SPACE LIFE SCIENCES SYMPOSIUM (A1)
Life Support and EVA Systems (6)

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THE PERFORMANCE OF THE SYSTEM FOR WATER RECOVERY ON RUSSIAN SEGMENT OF THE INTERNATIONAL SPACE STATION

Abstract

With the International Space Station (ISS) earth orbital flight for twelve years wide experience in crew life support, in particular, potable and service water supply has been obtained. Water is supplied through deliveries from earth and it is recovered from humidity condensate in the SRV-K system on board the station. During the first phase of the ISS flight, no water reclamation from urine is performed (only urine collection and pretreatment) therefore the SRV-K system plays a key role for water recovery onboard the ISS. The relation between the water recovered and the total amount of water required (consumed) is on average 0.45 to 0.55. The system is based on the use of special designed catalytic, sorption/catalytic and ion-exchange processes in gas/liquid a liquid phases. The principle of complete water purification to distilled grade followed by potable water conditioning with salt, microelement and pretreatment chemicals addition is employed. All the processes are conducted in the operational system at temperature and pressure maintained in the space station's crew module with power consumption for recovery equal to 2 W-hr per liter of water produced. The finish water decontamination is produced via pasteurization by 85oC. The specific mass consumptions are 0.08 kg per 1 kg of recovered water. The paper summarizes the experience gained with the ISS water management systems during the missions ISS-1 (since November 2, 2000) up to current time. The water supply sources and structure, consumption and supply balance and specifics balance of astronauts at various phases of space station operation are reviewed. The performance data of the system for water recovery from humidity condensate SRV-K and urine feed and pretreatment system SPK-U in the Russian orbital segment are presented. The key role of water recovery on board the ISS and the need to supplement the station's water supply hardware with a system for water reclamation from urine SRV-U is emphasized. The prospects of regenerative water supply system development are considered.