

Family of Patented Processes

HIGHSULF™

Selective Removal of H₂S
Enrichment of Acid Gas
Tail Gas Treatment

TKK COMPANY

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*“The beauty of HIGHSULF™ process in its simplicity”
- Dr. Tofik K. Khanmamedov, Inventor*

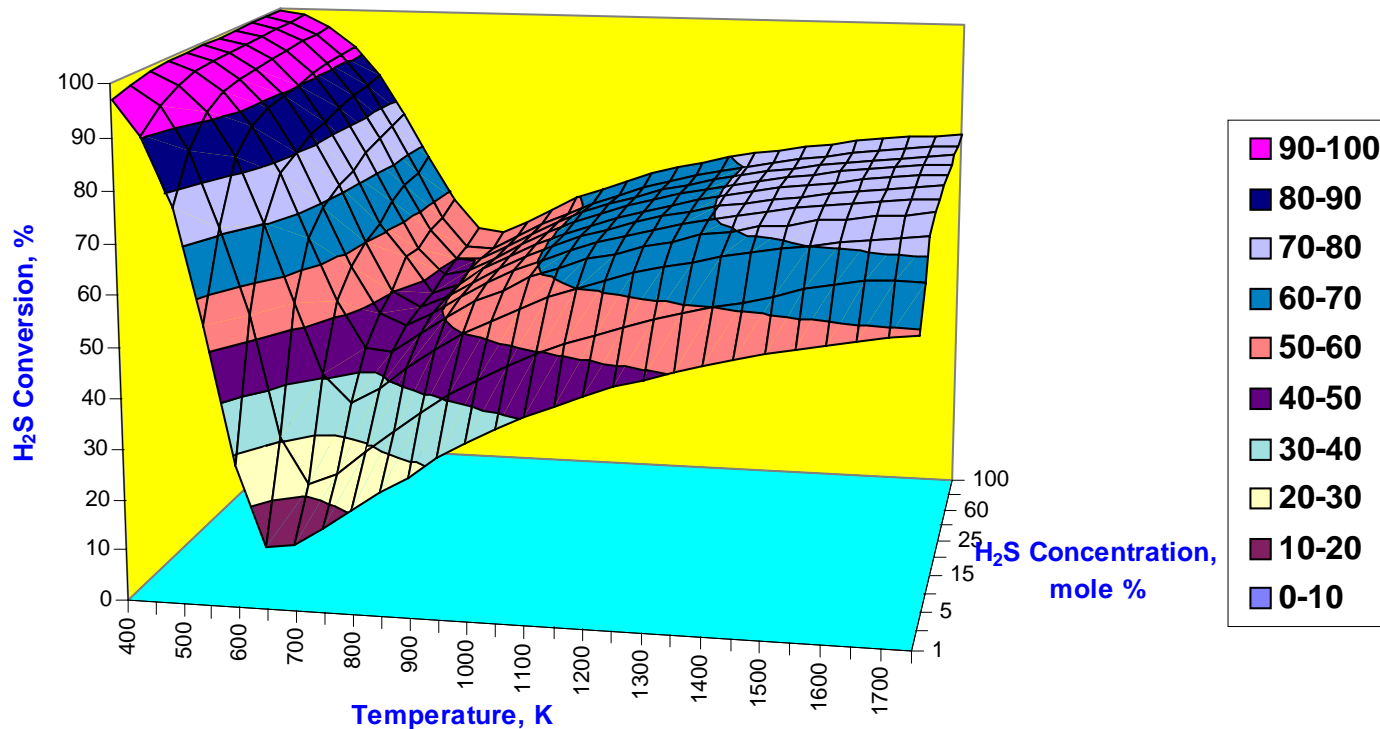
Family of Patented HIGHSULF™ Processes

**Acid Gas Enrichment at
Zero Operating Cost and
Next to Zero Capital Investment**



TKK TECHNOLOGY COMPANY (dba TKK COMPANY) – unique technology engineering company incorporated in Houston, Texas, USA. In alliance with engineering-construction companies we design, fabricate and supply units for amine desulfurization, sulfur recovery, tail gas treatment and other processes globally.

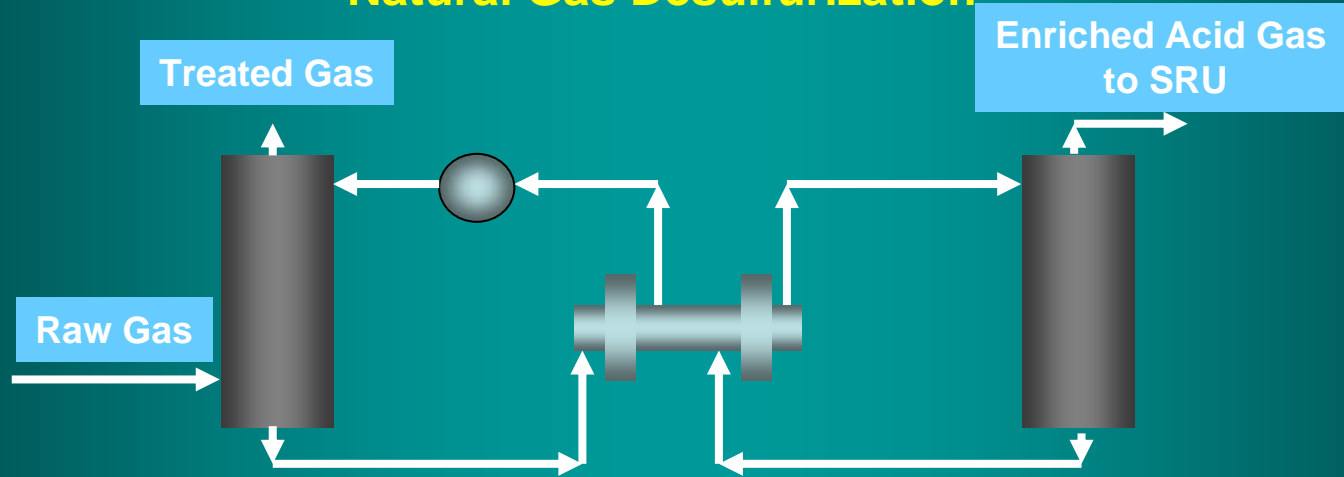
EQUILIBRIUM CONVERSION OF HYDROGEN SULFIDE TO SULFUR VS. TEMPERATURE VS. CONCENTRATION



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For the first time in sulfur world Dr. Tofik K. Khanmamedov expressed unique and complicated thermodynamic of Claus sulfur recovery process in 3d format.

Patented HIGHSULF™ Process - Natural Gas Desulfurization

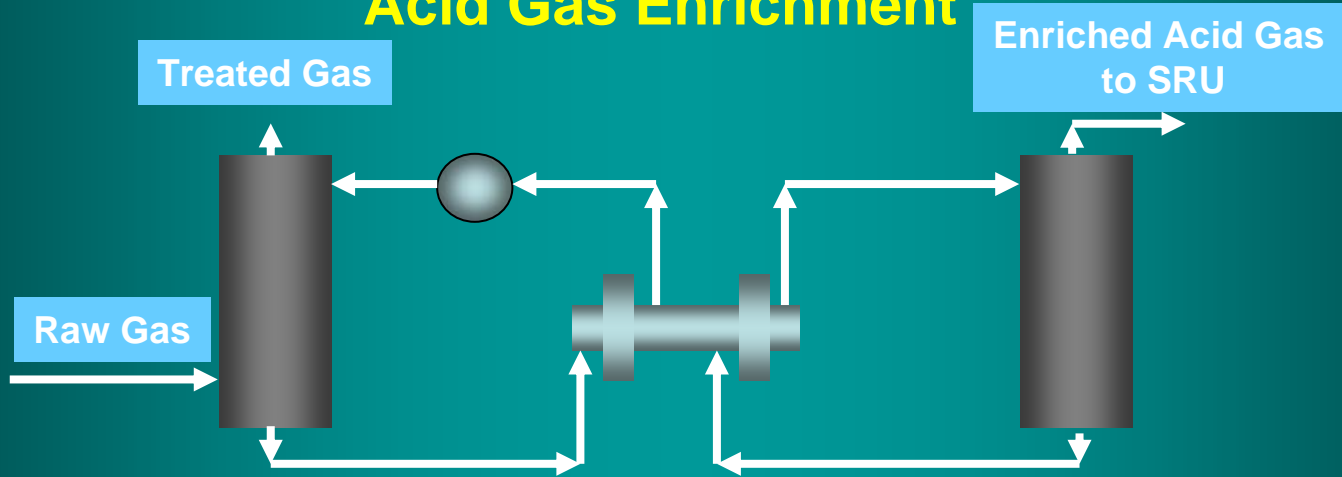


Components	Acid gas composition, mole %	
	Regular MDEA based amine unit	HIGHSULF MDEA based amine unit
H ₂ S	35.10	66.20
CO ₂	55.30	27.20
H ₂ O	8.43	6.40
Hydrocarbons	1.17	0.20

Advantages of our patented HIGHSULF™ process in compare with regular:

- Substantial increases in the concentration of H₂S in the acid gas
- Reduces the size of a new SRU or increases the capacity of an existing one
- Substantially reduces the level of hydrocarbons in the acid gas and leads to an increased life for catalyst in the first reactor of SRU
- Reduces losses of amine
- Requires zero operating cost and next to zero capital investment

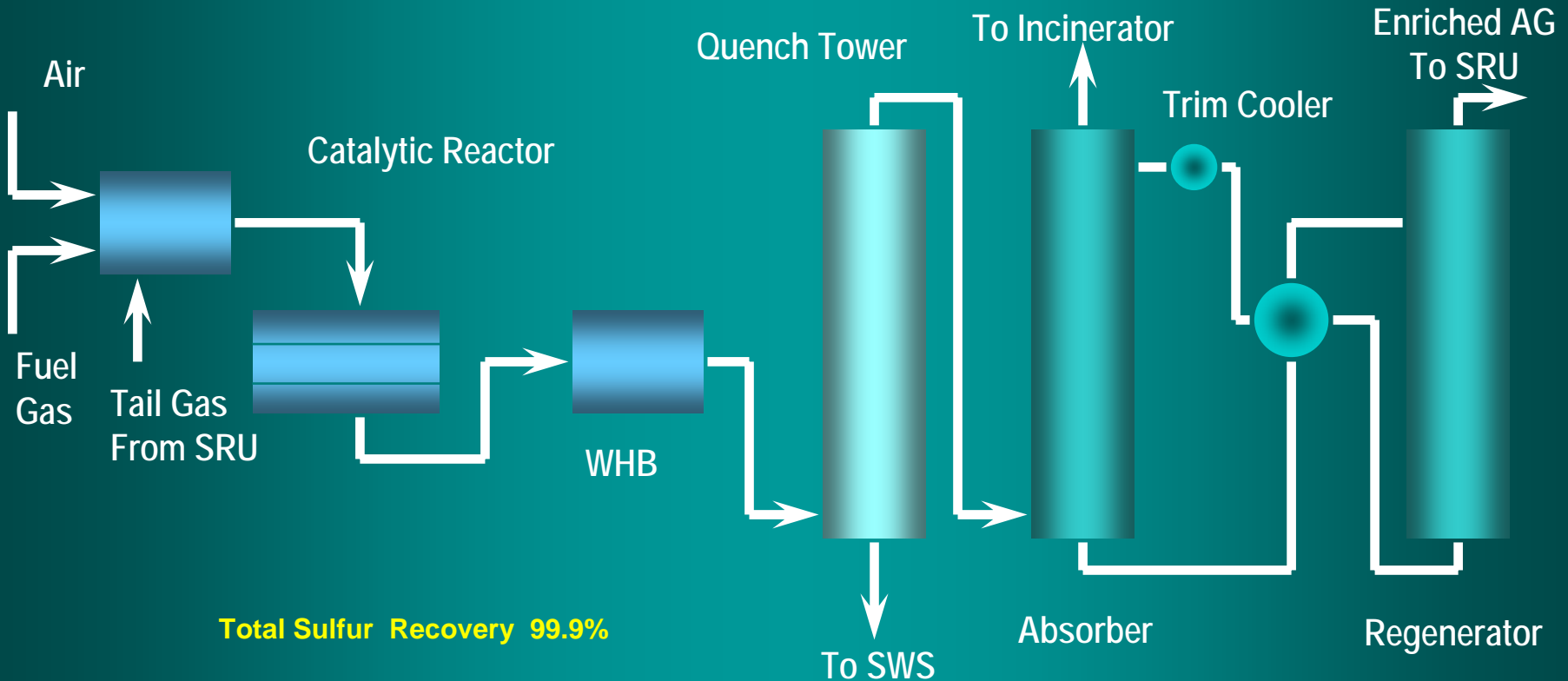
Patented HIGHSULF™ Process - Acid Gas Enrichment



Parameters	Relative extent of HIGHSULF™ process application in regular amine unit*, MDEA				
	Regular	1	2	3	4
H ₂ S in SRU feed (%)	29.1	33.4	39.5	48.9	67.2
Mass flow to SRU (kg/hr)	665	573	477	377	261
H ₂ S to incineration (ppmv)	0.5	0.6	0.7	1.0	4.1
CO ₂ slip (%)	80.4	84.0	87.8	91.9	96.4

*Khanmamedov, T. K., Weiland, R. H., "Upgrading Acid Gas Streams", SULPHUR, Sept-Oct, 2008.
 Khanmamedov, T. K., "Superior Gas Sweetening", HYDROCARBON ENGINEERING, Dec, 2003
 Khanmamedov, T. K., "Family of HIGHSULF™ Processes", Khimia i Teknologija Topliv i Masel, 6, 2003 (Russia)

Patented HIGHSULF™ Process - Tail Gas Treatment



Advantages of our patented HIGHSULF™ TGTU in compare with regular TGTU:

- More effectively utilize generic MDEA.
- Substantially enriches acid gas with hydrogen sulfide.
- Substantially reduces acid gas flow rate and increases capacity of SRU.
- Reduces operating cost of water coolers and eradicates trim cooler problems.
- Requires zero operating cost and next to zero capital investment.

Patented HIGHSULF™ Process - Tail Gas Treatment

Total Sulfur Recovery – 99.9%

Parameters	Relative extent of HIGHSULF™ application in regular Tail Gas Treatment Unit, MDEA*					
	0	1	2	3	4	5
H ₂ S to SRU (МОЛ %)	38.6	41.8	46.4	53.6	66.3	71.4
H ₂ S to Incinerator (ppmv)	5.3	6.4	7.3	9.3	16.6	40.2
CO ₂ Slip (%)	58.8	64.2	70.8	78.7	88.5	91.4

* Generic Methyldiethanolamine

*Khanmamedov, T. K., Weiland, R. H., "Upgrading Acid Gas Streams", SULPHUR, Sept-Oct, 2008.

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