**DEAS 345: 2021**

ICS 87.080

# DRAFT EAST AFRICAN STANDARD

## Toluene — Specification



## EAST AFRICAN COMMUNITY



Second Edition 2021

## Foreword

Development of the East African Standards has been necessitated by the need for harmonizing requirements governing quality of products and services in the East African Community. It is envisaged that through harmonized standardization, trade barriers that are encountered when goods and services are exchanged within the Community will be removed.

The Community has established an East African Standards Committee (EASC) mandated to develop and issue East African Standards (EAS) and other deliverables. The Committee is composed of representatives of the National Standards Bodies in Partner States, together with the representatives from the public and private sector organizations in the community.

East African Standards are developed through Technical Committees that are representative of key stakeholders including government, academia, consumer groups, private sector and other interested parties. Draft East African Standards are circulated to stakeholders through the National Standards Bodies in the Partner States. The comments received are discussed and incorporated before finalization of standards, in accordance with the principles and procedures for development of East African Standards.

East African Standards and other deliverables are subject to review, to keep pace with technological advances. Users of the East African Standards are therefore expected to ensure that they always have the latest versions of the standards they are implementing.

The committee responsible for this document is Technical Committee EASC/TC 069, *Organic and Inorganic chemicals.*

Attention is drawn to the possibility that some of the elements of this document may be subject of patent rights. EAC shall not be held responsible for identifying any or all such patent rights.

This second edition cancels and replaces the first edition (EAS 345:2004), which has been technically revised.

# Toluene — Specification

## 1 Scope

This Draft East African Standard prescribes the requirements, sampling and test methods for toluene.

## 2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ASTM D7504, *Standard Test Method for Trace Impurities in Monocyclic Aromatic Hydrocarbons by Gas Chromatography and Effective Carbon Number*

ASTM D86, *Standard Test Method for Distillation of Petroleum Products and Liquid Fuels at Atmospheric Pressure*

ASTM D4052, *Standard Test Method for Density, Relative Density, and API Gravity of Liquids by Digital Density Meter*

ASTM D1218, *Standard Test Method for Refractive Index and Refractive Dispersion of Hydrocarbon Liquids*

ASTM D2622, *Standard Test Method for Sulfur in Petroleum Products by Wavelength Dispersive X-ray Fluorescence Spectrometry*

ASTM D445, *Standard Test Method for Kinematic Viscosity of Transparent and Opaque Liquids (and Calculation of Dynamic Viscosity)*

ASTM D974, *Standard Test Method for Acid and Base Number by Color-Indicator Titration*

ASTM D5986, *Standard Test Method for Determination of Oxygenates, Benzene, Toluene, C8–C12 Aromatics and Total Aromatics in Finished Gasoline by Gas Chromatography/Fourier Transform Infrared Spectroscopy*

ISO 760, *Determination of water — Karl Fischer method (General method)*

ISO 13736, *Determination of flash point — Abel closed-cup method*

## 3 Terms and definitions

No terms and definitions are listed in this document. ISO and IEC maintain terminological databases for use in standardization at the following addresses: — ISO Online browsing platform: available at http://www.iso.org/obp

# 4 Requirements

## 4.1 General requirements

The Toluene shall be clear liquid, free of sediment or haze at 20.0 °C to 25.6 °C.

## 4.2 Specific requirements

The Toluene shall comply with specific requirements given in Table 1 when tested according to the methods prescribed

Table - 1: **Specific requirements for toluene**

| S/No. | Characteristic | Requirements | Test method |
|---|---|---|---|
| i) | Toluene, percent by mass, min | 99.8 | ASTM D7504 |
| ii) | Distillation range at 760 mmHg/°C | Not more than 5 °C from the dry point including the temperature of 110.6 °C | ASTM D86 |
| iii) | Specific gravity at 20/20 °C | 0.860 - 0.870 | ASTM D4052 |
| iv) | Refractive index at 25 °C | 1.490 - 1.500 | ASTM D1218 |
| v) | Sulfur content, mg/kg, max. | 1 | ASTM D2622 |
| vi) | Flash point °C, min | 4 | ISO 13736 |
| vii) | Viscosity at 25°C, mPa.s | 0.480 – 0.515 | ASTM D445 |
| viii) | Acidity | No free acid | ASTM D974 |
| ix) | Non-aromatics, max | 1.5 | ASTM D5986 |
| x) | Evaporation rate | 2.0 – 2.5 | |
| xi) | Water | Not sufficient to cause turbidity at 20°C | ISO 760 |
| xii) | Solvent power, Kauri-butanol value, min. | 100 | Annex B |

# 5 Packaging

The Toluene shall be packed in securely closed suitable containers that protects its quality.

# 6 Labelling

**6.1** Each package shall be legibly and indelibly labelled in English and/or any other official language (French, Kiswahili, etc) used in the importing East African Partner State with the following information:

a) the name of the product as "Toluene"

b) purity;

c) manufacturer's name and physical address;

d) net content in litres

e) country of origin;

f) batch number or lot number;

g) date of manufacture and expiry date.

h) cautions for safety such as signal words, hazard pictogram, precaution statement, and hazard statement

**6.2** Toluene shall be supplied with the safety data sheet which is written in language as depicted in 6.1

## 7 Sampling

Representative samples each having a volume of not less than 500 ml shall wherever possible be taken in triplicate from one or more original and unopened containers of dark glass or metal. The containers shall be of such size that they are nearly filled by the sample. Each sample container shall be sealed with a material unaffected by its contents.

# Annex B

(Normative)

## Determination of solvent power (Kauri-butanol value)

**B.1 Definition**

**Kauri-butanol value of a solvent**
The volume in millilitres at 25 °C of the solvent, corrected to a defined standard, required to produce a defined degree of turbidity when added to 20 g of a standard solution of kauri resin in normal butyl alcohol. The kauri resin solution is standardized against toluene, which has an assigned value of 105, and a mixture of 57 % n-heptane and 25 % toluene on a volume basis, which has an assigned value of 40.

**B.2 Significance and use**
The kauri-butanol value is used as a measure of solvent power of hydrocarbon solvents. High kauributanol values indicate relatively strong solvency.

**B.3 Apparatus**
**B.3.1 Water bath**, a clear glass vessel, maintained at 25 °C ± 1 °C. Alternatively, a room maintained at 25 °C ± 1°C may be used.
**B.3.2 Volumetric flask**, 200 ml capacity
**B.3.3 Erlenmeyer flask**, 250 ml capacity.
**B.3.4 Burette**, 50 ml capacity.
**B.3.5 Print specimen**, a sheet of white paper having on it black 10 on 12-point print No.31 Bruce Old Style type.

**B.4 Reagents**
**B.4.1 Purity of reagents** – Reagent grade chemicals shall be used in all tests.
**B.4.2 Kauri-butanol solution** – Place in a 3-litre flask 400 g of clean, pale bold kauri resin of grade XXXX, XXX, or XX ground to pea-size or smaller. Add, while agitating vigorously, 2000 g of n-butyl alcohol, (boiling range from 116 °C to 118 °C). Shake on a mechanical shaker until the resin goes into solution, warming to about 55 °C, if necessary, to aid solution. If a mechanical shaker is not available, fit the flask with a reflux condenser and heat on a steam bath until kauri resin is all dissolved. Permit the solution to stand for 48 h and then clarify by filtering through a Buchner funnel with suction, using double filter paper and changing as frequently as necessary.

**B.4.3 Standard toluene**

**B.4.4 Heptane-toluene blend** – Consisting of 25 %± 0.1 % toluene and 75 % ± 0.1 % n-heptane on volume basis for use as a low solvency standard.

NOTE The blend of 25 % ± 0.1 % toluene and 75 % ± 0.1 % heptane can be prepared in any way that will give the desired accuracy. The following technique is adequate.

Bring the pure toluene and pure heptane and a calibrated 200 ml volumetric flask to the same temperature, preferably in constant temperature room to thermostat. Run 50 ml of toluene into the 200 ml volumetric flask, using a burette of pipette calibrated to deliver 50 ml of toluene at the chosen temperature (preferably 25 °C). Fill the volumetric flask to slightly below the calibration line with n-heptane, insert the ground glass stopper of the volumetric flask, and mix carefully by repeatedly inverting the flask. Allow to stand for a few minutes, then bring to the 200 ml calibration mark with heptane and again carefully mix.

**B.4.5 Standardization**
**B.4.5.1** Weigh out 20 g ± 0.10 g of kauri-butanol solution in a 250 ml Erlenmeyer flask and place in the water bath at 250 °C. Titrate with the standard toluene into the flask, with constant swirling, while maintaining the mixture in the flask at 25 °C ± 1°C. Gradually reduce the successive amounts of toluene added as the end point is approached. The end point is reached when the sharp outlines of 10-point print placed directly beneath the water bath and observed through the liquid are obscured to blurred, but not the point where the print becomes illegible. Check the temperature in the flask immediately after the end point has been reached, and if over 26 °C, repeat the titration.

**B.4.5.2** The volume of toluene used, in milliliters, represents the actual titer for the particular kauributanol solution at hand. This value should lie reasonably close to 105 ml, but not over 110 ml nor under 100 ml. If these limits are exceeded, adjust the concentration of the kauri-butanol solution to bring the total volume of toluene within them. Designate the final value using toluene as A.

**B.4.5.3** Weigh out 20 g ± 0.10 g of the kauri-butanol solution (adjusted as described B4.5.2) in a 250 ml Erlenmeyer flask and place in the water bath. Titrate with the heptane toluene blend in the same manner as described in B4.5.1. Designate the volume, in milliliters, of the blend used in this titration as *B*.

NOTE If the composition of the blend is known to differ from 25 % ± 1.0 % toluene, but is within the range from 22 % to 28 % toluene, the constant in the blend factor equation will differ from 40.0 by 0.60 units for each 1 % toluene. For example, at 28 % toluene, the constant is 41.8 instead of 40.0.

**B.4.6 Procedure**

Weigh 20 g ± 0.10 g of the adjustable kauri-butanol solution into a 250 ml Erlenmeyer flask. Place the flask in the water bath at 25 °C ± 1 °C fill the 50 ml flask with the solvent being tested and titrate the solvent into the Erlenmeyer flask with the constant swirling while maintaining the mixture in the flask at 25°C. Gradually reduce the successive amounts of solvent added as the end point is approached. The end point is reached when the sharp outlines of 10 point print (See B3.5) placed directly beneath the water bath and observed through the liquid are obscured to blurred, but not to the point where the print becomes illegible. Check the temperature in the flask immediately after the end point has been reached and if over 26 °C of under 24 °C, repeat the titration. Designate the volume of solvent, in milliliters, to produce turbidity as C

**B.4.7 Calculation and report**

**B.4.7.1** Calculate the kauri-butanol value, V, as follows:

$$V = 65(C\text{-}B0\ /(A - B) + 40$$

where,

A = toluene required to titrate 20 g of kauri-butanol solution (B4.5.2) ml;
B = heptane toluene blend required to titrate 20 g of kauri-butanol solution (B4.5.3)
C = Solvent under test required to titrate 20 g of kauri-butanol solution (B4.6) ml.

**B.4.7.2** If the burette is maintained at a temperature other than 25 °C ± 1 °C, correct the volume of solvent used to standard temperature as follows:

Correction, ml = C (25 –T) x 0.0009

where,

C = Solvent used in the titration, ml; and
T = temperature of the solvent in the burette, °C.

## Bibliography

EAS 345:2004, Toluene –Specification
IS 537 : 2011, Toluene –Specification