

# Product Information

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## Superoxide Dismutase from *Escherichia coli*

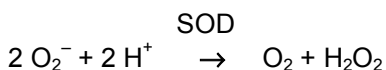
Catalog Number **S5389**  
Storage Temperature  $-20\text{ }^{\circ}\text{C}$

CAS RN 9054-89-1  
EC 1.15.1.1  
Synonyms: Superoxide:superoxide oxidoreductase;  
SOD

### Product Description

SOD from bovine erythrocytes was the first SOD to be found in mammalian tissues. Before its enzymatic activity was discovered the protein was known as haemocuprein or erythrocuprein.<sup>1</sup>

Superoxide Dismutase (SOD) catalyzes the conversion of superoxide radicals into hydrogen peroxide and molecular oxygen.



SOD plays a critical role in the defense of cells against the toxic effects of oxygen radicals. It competes with nitric oxide (NO) for superoxide anions, which react with NO to form peroxynitrite. SOD has suppressed apoptosis in cultured rat ovarian follicles, neural apoptosis in neural cell lines, and transgenic mice by preventing the conversion of NO to peroxynitrate, an inducer of apoptosis.<sup>2-4</sup>

Molecular weight:<sup>5</sup> 38.7 kDa (ultracentrifugation)

*E. coli* can produce two SODs depending on growth conditions.<sup>6</sup> Fe-SOD is a homodimeric non-covalently bound protein with one iron per mole and Mn-SOD has 1.6–1.8 moles Mn per mole.<sup>5,7</sup> There is high structural homology between these two enzymes.<sup>8</sup> This product (Catalog Number S5389) is a Fe-SOD.

Metal content (mole/mole):  
Fe 0.8 Mn 0.0039

There are three forms of SOD differentiated by the metal ions in the active site. These are  $\text{Cu}^{2+}/\text{Zn}^{2+}$ ,  $\text{Mn}^{2+}$ , and  $\text{Fe}^{2+}$  SOD. In vertebrate organisms Cu/Zn-SOD is found in the cytoplasm and the mitochondrial intermembrane space, while Mn-SOD is found in the mitochondrial matrix space and in prokaryotes.<sup>9</sup> Fe-SOD is found in prokaryotes and some higher plants.<sup>10</sup>

Extinction coefficient:<sup>5</sup>  $E^{\text{mM}} = 55$  (280 nm)

pH optimum:<sup>11</sup> 7.8

Isoelectric point:<sup>12</sup> 4.93

Inhibitors:  
Halides,<sup>13</sup> azide,<sup>13,14</sup>  $\text{H}_2\text{O}_2$ ,<sup>14</sup> perchlorate<sup>15</sup>

This product (Catalog Number S5389) is highly purified from *E. coli*. It is supplied as an off-white to light tan lyophilized powder.

Protein: ~70% (biuret), balance primarily Tris buffer salts.

Specific activity:  $\geq 1,000$  units/mg protein

Unit Definition: One unit will inhibit the rate of reduction of cytochrome c by 50% in a coupled system, using xanthine and xanthine oxidase, at pH 7.8 at  $25\text{ }^{\circ}\text{C}$  in a 3.0 ml reaction volume. The xanthine oxidase concentration should produce an initial (uninhibited)  $\Delta A_{550}$  of  $0.025 \pm 0.005$  per minute.

SOD is assayed spectrophotometrically in a 3.00 ml reaction mix. The final concentrations are 50 mM potassium phosphate, 0.1 mM EDTA, 0.01 mM cytochrome c, 0.05 mM xanthine, 0.005 unit of xanthine oxidase, and 1 unit of superoxide dismutase at pH 7.8 at  $25\text{ }^{\circ}\text{C}$ .

SOD has also been assayed photochemically in a system containing methionine, riboflavin, and nitroblue tetrazolium.<sup>16</sup>

### Precautions and Disclaimer

This product is for R&D use only, not for drug, household, or other uses. Please consult the Material Safety Data Sheet for information regarding hazards and safe handling practices.

### Preparation Instructions

SOD is soluble in water (20 mg/ml) yielding a colorless to light red solution. SOD is also soluble in aqueous buffers such as 0.1 M potassium phosphate, pH 7.5.

### Storage/Stability

Store the product at  $-20^{\circ}\text{C}$ . When stored at  $-20^{\circ}\text{C}$ , the enzyme retains activity for at least two years.

A solution of SOD in 0.1 M potassium phosphate, pH 7.5, shows no loss of activity after one hour at  $60^{\circ}\text{C}$ , after six hours at room temperature, or at least two days at  $4^{\circ}\text{C}$ . For long term storage, store in aliquots at  $-20^{\circ}\text{C}$ .

### References

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KAD,RBG,JWM,MAM 11/07-1

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