REV	Description	Eng	Date	Appr	Date
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REVISION HISTORY

MARSSPACECONSTRUCTION. LLC
Montgomery, TX 77356
All we have to do is SCIENCE the HELL out if this
Texas Registered Engineering Firm F-XXX
Work by Mars Space Construction, LLC

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		GJR	6/11/2021

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BY	X	
APPR.	X	
NO.	X	
FIRM	X	

Title: Starship - MSC Rocket Propellant Plant Module

Design Variables need to be defined:

1. Extract 1 ton of ice per day to produce drinkable water and air for the base.
2. Locate module sufficient distance away from other modules for safety concerns.
3. Locate Propellant Plant sufficient distance away from other modules for safety concerns yet close to Starship
4. Locate landing locations.

Design to Scale:

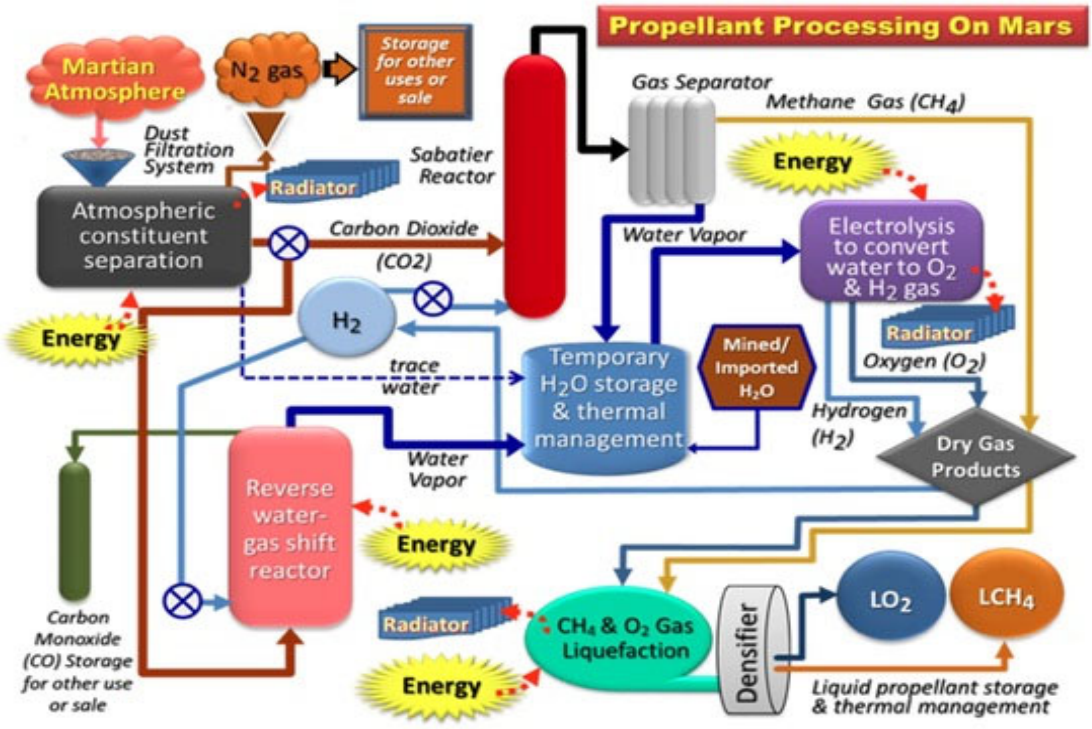
1. Process package to generate propellant in 2 months for re-fill Starship for return trip to Earth.
2. FULL cargo package design for processing & storage for re-fill multiple Starships for return trip to Earth.

PROPELLANT PROCESSING MODULE MSC-D-XXXX-P04-112

LIQUID OXYGEN PLANT MODULE MSC-D-XXXX-P04-014

Atmospheric Constituent Separation

Major constituents of dry air, by volume (by Wikipedia)



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REV.	DATE	BY	APPR.	NO.	FIRM	Request for Quotation
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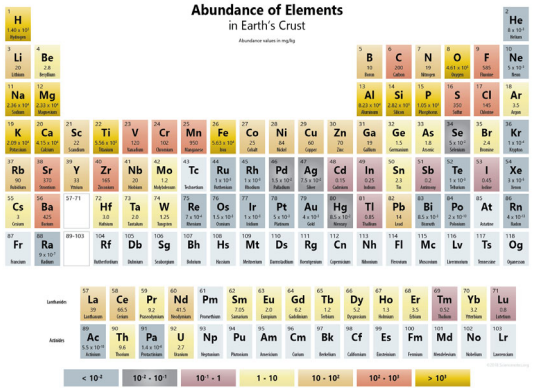
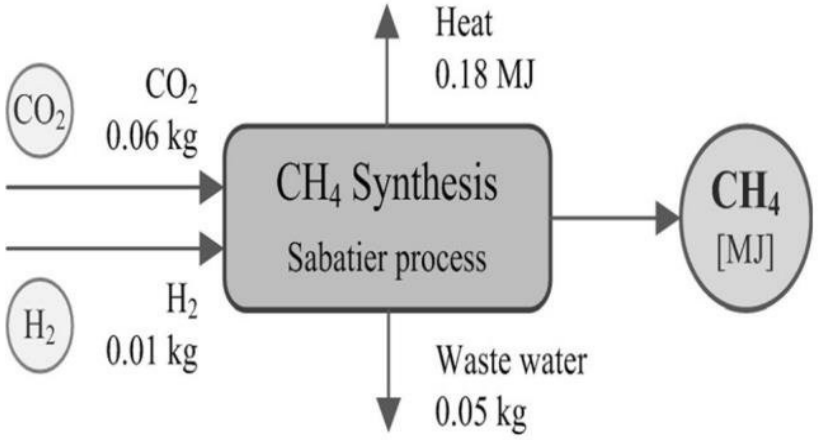
Title: Starship Module - MSC Rocket Propellant Plant





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Job No.	XXXXXXXX	By:	Date
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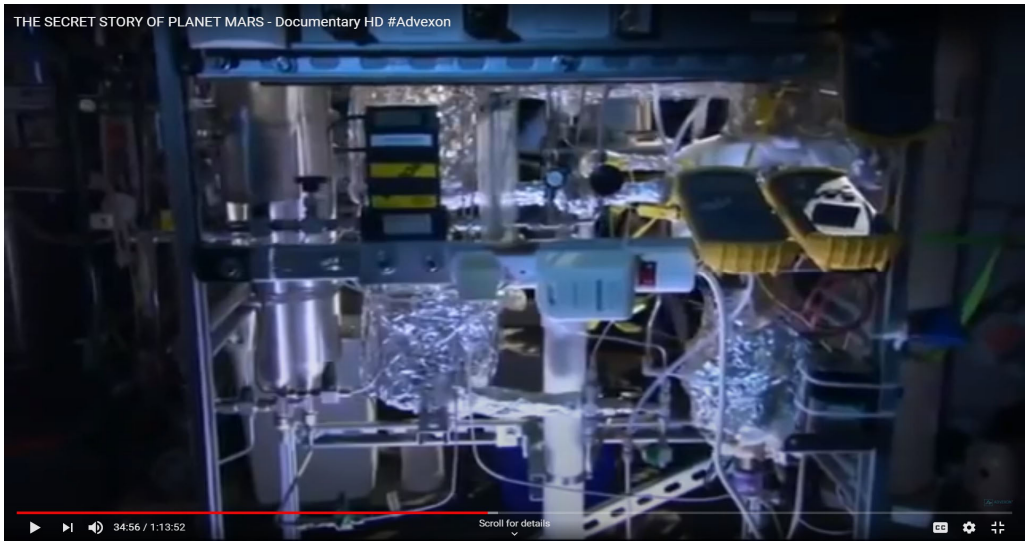
Title: Starship Module - MSC Rocket Propellant Plant



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Title: Starship Module - MSC Rocket Propellant Plant

AIR SEPARATION

Air separation is one of the largest, as well as earliest, industrial applications of cryogenics. In this process, cryogenic temperatures are used to separate air into its constituent gases: nitrogen (78.08%), oxygen (20.95%), argon (0.93%) and carbon dioxide (0.3%). Trace gases such as krypton, neon, xenon and helium total far less than 1%. Water vapor can also be a significant fraction of air but it is removed along with carbon dioxide at the start of the separation process.

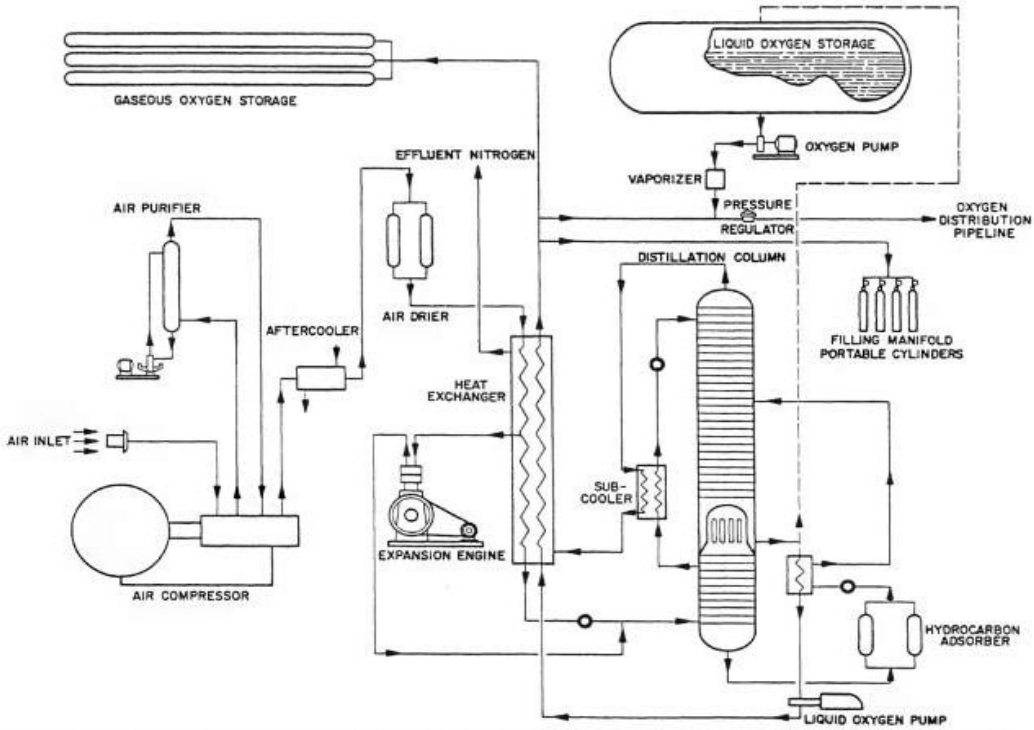

Figure 1: Schematic of a liquid oxygen plant. Image: Mechanical Engineers' Handbook, Vol. 4, M. Kutz (Ed). Copyright © 2015 Air Liquide. Reproduced with permission of John Wiley & Sons, Inc.

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