

PED ORIENTATION PROGRAM

METHYL CHLORIDE UNIT

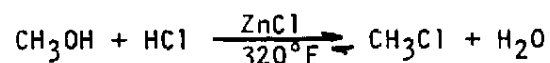
LAKE CHARLES CHEMICAL PLANT

The methyl chloride plant was built at Westlake in 1961 as a joint 50/50 venture of Conoco and Ancon Chemical. Conoco operated the plant and Ansul marketed the product. Design capacity of the Reactor was 20 MM pounds per year. Design capacity of downstream equipment was 40 MM pounds per year. Conoco and Ancon did the process design based on pilot plant data from Ancon. Blow-Knox built the plant. Shortly after startup, the plant operated at 28 MM pounds per year. Several changes and additions were completed prior to 1966 based on a design by PED which increased the capacity to 55 MM pounds per year. Near the end of 1966, a design was issued by PED to expand the plant capacity to 78 MM pounds per year. The plant was expanded to 98 MM pounds per year capacity in 1970.

In 1972, Conoco acquired full ownership of the methyl chloride plant in return for some concessions to Ancon. Another expansion was completed late in 1973 to raise production capability to 112 MM pounds per year.

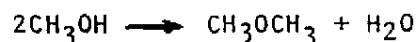
GENERAL DESCRIPTION

Methanol and HCl are reacted at approximately 320°F and 22 psig in the presence of 60-70 percent ZnCl solution catalyst to yield methyl chloride and water as shown in the following reaction:



Theoretical conversion for CH₃OH and HCl is approximately 97 to 98 percent at these conditions. Actual reaction conversions typically run above 94 percent for HCl and approximately 89 percent for methanol. Overall plant yields for both HCl and methanol are 94 percent. The methanol recovery unit recycle raises the overall methanol yield above reaction conversion.

An undesirable side reaction also occurs which produces dimethyl ether. This tends to reduce methanol conversion to methyl chloride.



Operating experience has shown that this reaction can be minimized by limiting the reaction temperature to under 350°F and feeding a slight excess of HCl. Typical mol feed ratios are 1.05-1.10 HCl to methanol.

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The sulfuric acid scrubbers remove dimethyl ether and water from the methyl chloride stream. Methyl chloride refrigerant is flashed into each scrubber to compensate for heats of solution and lower the temperature to 50°F out the last scrubber. Acid is circulated from the acid receivers to the scrubbers which are also packed with polypropylene intalox saddles. Fresh 93 percent H₂SO₄ is metered into the last acid receiver and spent acid removed from the first acid receiver goes to storage.

The methyl chloride flows through a knockout pot to prevent any sulfuric acid from entering the carbon bed or compressor suction. The carbon bed removes impurities which would foul the compressor cylinders. The methyl chloride is compressed from 10 to 165 psig in the two-stage reciprocating lubricated compressors and is cooled to 120°F in the aftercoolers. Oil from the compressor cylinders, along with a small amount of condensed methyl chloride, is separated from the main process vapor stream in the oil knockout pot. This material goes to slop storage and is recycled to the process.

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PROCESS DESCRIPTION (CONTINUED)

The methyl chloride vapor is condensed at 100°F and 160 psig. Most of the CO₂ also condenses in the methyl chloride stream. The condenser vent gas containing methyl chloride, nitrogen, and some CO₂ goes to a vent gas chiller which uses methyl chloride as a refrigerant to condense most of the remaining methyl chloride before venting the gas to the atmosphere at 20°F. The refrigerant methyl chloride is recycled to the compressors.

The methyl chloride product containing CO₂ goes to intermediate storage where it is pumped to the CO₂ stripper. Heat for stripping is furnished by a steam reboiler. The CO₂-rich vapor is taken overhead and goes to an overhead condenser similar to the vent gas chiller. Most of the methyl chloride in the gas stream is condensed and recovered before venting the CO₂ stream at 40°F. As in the vent chiller, methyl chloride is used as a refrigerant and is recycled to the compressors.

The purified methyl chloride product (stripper bottoms) is cooled to 100°F in the product cooler and flows to product storage where it is loaded into tank cars.

PRODUCT

Approximately 500 MM pounds of methyl chloride are produced per year in the U.S. However, 300 MM pounds are for captive requirements, and the other 200 MM pounds are marketed. Conoco market all of their methyl chloride making it the supplier of 50 percent of all methyl chloride available for sale in the U.S. Conoco are the only true marketer since the other 100 MM pounds sold are excess production from companies with captive uses.

The main uses of methyl chloride are as follows:

1. Silicones
2. Tetramethyl lead
3. Additive in synthetic rubber
4. Propellant gas in aerosol spray bombs
5. Weed Killers

Silicones and tetramethyl lead combined account for approximately 75 percent of the methyl chloride end use. At present, usage for each product is about the same, but usage for silicones will increase while tetramethyl lead will decrease due to environmental regulations concerning lead content in gasoline.

The third important use for methyl chloride is in synthetic rubber production. All other uses of methyl chloride, such as weed killers and propellant in aerosol spray bombs, are minor.

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METHYL CHLORIDE

<u>Test</u>	<u>Specification</u>	<u>Typical Property</u>	<u>Test Method</u>
Methyl Chloride, Wt %	99.95 Min	99.97	1.500
Dimethyl Ether, ppm Wt	20.0 Max	<5	1.500
Lower Boiling Compounds, ppm Wt	250.0 Max	50	1.500
Higher Boiling Compounds, ppm Wt	100.0 Max	<25	1.500
Water, ppm Wt	80.0 Max	35	1.500
Acidity, as HCl, ppm	10.0 Max	<4	1.501
Residue, ppm Wt	100.0 Max	<50	1.502

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D-26
K.O. POT

R-1
REACTOR

R-2
REACTOR

R-3
REACTOR

R-4
REACTOR

D-8
V&C
VAPORIZER

W-1A
SEPARATOR

W-2
BRINE
SCRUBBER

W-3
BRINE
SCRUBBER

W-1B
BRINE
SEPARATOR

D-3
D-3

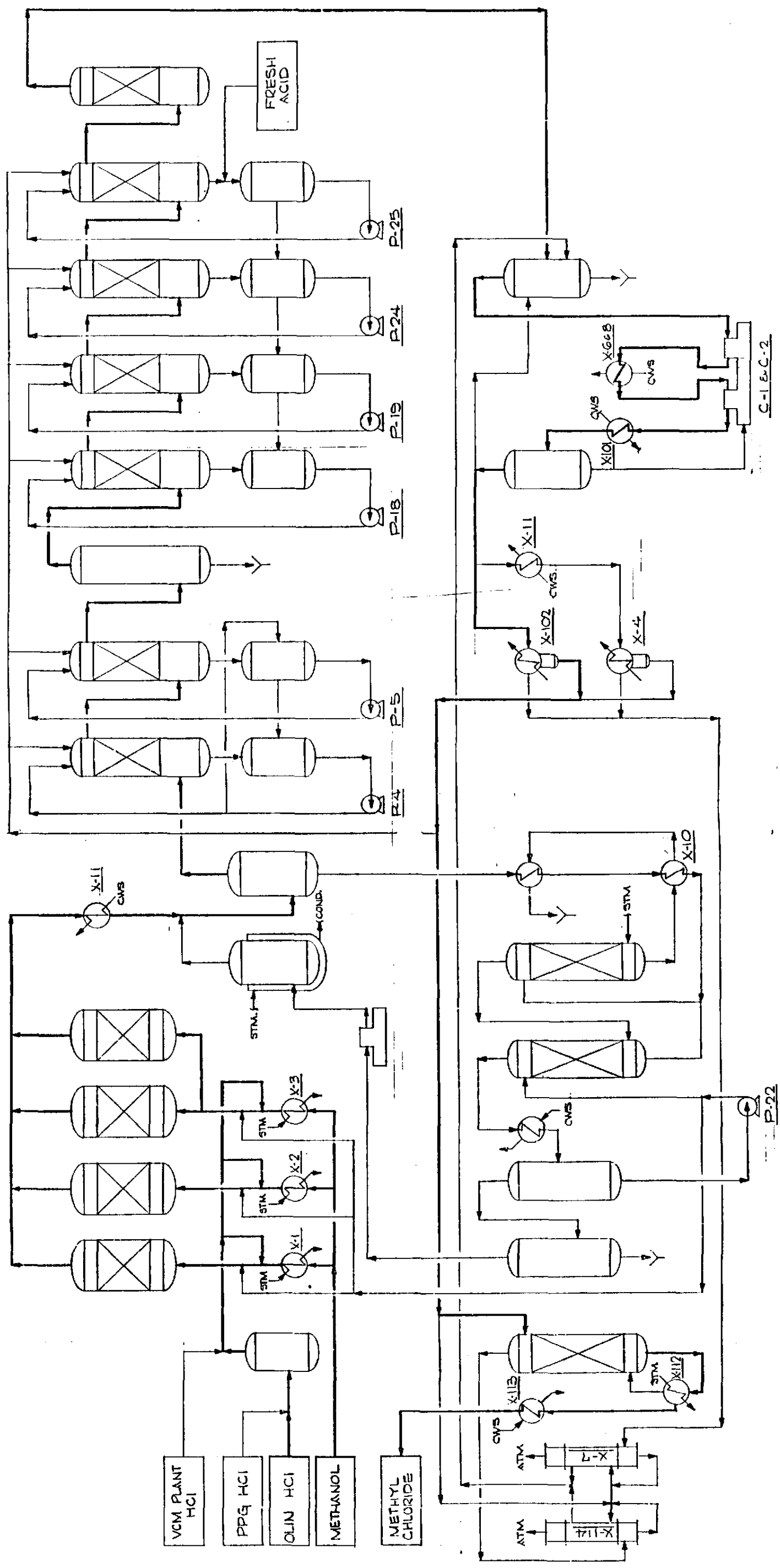
W-4
ACID
SCRUBBER

W-5
ACID
SCRUBBER

W-6
ACID
SCRUBBER

W-7
ACID
SCRUBBER

D-11
CARBON
D-11



W-112
CO2
STRIPPER

D-20
K.O.
DRUM

D-25
REFLUX
DRUM

W-22
METHANOL
STRIPPER

W-21
METHANOL
STRIPPER

D-8
OIL K.O.
POT

D-7
ACID K.O.
POT

ISSU	DATE	DESCRIPTION	BY	CHKD	APR
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CONTINENTAL OIL COMPANY
ENGINEERING CENTER
PONCA CITY, OKLAHOMA

OVERALL PROCESS FLOW DIAGRAM
METHYL CHLORIDE UNIT
LAKE CHARLES CHEMICAL PLANT

APPROVED: _____
DATE: _____

NO. CT-25-D

Ethylene Unit

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