

# Production of Sulphur by Oxidation and Reduction of H<sub>2</sub>S

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## Background & Description:

Sulfur has the chemical formula S and an atomic weight of 32.07. It exists as rhombic crystals, m.p. 112.8°C and as monoclinic crystals, m.p. 119°C and it boils at 444.6°C. The specific gravity at 18°C of the rhombic form is 2.07 and of the monoclinic form is 1.96. The liquid has a specific gravity of 1.803. It is insoluble in water, but soluble in organic solvents and liquid ammonia.

Sulfur exists in the following forms: rock, lump, molten, ground powder and sublimed powder.

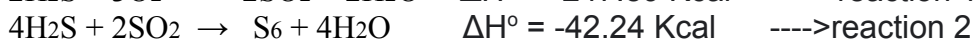
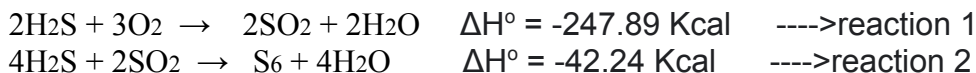
### Some end uses of elemental Sulfur are:

- 85 to 90% for sulfuric acid manufacture
- Rest for production of:
- SO<sub>2</sub>, SO<sub>3</sub>, CS<sub>2</sub>, and P<sub>2</sub>S<sub>5</sub>; rubber vulcanization agents; gunpowder, sulfur dyes; putties, sulfur concrete; paper.

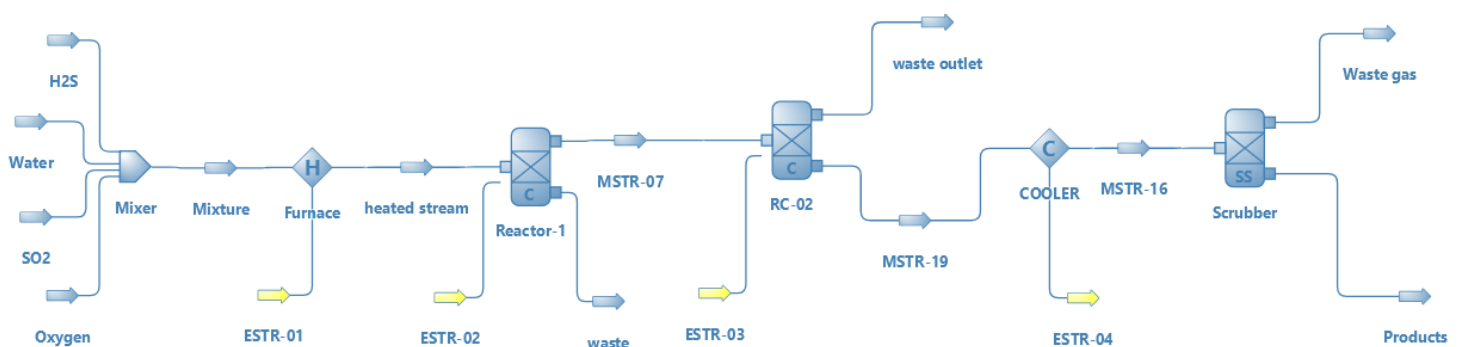
### Process Description:

H<sub>2</sub>S and Air are burned in the furnace along with Water and SO<sub>2</sub>. Reaction 1 takes place in the first reactor; the product SO<sub>2</sub> oxidizes H<sub>2</sub>S by reaction 2 in a two stage catalytic reactor with intercooling and condensing. Sulfur as the final product is obtained.

### Chemical reactions:



### Flowsheet:



## Results:

Results						
Object	H2S	Oxygen	Products	SO2	Water	
Temperature	300	300	25	300	300	C
Pressure	1.01325	1.01325	1.01325	1.01325	1.01325	bar
Mass Flow	1000	1500	14.2164	2500	1500	kg/h
Molar Flow	29.342	46.8768	0.445903	39.0236	83.2627	kmol/h
Volumetric Flow	1379.91	2204.55	10.9086	1835.22	3915.72	m3/h
Molar Enthalpy (Mixture)	9959.8	8385.45	3.35579E-08	12242.8	9516.55	kJ/kmol
Molar Entropy (Mixture)	23.5158	19.8417	0.938129	28.7963	22.5376	kJ/[kmol.K]
Molar Fraction (Mixture) / Sulfur	0	0	0.986988	0	0	