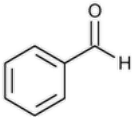


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# Benzaldehyde



C<sub>7</sub>H<sub>6</sub>O                    106.12  
Benzoic aldehyde;  
Phenyl formaldehyde    CAS RN<sup>®</sup>: 100-52-7.

**DEFINITION**  
Benzaldehyde contains NLT 98.0% and NMT 102.0% of benzaldehyde (C<sub>7</sub>H<sub>6</sub>O).

**IDENTIFICATION**

Change to read:

- **A.** ▲ [SPECTROSCOPIC IDENTIFICATION TESTS \(197\), Infrared Spectroscopy: 197F](#) ▲ (CN 1-MAY-2020)

**ASSAY**

• **PROCEDURE**

**Solution A:** Acetonitrile and glacial acetic acid (1000:1, v/v)  
**Solution B:** Glacial acetic acid and water (1:1000, v/v)  
**Mobile phase:** See [Table 1](#).

Table 1

Time (min)	Solution A (%)	Solution B (%)
0	18	82
20	60	40
30	60	40

**System suitability solution:** 0.1 mg/mL of [USP Benzoic Acid RS](#) and 0.06 mg/mL of [USP Methylparaben RS](#) in acetonitrile  
**Standard solution:** 0.15 mg/mL of [USP Benzaldehyde RS](#) in acetonitrile  
**Sample solution:** 0.15 mg/mL of Benzaldehyde in acetonitrile

**Chromatographic system**

(See [Chromatography \(621\), System Suitability](#).)

**Mode:** LC  
**Detector:** UV 235 nm  
**Column:** 4.6-mm × 25-cm; 5-µm packing L1  
**Flow rate:** 1.2 mL/min  
**Injection volume:** 10 µL

**System suitability**

**Samples:** *System suitability solution and Standard solution*  
**Suitability requirements**  
**Resolution:** NLT 2.0 between benzoic acid and methylparaben, *System suitability solution*  
**Tailing factor:** NMT 2.0 for benzoic acid and methylparaben, *System suitability solution*  
**Relative standard deviation:** NMT 2.0% for benzaldehyde, *Standard solution*

**Analysis**

**Samples:** *Standard solution and Sample solution*

Calculate the percentage of benzaldehyde ( $C_7H_6O$ ) in the portion of Benzaldehyde taken:

$$\text{Result} = (r_U/r_S) \times (C_S/C_U) \times 100$$

$r_U$  = peak response of benzaldehyde from the *Sample solution*

$r_S$  = peak response of benzaldehyde from the *Standard solution*

$C_S$  = concentration of [USP Benzaldehyde RS](#) in the *Standard solution* (mg/mL)

$C_U$  = concentration of Benzaldehyde in the *Sample solution* (mg/mL)

**Acceptance criteria:** 98.0%–102.0%

## IMPURITIES

### • LIMIT OF HYDROCYANIC ACID

**Sample solution:** Shake 0.5 mL of Benzaldehyde with 5 mL of water, add 0.5 mL of 1 N sodium hydroxide and 0.1 mL of ferrous sulfate TS, and warm the mixture gently.

**Acceptance criteria:** Upon the addition of a slight excess of hydrochloric acid, no greenish-blue color or blue precipitate is produced within 15 min.

### • LIMIT OF NITROBENZENE

**Sample solution:** Dissolve 1 mL of Benzaldehyde in 20 mL of alcohol, and mix with 10 mL of water.

**Analysis:** Add 1-g portions of zinc and 1-mL portions of 2 N sulfuric acid, as needed, to maintain a brisk evolution of hydrogen for 1 h. Filter, evaporate the liquid to 20 mL, and boil 10 mL of the concentrated liquid with 1 drop of potassium dichromate TS.

**Acceptance criteria:** No purplish color is produced.

### • CHLORINATED COMPOUNDS

**Analysis:** Wind a strip of 20-mesh copper gauze 1.5 cm wide and 5 cm long around the end of a copper wire. Heat the gauze in the nonluminous flame of a Bunsen burner until it glows without coloring the flame green. Permit the gauze to cool, and heat several times until a thick coat of oxide has formed. With a medicine dropper, apply 2 drops of Benzaldehyde to the cooled gauze, ignite, and permit it to burn freely in the air. Again cool the gauze, add 2 more drops of Benzaldehyde, and burn as before. Repeat this process until a total of 6 drops have been added and ignited. Then hold the gauze in the outer edge of the Bunsen flame, adjusted to a height of 4 cm.

**Acceptance criteria:** Not even a transient green color is imparted to the flame.

### • LIMIT OF ETHYLBENZENE, CYCLOHEXYLMETHANOL, BENZYL ALCOHOL, AND BENZOIC ACID

**Sample solution:** Neat Benzaldehyde

**Standard solution:** 0.1% of [USP Ethylbenzene RS](#), 0.1% of [USP Cyclohexylmethanol RS](#), 0.2% of [USP Benzoic Acid RS](#), and 0.2% of [USP Benzaldehyde RS](#) in [USP Benzyl Alcohol RS](#)

### Chromatographic system

(See [Chromatography \(621\)](#), [System Suitability](#).)

**Mode:** GC

**Detector:** Flame ionization

**Column:** 0.32-mm × 30-m fused silica capillary, coated with a 0.5-μm layer of phase G16

### Temperatures

**Detector:** 310°

**Injection port:** 200°

**Column:** See [Table 2](#).

Table 2

Initial Temperature (°)	Temperature Ramp (°/min)	Final Temperature (°)	Hold Time at Final Temperature (min)
50	5	220	35

**Carrier gas:** Helium

**Flow rate:** 1.2 mL/min

**Injection volume:** 0.1 μL

**Injection type:** Splitless injection

### System suitability

**Sample:** *Standard solution*

[NOTE—For relative retention times, see [Table 3](#).]

Table 3

Component	Relative Retention Time
Ethylbenzene	0.45
Benzaldehyde	1.00
Cyclohexylmethanol	1.03
Benzyl alcohol	1.45
Benzoic acid	2.04

System suitability requirements

**Resolution:** NLT 3.0 between benzaldehyde and cyclohexylmethanol

Analysis

**Samples:** *Standard solution* and *Sample solution*

Calculate the percentage of each impurity in the portion of Benzaldehyde taken:

Result =  $(r_u/r_T) \times 100$

$r_u$  = peak response of each impurity from the *Sample solution*

$r_T$  = sum of all the peak responses from the *Sample solution*

Acceptance criteria

**Each individual impurity:** NMT 1.0%

**Total impurities:** NMT 2.0%

SPECIFIC TESTS

- **WATER DETERMINATION, *Method I* (921):** NMT 1.5%

ADDITIONAL REQUIREMENTS

- **PACKAGING AND STORAGE:** Preserve in well-filled, tight, light-resistant containers. Store at room temperature, and avoid exposure to excessive heat.

- **USP REFERENCE STANDARDS (11).**

[USP Benzaldehyde RS](#)  
[USP Benzoic Acid RS](#)  
[USP Benzyl Alcohol RS](#)  
[USP Cyclohexylmethanol RS](#)  
[USP Ethylbenzene RS](#)  
[USP Methylparaben RS](#)

Auxiliary Information - Please [check for your question in the FAQs](#) before contacting USP.

Topic/Question	Contact	Expert Committee
BENZALDEHYDE	<a href="#">Documentary Standards Support</a>	SE2020 Simple Excipients

Chromatographic Database Information: [Chromatographic Database](#)

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