Triton X-100 Characterization

Project: Innoculant
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Aim:

To determine the concentration of Sorbic acid before and after the degradation protocol using Luminol-H_2O_2-Triton X-100 chemiluminesence system.

Principle:

Under the optimal conditions, the standard curve was drawn up and quotas were evaluated. The linear range was 2×10^{-4} g·mL^{-1}-4×10^{-2} g·mL^{-1} (w/v), and the detection limit was 3.97×10^{-5} g·mL^{-1} Triton X-100 (w/v). The relative standard deviation was less than 4.73% for 2×10^{-2} g·mL^{-1} (w/v) Triton X-100 (n = 7). This method has been applied to the determination of Triton X-100 in environmental water samples. The desirable recovery ratio was between 96%–102% and the relative standard deviation was 2.5%–3.3%. The luminescence mechanism was also discussed in detail based on the fluorescence spectrum and the kinetic curve, and demonstrated that Triton X-100-luminol-H_2O_2 was a rapid reaction.

Apparatus:

1. Ultra-weak luminescence analyzer
2. Sensitive PhotoMultiplier Tube (PMT)
3. Fluorescence Spectrophotometer

Reagents:

1. Luminol
2. Triton X-100
3. 1M NaOH Solution
4. 0.2M Na_2CO_3

Preparation of solutions:

1. Prepare the 0.01 mol·L^{-1} **luminol stock solution** by dissolving 0.1772 g luminol with 5 mL 1 mol·L^{-1} NaOH solution and doubled distilled water to 100 mL and store in 4°C.
2. Prepare the **working standard solutions of luminol** from the stock solution by appropriate dilutions with 0.2 mol·L^{-1} Na_2CO_3 before use and pH adjusted to 12.5 with 1 mol·L^{-1} NaOH.
3. Prepare a **standard solution of Triton X-100 (8% w/v)** by dissolving 8g Triton X-100 with doubly distilled water to 100 mL.
4. Prepare **working standard solutions of Triton X-100** from the stock solution by appropriate dilutions.

Procedure:

1. Rapidly inject 100 µL Triton X-100 (1×10^{-2} g·mL^{-1}), 100 µL H_2O_2 (0.4 mol·L^{-1}) and 100 µL luminol (1.0×10^{-4} mol·L^{-1}) into the sample pool in the correct order.
2. Close the reaction door to maintain the reaction in the dark.
3. Immediately start recording the CL intensity. The CL intensity ΔI is calculated by $\Delta I = I_s - I_0$, where I_s and I_0 are the CL signals in the presence and absence of Triton X-100, respectively.
4. Collect the CL signal and record consecutively within 100 seconds and plot the CL intensity-time curve (kinetic curve).