Paper ID: 36769
student

Challenges of Life Support - Medical Support for Manned Space Exploration (9)
Challenges of Life Support - Medical Support for Manned Space Exploration (2)

Author: Mr. Kun Dai
Astronaut Center of China, China, daikun@pku.edu.cn

Prof. Qingni Yu
National Key Laboratory of Human Factors Engineering, China Astronaut Research and Training Center&State Key Laboratory of Space Medicine Fundamentals and Application, China Astronaut Research and Training Center, China, yuqingni@139.com

OXYGENATED VOLATILE ORGANIC COMPOUNDS IN 4-PERSON-180-DAY CONTROLLED ECOLOGICAL LIFE SUPPORT SYSTEM

Abstract

A four-person-180-day controlled ecological life support system (CELSS) integrated test was carried out, and more than 20 kinds of oxygenated volatile organic compounds (OVOCs) including acetaldehyde, acetone, methanol, ethanol, and vinylacetate were measured and analyzed continuously. The results showed that the mixing ratios of those OVOCs presented a decreasing tendence during the experimental period. Acetaldehyde, acetone, methanol, and ethanol were the most abundant trace gases among those measured OVOCs. At the first day, the average mix ratios of acetaldehyde, acetone, methanol, and ethanol were 175, 22, 355, 78 ppbV. In the middle of the test, the average mix ratios of acetaldehyde, acetone, methanol, and ethanol decreased to 10, 20, 33, 9 ppbV, and they kept falling to 6.4, 5.9, 8.4 and 1.4 ppbV in the end. The toatal mixing ratio of methacrolein and methylvinylketone, which were considered as secondary products from isoprene, decreased from 3.52 ppbV to 0.29 ppbV as well. As for different cabins in CELSS, non-plants cabins had much higher concentrations of those OVOCs in the atmosphere than those plant cabins, which suggests that more efforts should be made to control those OVOCs in non-plant cabins and plants in CLESS may help purify these harmful gases. At last, we hope that the work can be helpful and give some implications for controlling OVOCs effectively and building livable CELSS integrating tests with more crew, longer period, and higher closure.