverage bottling ensures hygienic standards, product safety, and cost efficiency. Online stainless-steel process analyzer enable precise, real-time

control, minimizing contamination risks and optimizing disinfection in beverage production environments.

## RELATED APPLICATION NOTES

[AN-PAN-1036](#) Online determination of alkalinity and hardness in process and make up water for beer production

[AN-PAN-1049](#) Online determination of bromate

and other disinfection byproducts in drinking & bottled water with IC

[AN-T-076](#) Conductivity, pH value, alkalinity, hardness, and chloride in tap water

## BENEFITS FOR ONLINE ANALYSIS IN PROCESS

- Improved product quality and manufacturing efficiency.
- Ensure regulatory compliances for process and make-up water.
- Detect process upsets via automated analysis.

## REFERENCES

1. Proquimia. Peracetic Acid Disinfection in the Food Industry. *Proquimia*, 2022.
2. *Food contamination: Understanding and preventing risks* | Arthur D. Little. <https://www.adlittle.com/en/insights/viewpoints/food-contamination-understanding-and-preventing-risks> (accessed 2025-08-28).
3. *Peracetic Acid in the Fresh Food Industry* | Food Safety. <https://www.food-safety.com/articles/2451-peracetic-acid-in-the-fresh-food-industry> (accessed 2025-08-28).
4. Morell, J. Industrial Applications for Chlorination Systems. *Hydro Instruments*, 2025.

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## CONFIGURATION



### 2060 TI Ex Proof Process Analyzer

2060 TI Ex Proof Process Analyzer 是一款本安全型湿化学程分析,用于 0 区、1 区和 2 区或 20 区、21 区和 22 区气体或粉危境中的程。器符合欧盟指令 94/9/EC(ATEX95),并准在 1 区和 2 区使用。其合了吹和加系与本安全型子。空气吹段和持超可防止潜在爆炸性境入分析外。

分析的无需大型分析遮蔽棚行吹,可直接安装在危区域内的生上。它支持多分析技,包括滴定、·休滴定法、光度法、子性量和直接量。