**Optimal design for cryogenic structured packing column using particle swarm optimization algorithm**

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Research data

**1. Measured data of the materials at the inlets and outlets in 17000 Nm3/h ASU**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | Stage | Phase | Temperature/K | Pressure/kPa | $$x\_{N\_{2}}$$ | $$x\_{O\_{2}}$$ | Flow rate/Nm3·h-1 |
| N2 product | 1 | V | 79.3 | 126.7 | 0.999922 | 0.00005 | 17010 |
| LN2 return | 1 | L | 79.3 | 126.7 | 0.999838 | 0.000005 | 22198 # |
| Waste N2 withdrawn | 3 # | V | 81 | 130.1 | 0.934 | 0.054 | 47083 # |
| Waste LN2 in | 15 # | L | 80.7 | 126.7 | 0.813 | 0.175 | 17373 # |
| Rich O2 liquid air in | 27 # | L | 82.6 | 129.6 | 0.6125 | 0.3732 | 5822 # |
| Expanded air in | 36 # | V | 83.9 | 129.5 | 0.782 | 0.209 | 9069 # |
| Liquid air return | 37 # | L | 86.2 | 127.9 | 0.615 | 0.371 | 22334 # |
| Ar withdrawn | 55 # | V | 92.4 | 129.9 | 0.000159 | 0.936841 | 18805 # |
| Ar return | 77 # | L | 92.3 | 129.8 | 0.000046 | 0.937288 | 18102 # |
| LO2 product | 111 | L | 92.8 | 132.2 | 0 | 0.99765 | 12002 |

Notes: The superscript # stands for the parameter to be optimized. All of these data come from Hangzhou Hangyang Co. Ltd, China. ($x\_{O\_{2}}+x\_{N\_{2}}+x\_{Ar}=1$)

**2. The user-specified parameters of MI-PSO and fitness function**

|  |  |
| --- | --- |
| User-specified parameters | Value |
| Particle size (N) | 25 |
| Max time instant (T) | 200 |
| Personal acceleration factor ($c\_{1}$) | 1.7 |
| Global acceleration factor ($c\_{2}$) | 1.7 |
| Start inertia weight ($ω\_{1}$) | 1.1 |
| End inertia weight ($ω\_{2}$) | 0.5 |
| Additional weight ($κ$) | 1.0 |

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