CRS hydrocarbon recovery

The presence of H2S or addition of natural gas liquids shifts the solids line in the phase diagram to the left.

Further enrichment is possible by operating in the vapour-liquid-solid regime. In point C liquid and solids are of approximately equal amount and form a slurry that can be handled by the RPS. The contaminant level is reduced from 13% to 1.5%.

Solvent based gas treating systems have been the work horse of industry for many years. Energy consumption and installation size increase proportionally with the contamination level however and become large for contamination levels above 10%.

Membrane systems are used for bulk separation before a solvent system. Equipment is bulky, significant slip-through of methane is unavoidable and considerable compression energy is required.

Cryogenic temperature distillation processes like SPREX by Total and CFZ by Exxon-Mobile achieve high product specifications independent of the incoming feed concentration without multiple columns and low energy consumption.

| CO₂ | 9 % mol, CO₂ |
| H₂S | 4 % mol,H₂S |
| CH₄ | 86 % mol,CH₄ |
| C₂H₆ | 1 % mol,C₂H₆ |

Gas Recoveries
- CH₄: 99.9 %
- C₂H₆: 84.2 %
- CO₂: 86.6 %
- H₂S: 87.4 %

Liquid Recoveries
- CO₂: 63 % mol, CO₂
- H₂S: 34 % mol,H₂S
- CH₄: 0.8 % mol,CH₄
- C₂H₆: 1.8 % mol,C₂H₆
- 0.11 mol/s

0.89 mol/s

Puriﬁed gas

Cooler throttle valve separator

Residence time 0.1 s hence compact installation

CRS Performance Summary:

Gas Purity:
- contaminant CO₂+H₂S: reduction to ~1%
- contaminant H₂S only: reduction to < 1% but not ppm
- contaminant CO₂ only: reduction to 12-15 % independent of incoming concentration

Liquid (H₂S/CO₂) purity: 95 - 99%

Methane recovery: 99.0% - 99%

Energy consumption: 1% - 3% of methane heating value

Cryogenic distillation processes like SPREX by Total and CFZ by Exxon-Mobile achieve high product specifications independent of the incoming feed concentration without multiple columns and low energy consumption. Waste is produced as a dense phase liquid stream and does not require recompression.

CRS uses pressure instead of temperature distillation: equipment is up to 100x smaller.

CRS is the break-through technology for bulk separation.