simulation of CO_2 compression and liqufication process for high concentration of water vapour in the feed.

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This study is on the liquefaction process of carbon dioxide after the carbon capture process under high pressure to super critical conditions which is suitable for transportation and storage. While CO_2 is liquefied, its purity level is also increased during the process. Water vapor is removed at the first and second stages of compression where other impurities (nitrogen and oxygen) are separated at the end of compression step using distillation column. Without the use of distillation column around 97 % purity of CO_2 can be achieved, but use of distillation column can enhance the purity to the level of 99 %. Aspen simulation result shows using five stage compressor, the liquefaction process can be increased to the purity level of 99 % with cost of compression energy around 115 kWh per ton of CO_2 captured. This cost depends on initial feed conditions (temperature, pressure and concentration), Aspen simulation is done for different initial concentration of nitrogen and water vapor. And as observed higher concentration of nitrogen largely affects compression energy. For steam desorption process in carbon capture process, the water vapor amount will be very high after capturing. But the increase of H_20 vapor increase the cost of compression by small amount. During optimization of the process, the formation of hydrate is considered as a constraint to avoid plugging of pipes and formation of solids on equipment wall. Even though, a cogent hydrate formation experimental data were not available.