H_2S Odour Scrubber: Hypochlorite, Caustic and Water Use

Hydrogen sulphide removed from an air stream, sodium hypochlorite and caustic consumed by stoichiometry, scrubbing water flow and caustic solution volume.

Input parameters

Unit system: SI

Parameter	Value	Unit
Air flow	120.00	m^3/min
H_2S in the air (ppmv)	50.000	
Air temperature	25.000	°C
Air pressure	1.0000	atm
Air density	1.2040	kg/m^3
Liquid-to-gas mass ratio	2.0000	
Caustic solution density	1,520.0	kg/m^3
NaOH in the solution	50.000	%

Calculated results

Parameter	Value	Unit
H_2S concentration	69.649	mg/m^3
H_2S to treat	12.035	kg/d
Sodium hypochlorite (8.74 kg/kg)	105.15	kg/d
Caustic (2.35 kg/kg)	28.252	kg/d
Caustic solution volume	37.174	L/d
Scrubbing water	0.28896	m^3/min

Notes for this case

- Stoichiometry of H_2S + 4 NaOCl + 2 NaOH → Na_2SO_4 + 4 NaCl + 2 H_2O: 8.74 kg of hypochlorite and 2.35 kg of caustic per kg of H_2S. Practical scrubbers use 2-3 kg NaOH per kg of sulphide and a pH of 11-12.5; the supplier fixes the water rate.

Formula and method

$$C_{H_2S} = y\frac{pM_{H_2S}}{RT}, \quad M_{NaOCl} = \frac{4M_{NaOCl}}{M_{H_2S}}M_{H_2S}, \quad M_{NaOH} = \frac{2M_{NaOH}}{M_{H_2S}}M_{H_2S}$$

Variables

Q_a	Air flow	m^3/s
y	H_2S in the air (ppmv)	-
T	Air temperature	K
p	Air pressure	Pa
ρ_a	Air density	kg/m^3
L/G	Liquid-to-gas mass ratio	-
ρ_s	Caustic solution density	kg/m^3
w	NaOH in the solution	-
C_{H_2S}	H_2S concentration	kg/m^3
M_{H_2S}	H_2S to treat	kg/s
M_{NaOCl}	Sodium hypochlorite (8.74 kg/kg)	kg/s

M_{NaOH}	Caustic (2.35 kg/kg)	kg/s
V_{NaOH}	Caustic solution volume	m³/s
Q_w	Scrubbing water	m³/s

Method and standards

Stoichiometric chemical scrubber requirements.

Assumptions and limits

- Complete oxidation to sulphate; real consumption is higher.

Report details

Report reference	FCC-TXZA-H3FX (the same inputs always give the same reference)
Generated	23 November 2026, 17:51 UTC
Calculator	H_2S Odour Scrubber: Hypochlorite, Caustic and Water Use
Method last reviewed	17 November 2026
Software release	FireCAD Calc, release of 22 November 2026
Release checks	3 reference cases of this calculator, computed independently, are checked on every release

Results are for engineering estimation. Verify critical designs against the referenced standards and your own data.

This calculator online

https://calc.firecad.com/environmental/wastewater/h2s-scrubber-hypochlorite-caustic

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.