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

GB/T 15516-1995

**Air quality--Determination of formaldehyde--Acetylacetone
spectrophotometric method**

空气质量 甲醛的测定 乙酰丙酮分光光度法

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1 Subject content and application scope

GB/T 15516-1995 is the Chinese national standard on air quality--determination offormaldehyde--acetylacetone spectrophotometric method, in the field of environment and health protection, safety. The /T suffix marks it as a recommended standard: it is not compulsory by itself, but it becomes binding as soon as a contract, a tender or a customer specification calls it up - which in practice is how most foreign buyers meet it. It was issued on 19 January 1995 by the Ministry of Ecology and Environment, and has been in force since 1 August 1995. Classification: ICS 13.040.01, CCS Z15. This page is published from the official record of the standard held by the Chinese standards administration: the identification, the dates, the classification and the issuing body are taken from there. The clause text, the tables and the numeric limits are in the document itself, which is delivered complete in English translation.

1.1 Subject content This Standard specifies the acetylacetone spectrophotometric method to measure formaldehyde in industrial emissions and ambient air.

1.2 Application scope

1.2.1 This Standard applies to emissions in those industries such as resin manufacturing, coatings, rayon, plastics, rubber, dye, pharmaceutical, paint, and tanning. And it also applies to determination of formaldehyde vapor produced when conducting pharmaceutical disinfection, corrosion, and fumigation.

1.2.2 When the sampling volume is 0.5~

10.0 L, the measuring range is 0.5~800 mg/m³.

1.2.3 When formaldehyde concentration is 20 µg/10 ml, coexist 8g of phenol (400 times), 10mg of acetaldehyde (500 times), 600mg of ammonium ion (30000 times) without interference; coexist SO₂, less than 20 µg, NO₂ is less than 50 µg, the recovery of formaldehyde shall not be less than 95.

2 Principle

After formaldehyde gas is absorbed by water, then in the acetic acid-ammonium acetate buffer solution of PH=6, it has chemical action with acetylacetone. Under the condition of boiling water bath, it quickly generates stable yellow compound. Measure it at wavelength of 413 nm. The response equation is as follows:

3 Reagents

Unless otherwise specified, when analyzing, it shall use the analytical pure reagents which comply with national standard and the water prepared according to 3.1.

3.1 Organic-free distilled water. Add a small mount of alkaline solution of potassium permanganate into water. Then distill it (Water shall always be red throughout the whole distillation process, or potassium permanganate shall be added at any time).

3.2 Absorbing liquid. The organic-free double distilled water (3.1).

3.3 Ammonium acetate (NH₄CH₃COO).

3.4 Glacial acetic acid (CH₃COOH). rho=1.055.

3.5 Acetylacetone (C₅H₈O₂). rho=0.975.

3.6 Hydrochloric acid (HCl) solution. rho=1.19 (1+5).

3.7 Sodium hydroxide (NaOH) solution. 30g/100ml.

3.8 Iodine (I₂).

3.9 Potassium iodide (KI).

3.10 Potassium iodate (KIO₃) solution c(1/6KIO₃)=0.1000 mol/L. Weigh 3.567g of potassium iodate which has been dried at 110°C for 2h. Dissolve into water. Dilute to constant volume in the 1000ml flask.

3.11 Starch solution. 1g/100ml. Weigh 1g of starch. Mix them into paste with water. Pour it into 100ml of boiling water. It is transparent solution. It shall be prepared before using.

3.12 Sodium thiosulfate solution. c(Na₂S₂O₃)=

0.1 mol/L. Weigh 25g of sodium thiosulfate solution (Na₂S₂O₃·5H₂O) and 2g of sodium

(Na₂CO₃) to dissolve into 1000ml of water that has been freshly boiled and cooled. Store in the brown reagent bottle. Filter after placing for 1 week. And mark the concentration.

4 Instruments

4.1 Sampler. Air sampler. The flow range is 0.2~1.0L/min (with flow measurement device).

4.2 Soap film flowmeter.

4.6 Standard Pitot tube. With correction factor.

4.7 Inclined micro-manometer.

4.8 Sampling lead pipe. Teflon tube. Inner diameter is 6~7mm, with glass fiber filter in front of the lead pipe.

4.9 Aneroid barometer.

4.10 Mercury thermometers. 0~100°C.

4.11 pH acidity.

5 Samples

5.1 Sample collection Sampling system is in-series consisted of sampling lead pipe (4.8), sampling absorption tube (4.3), and air sampler (4.1).

5.2 Sample storage Collected sample shall be stored up at 2~5°C. Complete the analysis in 2 days, so as to prevent formaldehyde from oxidation.

6 Steps

6.1 Drawing of calibration curve Take 7 piece of 25ml colorimetric tube with stopper. Prepare the standard color columns according to following table.

6.2 Sample determination Transfer the after-absorbing sample solution into 50ml or 100ml flask. Use water to dilute to constant volume. Take less than 10ml of sample (the drawn amount is determined by sample concentration). In 25ml colorimetric tube (4.4), use water to fix constant volume to 10.0ml scale.

6.3 Blank test Use the absorbing liquid of blank absorption tube which does not sample on the spot to perform blank determination according to (6.1).

7 Results and expression

7.1 Calculation formula Calculate the formaldehyde absorbance y in the test sample with formula (6).

7.2 Precision and accuracy Analyzed by 6 laboratories, the 2 samples containing 2.96mg/L

and 3.55mg/L of formaldehyde are consistent.

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