

# Monothioglycerol

## 1 Nonproprietary Names

USP–NF: Monothioglycerol

## 2 Synonyms

1-Mercaptoglycerol; 1-mercapto-2,3-propanediol; monothioglycerin;  $\alpha$ -monothioglycerol; thioglycerin; 1-thioglycerol.

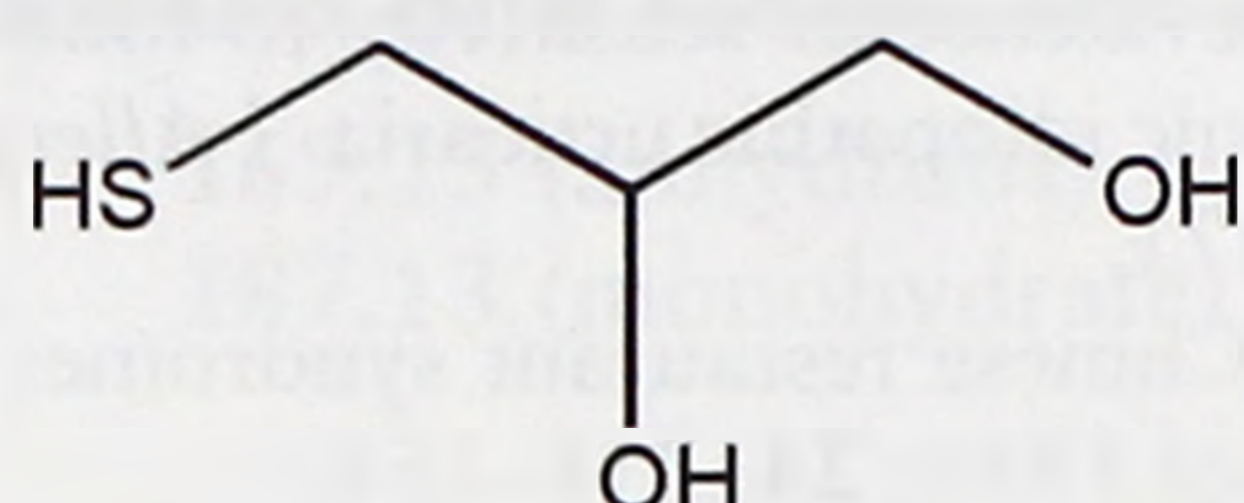
## 3 Chemical Name and CAS Registry Number

3-Mercapto-1,2-propanediol [96-27-5]

## 4 Empirical Formula and Molecular Weight

$C_3H_8O_2S$  108.16

## 5 Structural Formula



## 6 Functional Category

Antimicrobial preservative; antioxidant.

## 7 Applications in Pharmaceutical Formulation or Technology

Monothioglycerol is used as an antioxidant in pharmaceutical formulations, mainly in parenteral preparations.<sup>(1)</sup> Monothioglycerol is reported to have some antimicrobial activity.<sup>(2–4)</sup> It is also widely used in cosmetic formulations such as depilating agents.

## 8 Description

Monothioglycerol occurs as a colorless or pale-yellow colored, viscous, hygroscopic liquid with a slight odor of sulfide.

## 9 Pharmacopeial Specifications

See Table I.

**Table I:** Pharmacopeial specifications for monothioglycerol.

Test	USP 40–NF 35 S1
Specific gravity	1.241–1.250
Refractive index	1.521–1.526
pH (10% aqueous solution)	3.5–7.0
Water	≤5.0%
Residue on ignition	≤0.1%
Selenium	≤0.003%
Heavy metals	≤0.002%
Assay (anhydrous basis)	97.0–101.0%

## 10 Typical Properties

**Acidity/alkalinity** pH = 3.5–7.0 (10% w/v aqueous solution)

**Boiling point** 118°C

**Flash point** 110°C

**Refractive index**  $n_D^{25} = 1.521–1.526$

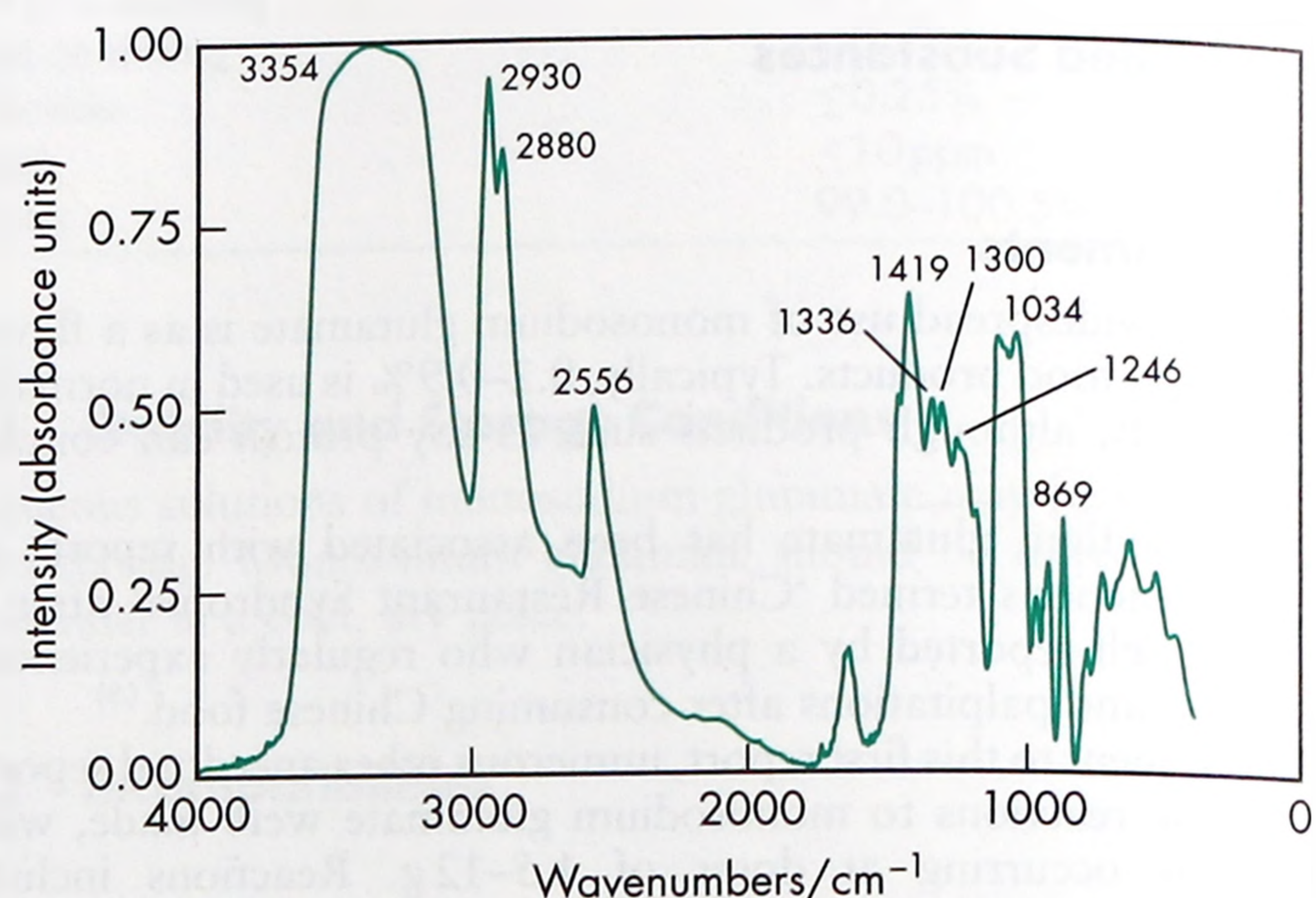
**Solubility** Miscible with ethanol (95%); freely soluble in water; practically insoluble in ether.

**Specific gravity** 1.241–1.250

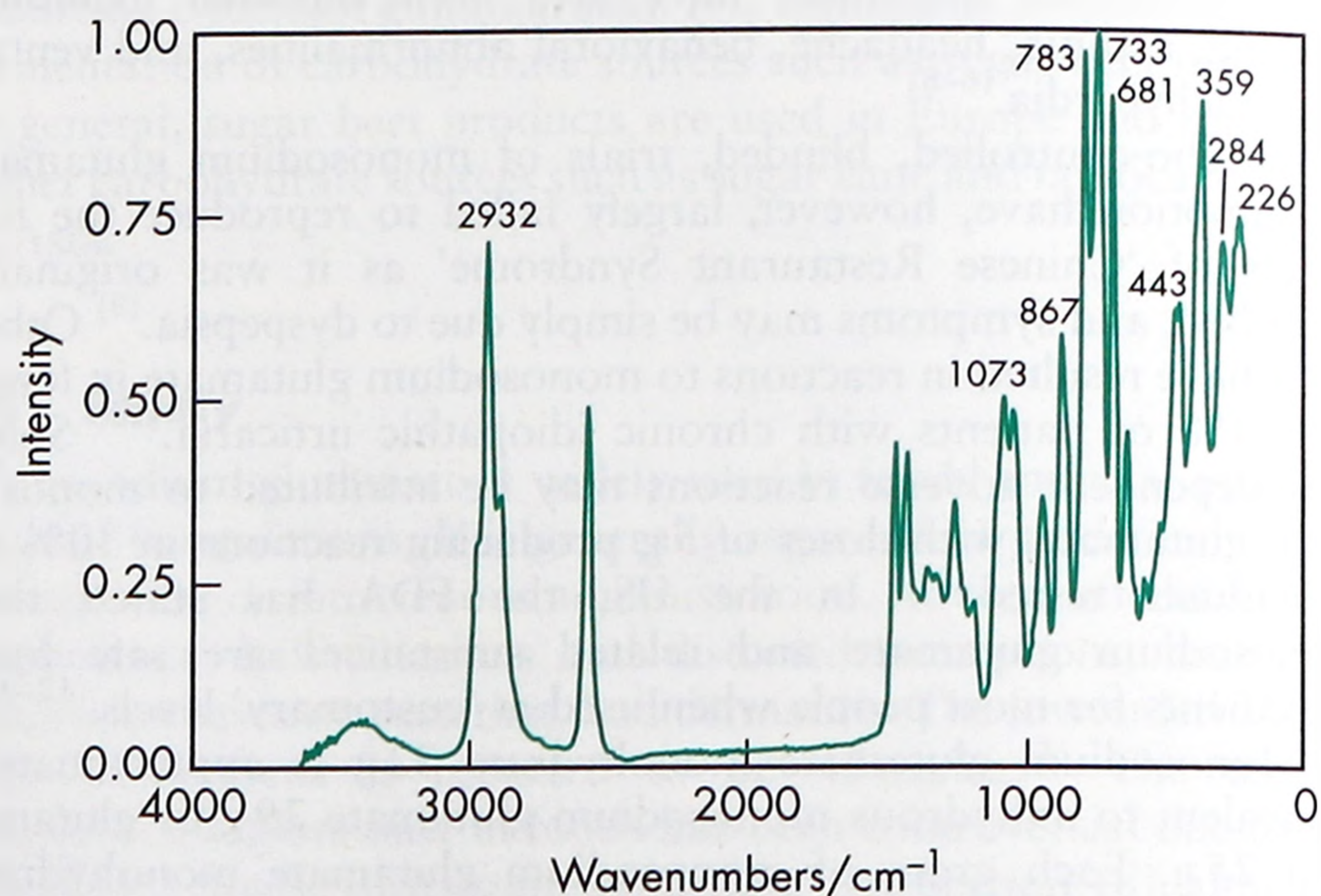
## Spectroscopy

IR spectrum *see* Figure 1.

Raman spectrum *see* Figure 2.



**Figure 1:** Infrared spectrum of monothioglycerol measured by transmission. Adapted with permission of Informa Healthcare.



**Figure 2:** Raman spectrum of monothioglycerol measured in the 180° reflectance mode. Adapted with permission of Informa Healthcare.

## 11 Stability and Storage Conditions

Monothioglycerol is unstable in alkaline solutions. Monothioglycerol should be stored in a well-closed container in a cool, dry place.

## 12 Incompatibilities

Monothioglycerol can react with oxidizing materials.

## 13 Method of Manufacture

Monothioglycerol is prepared by heating an ethanolic solution of 3-chloro-1,2-propanediol with potassium bisulfide.