NATIONAL STANDARD OF THE

PEOPLE'S REPUBLIC OF CHINA

GB 31604.46-2023

National food safety standard - Food contact materials and products - Determination of free phenol and migration

Issued on: September 6, 2023 **Implemented on: September 6, 2024**

Issued by: NHC; SAMR

Table of Contents

Foreword

This Standard serves as a replacement of GB 31604.46-2016 National Food Safety

Standard -

Food Contact Materials and Articles - Determination of Free Phenols and Determination of Migration.

In comparison with GB 31604.46-2016, the main changes are as follows.

---The Scope is modified;

---The detection limit and quantitation limit in Part 1 are modified;

---The analytical procedures and result expression in Part 2 are modified;

---Part 3 - The Determination of Phenol Migration is added.

National Food Safety Standard - Food Contact Materials and Products - Determination of Free Phenol and Migration

1 Scope

This Standard specifies the method for the determination of food contact materials and products

- free phenol and the determination of migration.

In this Standard, Part 1 is applicable to the determination of free phenol in epoxy phenolic resin coatings for food contact; Part 2 is applicable to the determination of free phenol migration in food contact materials and products; Part 3 is applicable to the determination of phenol migration in food contact materials and products.

Part 1 - Determination of Free Phenol

2 Principle

The free phenol in the specimen reacts with bromine to generate bromophenol. The remaining bromine reacts with potassium iodide. The precipitated iodine is titrated with sodium thiosulfate.

In accordance with the consumption of sodium thiosulfate solution, calculate the content of free phenol.

3 Reagents and Materials

Unless it is otherwise specified, the reagents used in this Method are all analytically pure, and

the water is Grade-1 water specified in GB/T 6682.

3.3.1 Sodium thiosulfate pentahydrate (Na2S2O3 ? 5H2O, CAS No.. 10102-17-7). working

reference reagent, or a standard substance certified by the state and awarded a reference material

certificate.

3.3.2 Potassium bromate (KBrO3, CAS No.. 7758-01-2). working reference reagent, or a

standard substance certified by the state and awarded a reference material certificate.

5.1 Distillation of Specimens

Weigh-take 1.0 g (accurate to 0.01 g) of epoxy phenolic resin coating specimen for food contact,

put it into a distillation bottle, add 20 mL of ethanol to dissolve it (for water-based modified

epoxy resin coatings, add 20 mL of water). Add 50 mL of water, then, use steam to distill off

free phenol. Collect the distilled solution in a 500 mL conical flash. Within 40 min ~ 50 min,

distill 300 mL ~ 400 mL of distilled liquid.

5.2 Titration

Transfer-take 100 mL of distilled liquid, place it in a 500 mL stoppered conical flask, add 25

mL of bromine standard solution and 5 mL of hydrochloric acid. At room temperature, use a

stopper to cover it to avoid light, and react for 15 min.

5.3 Blank Test

Take 20 mL of ethanol and use water to dilute it to 500 mL, then, transfer-take 100 mL of the

diluted solution (for water-based modified epoxy resin coatings, transfer-take 100 mL of water).

In accordance with the method of 5.2, conduct the determination.

6 Expression of Analysis Results

The content of free phenol in the sample is calculated in accordance with Formula (1).

7 Precision

The absolute difference between the results of two independent determinations obtained under

repeatability conditions shall not exceed 5% of the arithmetic mean.

8 Others

In this method, the detection limit is 0.4 g/kg and the quantitation limit is 2.0 g/kg.

9 Principle

Under alkaline conditions (pH 9.0 ~ 10.5), free phenol reacts with 4-aminoantipyrine under the

catalysis of potassium ferricyanide to generate antipyrine dye. The antipyrine dye in water is

extracted with chloroform.

10 Reagents and Materials

Unless it is otherwise specified, the reagents used in this Method are all analytically pure, and

the water is Grade-1 water specified in GB/T 6682.

10.2.1 Water-based food simulants. in accordance with the stipulations of GB 5009.156,

conduct the preparation.

10.3 Reference Material

Phenol (C6H6O, CAS No.. 108-95-2). with a purity > 99%, or a standard substance certified by

the state and awarded a reference material certificate.

10.4.7 Standard series of working solutions in isooctane

Respectively and accurately transfer-take 0 mL, 0.25 mL, 0.50 mL, 1.00 mL, 1.50 mL and