

SEMI C24-0813

SPECIFICATION FOR n-BUTYL ACETATE

This Standard was technically approved by the Liquid Chemicals Global Technical Committee. This edition was approved for publication by the global Audits and Reviews Subcommittee on June 4, 2013. Available at www.semiviews.org and www.semi.org in August 2013. Originally published in 1978; previously published March 2001.

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1 Purpose

1.1 The purpose of this Specification is to standardize requirements for n-butyl acetate used in the semiconductor industry and to document testing procedures to support those specifications. Test methods have been shown to give statistically valid results.

2 Scope

2.1 The scope of this Specification is for one grade of n-butyl acetate used in the semiconductor industry.

NOTICE: SEMI Standards and Safety Guidelines do not purport to address all safety issues associated with their use. It is the responsibility of the users of the Documents to establish appropriate safety and health practices, and determine the applicability of regulatory or other limitations prior to use.

3 Limitations

3.1 None.

4 Referenced Standards and Documents

4.1 *SEMI Standards and Safety Guidelines*

SEMI C1 — Guide for the Analysis of Liquid Chemicals

4.2 *ASTM[®] Standards*¹

ASTM D5127 — Standard Guide for Ultra Pure Water Used in the Electronics and Semiconductor Industry

NOTICE: Unless otherwise indicated, all documents cited shall be the latest published versions.

5 Terminology

5.1 None.

¹ ASTM International, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959, USA; Telephone: +1.610.832.9585, Fax: +1.610.832.9555, <http://www.astm.org>. ASTM trademark is owned by ASTM International.

6 Properties

Table 1 Properties of n-Butyl Acetate

Chemical Formula	CH ₃ -CO-O-C ₄ H ₉
CAS Number	123-86-4
Density at 25°C	0.88 g/mL
Boiling Point	126.5°C

7 Requirements

7.1 The requirements for n-butyl acetate for Grade 1 are listed in Table 3.

8 Grade 1 Procedures

NOTE 1: Alternative methods may be used as long as they comply with SEMI C1 requirements for method validation.

8.1 *Assay* — Analyze the sample by gas chromatography (refer to SEMI C1). The parameters cited have given satisfactory results.

8.1.1 Column: 30 meter × 530 micron I.D. fused silica capillary, coated with 5 micron film of DB-1 or equivalent (100% methyl silicone which has been surface bonded and cross linked).

8.1.2 Column Temperature: 40°C isothermal for 5 minutes, then programmed to 200°C at 10°C/min.

Table 2 Chromatography Conditions

Injector Temperature:	150°C
Detector Temperature:	250°C
Sample Size:	0.2 µL splitless
Carrier Gas:	Helium at 3 mL/min
Detector:	Thermal Conductivity
Approximate Retention Times (min), Butyl Acetate:	8.0

8.2 *Color* — Dilute 3.0 mL of platinum-cobalt stock solution (APHA No. 500) to 100 mL with water. Compare this standard (APHA No. 15) with 100 mL of sample in Nessler tubes. View vertically over a white background. The sample must be no darker than the standard.

8.3 *Acidity* — To 57 mL (50 g) of sample in a 250 mL conical flask, add 0.5 mL of phenolphthalein indicator solution (refer to SEMI C1) and titrate with 0.1 N alcoholic potassium hydroxide until a slight pink color persists for at least 15 seconds. Not more than 1.0 mL of the potassium hydroxide solution shall be required.

8.4 *Residue After Evaporation* — Evaporate 90 mL (80 g) of sample to dryness. Dry at 105°C for 30 minutes, cool in a desiccator, and weigh (refer to SEMI C1, “Determination of Residue After Evaporation”).

8.5 *Water* — Add 25 mL of methanol to a dry titration flask and add Karl Fischer (KF) reagent to a visually or electrometrically determined endpoint that persists for 30 seconds. Add 25 mL (22 g) of sample, taking care to protect the sample and contents of the flask from moisture. Stir vigorously and titrate with Karl Fischer reagent to the same endpoint.

$$\% \text{ Water (H}_2\text{O)} = \frac{\text{mL KF reagent} \times \text{KF factor} \left(\frac{\text{gH}_2\text{O}}{\text{mL}} \right) \times 100}{\text{Mass of Sample (g)}} \quad (1)$$

8.6 *Phosphate* — To 11 mL (10 g) of sample, add 10 mL of sodium carbonate reagent solution (refer to SEMI C1) and evaporate to dryness on a steam bath in a hood. Dissolve the residue in 25 mL of 0.5 N sulfuric acid. Add 1 mL of ammonium molybdate reagent solution (refer to SEMI C1) and 1 mL of p-(methylanino)phenol sulfate reagent