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## ^Morphine Sulfate Compounded Oral Solution

**DEFINITION**  
Morphine Sulfate Compounded Oral Solution contains NLT 90.0% and NMT 110.0% of the labeled amount of morphine sulfate pentahydrate  $(C_{17}H_{19}NO_3)_2 \cdot H_2SO_4 \cdot 5H_2O$ .

Prepare Morphine Sulfate Compounded Oral Solution, 0.4 mg/mL, as follows<sup>1</sup> (see [Pharmaceutical Compounding—Nonsterile Preparations \(.795\)](#)).

Morphine Sulfate Oral Solution <sup>a,b</sup>	20 mL
Purified Water, a sufficient quantity to make	100 mL

- <sup>a</sup> Morphine Sulfate Oral Solution 2 mg/mL, Roxane Laboratories, Columbus, OH.  
<sup>b</sup> Morphine Sulfate, *USP*, is morphine sulfate pentahydrate; therefore no additional calculation is needed to account for the waters of hydration.

Measure *Morphine Sulfate Oral Solution* into a calibrated container. Add a sufficient amount of *Purified Water* to final volume. Shake to mix well.

### ASSAY

• **PROCEDURE**

**Solution A:** A solution of 5.44 g/L of potassium phosphate dibasic in water, adjusted with phosphoric acid to a pH of 5.8. Pass through a polyvinylidene fluoride filter of 0.22-µm pore size.

**Mobile phase:** See [Table 1](#).

Table 1

Time (min)	Solution A (%)	Acetonitrile (%)
0	100	0
3	100	0
10	95	5
15	78	22
18	40	60
20	100	0
25	100	0

**Standard solution:** 0.1 mg/mL of [USP Morphine Sulfate RS](#) in water. Sonicate for 1 min and shake for 2 min.

**Sample solution:** Vortex the bottle for 1 min, then allow 1 min for bubbles to dissipate. Transfer about 8 mL of solution into a plastic cup.

Transfer 5.0 mL with a class A glass pipette into a 20-mL volumetric flask. Rinse the pipette 2 times using water and transfer the contents into the volumetric flask. Bring to volume with water. Vortex at least for 2 min.

**Chromatographic system**

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

**Mode:** LC  
**Detector:** UV 284 nm  
**Column:** 4.6-mm × 15-cm; 3-μm packing L1  
**Temperatures**  
**Autosampler:** 10°  
**Column:** 35°  
**Flow rate:** 1 mL/min  
**Injection volume:** 40 μL

**System suitability**  
**Sample:** *Standard solution*  
[NOTE—The retention time for morphine sulfate is about 13.5 min.]  
**Suitability requirements**  
**Tailing factor:** NMT 2.0  
**Relative standard deviation:** NMT 2.0% for replicate injections

**Analysis**  
**Samples:** *Standard solution* and *Sample solution*  
Calculate the percentage of the labeled amount of morphine sulfate pentahydrate (C<sub>17</sub>H<sub>19</sub>NO<sub>3</sub>)<sub>2</sub> · H<sub>2</sub>SO<sub>4</sub> · 5H<sub>2</sub>O in the portion of *Oral Solution* taken:

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

$r_U$  = peak response of morphine sulfate from the *Sample solution*  
 $r_S$  = peak response of morphine sulfate from the *Standard solution*  
 $C_S$  = concentration of [USP Morphine Sulfate RS](#) in the *Standard solution* (mg/mL)  
 $C_U$  = nominal concentration of morphine sulfate in the *Sample solution* (mg/mL)

**Acceptance criteria:** 90.0%–110%

**SPECIFIC TESTS**  
• **pH (791):** 2.9–3.9  
**Appearance:** Clear, blue solution with no particulates

**ADDITIONAL REQUIREMENTS**  
• **PACKAGING AND STORAGE:** Package in tight, light-resistant, plastic containers. Store in a refrigerator or at controlled room temperature.  
• **BEYOND-USE DATE:** NMT 90 days after the date on which it was compounded when stored at controlled room temperature or in a refrigerator.  
• **LABELING:** Label to indicate the *Beyond-Use Date*.  
• **USP REFERENCE STANDARDS (11).**  
[USP Morphine Sulfate RS](#)▲ (USP 1-Aug-2023)

<sup>1</sup> This formulation meets the requirements in [Antimicrobial Effectiveness Testing \(51\)](#).

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

Topic/Question	Contact	Expert Committee
MORPHINE SULFATE COMPOUNDED ORAL SOLUTION	<a href="#">Selma Mitiche</a> Associate Scientific Liaison	CMP2020 Compounding 2020
REFERENCE STANDARD SUPPORT	RS Technical Services <a href="mailto:RSTECH@usp.org">RSTECH@usp.org</a>	CMP2020 Compounding 2020

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