



Acetylene Recovery Units (ARUs): From the pioneer and leader in continuous recovery technology.



Linde Acetylene Recovery Unit in La Porte, Texas (USA).

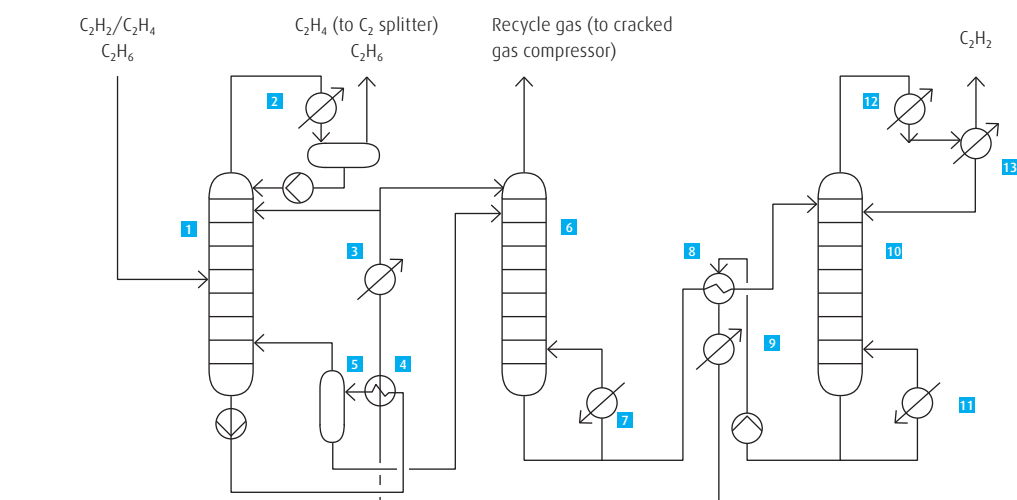
Maximising flexibility and efficiency of acetylene recovery

Having pioneered the continuous recovery of acetylene (C_2H_2) in a commercial steam cracker over forty years ago, Linde continues to refine this process to the benefit of its customers. Building on its track record and proven expertise in this area, Linde now offers customers even more flexibility by supporting different process pressures, acetylene concentrations and acetylene flow rates. For maximum efficiency, Linde ARUs use dimethylformamide (DMF) as the absorption solvent.

Highlights of Linde's ARU offering

- Long-term experience and proven track record for reliable ARU design and highest safety standards
- Ease of integration with any steam cracker technology due to capability to adjust to different process pressures
- Greater flexibility to existing ethylene plants with C_2 hydrogenation
- Added value to hydrogen production of existing ethylene plants with C_2 hydrogenation
- Extremely pure ethylene stream with < 0.1 ppm vol. acetylene
- Energy consumption and operating cost comparable to those of acetylene hydrogenation units
- Piping and equipment are designed to exclude the risk of acetylene decomposition

Process overview



- 1 DMF scrubbing column: Scrubbing of the acetylene, as well as small quantities of ethylene and ethane, using DMF.
- 2 Heat exchanger: Overhead gas fraction cooled and condensed by vaporising the ethylene. Condensate serves as reflux to scrub vapours.
- 3 Heat exchanger: Regenerated DMF stream is cooled against vaporising propylene.
- 4 Heat exchanger: Loaded DMF is preheated against generated DMF.
- 5 Separator: Released hydrocarbons are separated and passed back to the scrubbing column.
- 6 Stripper/absorber: Ethylene and ethane are removed from the loaded DMF.
- 7 Heat exchanger: Stripping gas is generated by heating the loaded DMF with steam.
- 8 Heat exchanger: Rich DMF is heated against lean DMF.
- 9 Heat exchanger: Lean DMF is cooled with water.
- 10 Regeneration column: Acetylene is separated from DMF by simultaneous reboiling and stripping with DMF vapour.
- 11 Heat exchanger: Stripping gas required is generated by heating with steam.
- 12 Heat exchanger: Regeneration column overhead is cooled with water.
- 13 Heat exchanger: Overhead gas is further cooled against vaporising propylene, DMF vapour is condensated releasing high purity acetylene product.

Technical data

Material balance

	Gas feed [mol%]	Gas after scrubbing [mol%]	Recycled gas [mol%]	Pure C ₂ H ₂ [mol%]
Methane (CH ₄)	Traces	Traces	-	-
Acetylene (C ₂ H ₂)	0.9	0.1 vppm	1	99.9
Ethylene (C ₂ H ₄)	65	67	82.8	Traces
Ethane (C ₂ H ₆)	34	32.9	14.8	Traces
C ₃	Traces	0.1	1.4	Traces
DMF	-	Traces	Traces	Traces
kg/h	228000	222000	4800	2000
°C	-13	-16	-26	-40
bar abs.	25	23	1	1

C₂ fraction from a plant producing 1200 kilo tonnes per annum of ethylene (C₂H₄).

Utilities consumption

DMF	kg/h	1
Heating steam	t/h	9
Cooling water	m ³ /h	260
Electrical energy	kW	290
Compression energy (for refrigeration coverage)	kW	3600
Space requirements	m	approx. 45 x 60

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