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**NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

GB 14883.2-2016

Replacing GB 14883.2-1994

**National Food Safety Standard -- Determination of radioactive
material -- Hydrogen**

食品安全国家标准 食品中放射性物质氢-3的测定
(English Translation)

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Table of Contents

Foreword	
1 Scope	
3 Reagents and materials	
3.1 Reagents	
3.2 Reagent preparation	
3.3 Standard	
4 Instruments and equipment	
5 Step, Analysis	
5.1 Sampling and pretreatment	
5.3 Purified water samples	
5.4 Electrolytic concentration	
5.5 Sample Preparation	
5.6 Measuring	
5.7 Blank test	
6 Expression analysis	
7 Other	

Foreword

This standard replaces GB 14883.2-1994 "test radioactive materials for foods - 3 Determination of hydrogen." this standard compared with GB 14883.2-1994, the main changes are as follows.

--- Standard name was changed to "national food safety standard radioactive materials in foods Determination of Hydrogen-3 ';

--- National food safety standards in accordance with the format of the text has been adjusted;

--- Supplementary analysis and refinement of the experimental procedure.

National Food Safety Standard Determination of radioactive materials in foods hydrogen - 3

1 Scope

This standard applies to all types of foods hydrogen -3 (3H) measurement.

Principle 2

FRESH burned - oxidation, free water and organic matter in the water is converted to hydrogen all. After collecting water purification electrolysis to concentrate 3H, with liquid Scintillation counter measuring 3H radioactivity.

3 Reagents and materials

Unless otherwise indicated, the methods used were of analytical grade reagents and water as a water GB/T 6682 regulations.

3.1 Reagents

3.1.1

Potassium persulfate ($K_2S_2O_8$).

3.1.2

Sodium peroxide (Na_2O_2).

3.1.3

phosphoric acid solution. concentration of 85%, commercially available.

3.1.4 2,5-diphenyl oxazole [$OC(C_6H_5) = NCH = CC_6H_5$]. abbreviation PPO, pure flashes.

3.1.5 1,4-bis-2- (5-phenyl-yl) - benzene ($[OC(C_6H_5) = CHN = C] 2C_6H_4$). short POPOP, flashing pure.

3.1.6

naphthalene ($C_{10}H_8$).

3.1.7 1,4-dioxane ($C_4H_8O_2$).

3.1.8

The bottom water. conductivity less than $2 \times 10^{-6} \Omega \cdot \text{cm}^{-1}$. The water should be taken from the bottom level as low as possible 3H activity concentration of water, such as (deep) groundwater. Distillation to obtain water samples Determination of 3H activity concentration (Bq/m^3), and record the measurement date ($t = 0$). Packed in borosilicate glass bottles Constant temperature kept in the dark.

3.2 Reagent preparation

Scintillation fluid. Take 6gPPO, 0.3gPOPOP naphthalene and 100g, was dissolved in purified distilled 1,4-dioxane (dioxane Ring) and diluted to 1L. Save wrapped in black good brown bottle, dark standby. PPO and POPOP flashes are pure. You can also use Have a good product with a commercial scintillation fluid, but should try to use low toxicity, high flash point solubility good safe and efficient products. Users should test alternative Goods

scintillation fluid performance and optimal conditions to ensure acceptability.

3.3 Standard

Standard 3H Water. known accurately 3H activity, was diluted with water background backup.

4 Instruments and equipment

4.1

liquid scintillation counter. background count rate of not more than 60 counts/min, 3H counting efficiency of not less than 20%, preferably at a constant temperature operation.

4.2 3H oxidation combustion devices. Figure 1.

Explanation.

- 1 --- combustion chamber;
- 2 --- oxidation chamber;
- 3 --- high-temperature furnace;
- 4 --- thermocouple;
- 5 --- received water bottles;
- 6 --- condenser.

Figure 1 3H oxidation combustion device

4.3 3H electrolysis enrichment device. Figures 2 and 3.

Explanation.

- 1 --- electrolytic cell;
- 2 --- holder;
- 3 --- cooling pipes.

2 3H electrolysis enrichment device of FIG.

Explanation.

- 1 --- rubber stopper;
- 2 --- a nickel cathode;
- 3 --- nickel anodes;
- 4 --- plastic ring.

Figure 3 electrode

5.1 Sampling and pretreatment

Sampling and pretreatment according to the provisions of GB 14883.1.

Combustion and oxidation of the sample 5.2 5.2.1 weighed 1.00kg washed, dried food fresh sample was charged in the combustion chamber 3H oxidation combustion device.

5.2.2 First pass oxygen flow rate control in 0.5L/min ~ 0.7L/min, catch air device inside the net.

5.2.3 the power is turned on high-temperature furnace. The temperature of the oxidation chamber is raised to 700 deg.] C, and then heating the combustion chamber, when the temperature was raised to 100 deg.] C, water alone it flows into the receiving flask. Maintain this temperature until the water flows out slow and then slowly warmed.

5.2.4 When the temperature rose to 200 °C ~ 300 °C, warming slowly as possible, and carefully observe the situation through oxygen. General combustion chamber temperature was raised to on no more than 500 °C fraction outflow.

5.2.5 controlling the temperature at 600 °C, continue to burn for some time, so that complete oxidation of food samples, then cuts off the heating and ventilation.

Combustion chamber gas generated by the oxidation is oxidized by water vapor condenser collected in the receiving flask.

5.3 Purified water samples

By measuring the total volume of water collected later transferred to 500mL distillation flask was added 20g ~ 30g potassium persulfate, peroxide reflux for approximately 2h, if dissolved Still colored liquid can be added after about 10g of potassium persulfate reflux for 2h. Repeat the operation until complete oxidation reflux fade. The retort access Distillation apparatus was distilled, the resulting water-necked flask sealed in the mill.

5.4 Electrolytic concentration

5.4.1

electrolysis process is carried out in FIG. 2 device. Before recording the electrolysis of purified water sample volume and a 1% sodium peroxide solution dubbed as electricity Hydrolyzate.

5.4.2

Electrolytic nickel electrode before (see Figure 3) in advance immersed in hot dilute phosphoric acid solution for a few minutes, rinse with water after drying out, and then into electricity Solution pool (see Figure 2).