



#### Production of Sulfur Trioxide from Sulfur Dioxide

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### **Background & Description:**

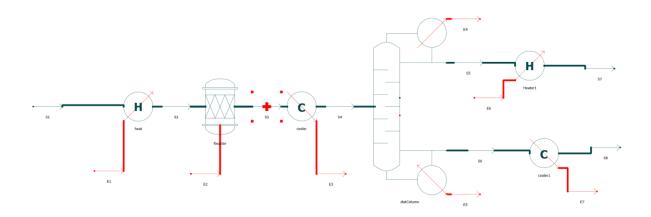
**Sulfur trioxide** (alternative spelling **sulphur trioxide**) is the chemical compound with the formula SO<sub>3</sub>. It is prepared on an industrial scale as a precursor to sulfuric acid, and is also known as sulfuric anhydride. In perfectly dry apparatus, sulfur trioxide vapor is invisible, and the liquid is transparent. However, it fumes profusely even in a relatively dry atmosphere (it has been used as a smoke agent) due to formation of a sulfuric acid mist. This vapor has no odor but is extremely corrosive.

Sulfur Trioxide is formed by adding an excess of oxygen to sulfur dioxide in the presence of the catalyst vanadium pentoxide at 450 °C and 1-2 atm.

$$2 SO_{2(g)} + O_{2(g)} \rightleftharpoons 2 SO_{3(g)}$$

This reaction can go backward or forward (it is a reversible reaction); so the sulfur dioxide can be oxidized into sulfur trioxide, or the sulfur trioxide can be reduced into sulfur dioxide.

### Flowsheet:







## Results:

# DWSIM – Mole Fractions:

	Feed	Bottoms	Products
Sulfur Dioxide	0.67	0.666	0.01
Oxygen	0.33	0.319	0
Sulfur Trioxide	0.0	0.0578	0.99

# OpenModallica – Mole Fractions:

	Feed	Bottoms	Products
Sulfur Dioxide	0.67	0.62854	0.0630
Oxygen	0.33	0.3136	0
Sulfur Trioxide	0.0	0.000852	0.9369