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China Astronaut Research and Training Center, China, gjpgyl@163.comAN EQUIPMENT FOR COLLECTING QUANTITATIVE HARMFUL GASES IN THE SPACECRAFT
CABIN**Abstract**

Object: The non-metallic materials in the spacecraft cabin will produce a variety of harmful gases. If we can't control well, these harmful gases will damage to the astronauts' health and lower their productivity, or even endanger their lives in extreme cases. It is necessary to design a specialized equipment to monitor the concentration of harmful gases in the cabin atmosphere. **Method:** We have designed an equipment for collecting quantitative harmful gases and mounted it in the Tiangong 1 spacecraft cabin, which absorbs the gas of the cabin by using a vacuum pump to generate negative pressure. The equipment has control circuit to limit the gas adsorbance, and has closed recycling component as the carrier to adsorb the organic components of the gas in the cabin. The closed recycling component will be taken back by Shenzhou 9 and then scientists will analysis whether it has aldehydes, ketones, acids, esters, paraffins, olefins, benzene homologues or other harmful gases. **Result:** On the ground experiment, we get the sample adsorption recovery of the sampling tube of the equipment by detecting and analyzing the harmful gas components after absorbing the standard mixed gas sample. This experiment result has established the methods for harmful gases acquisition and adsorption analysis in the space flight missions. When Shenzhou 9 docked with Tiangong 1, astronauts used the equipment to absorb the harmful gases of Tiangong 1 cabin. After Shenzhou 9 returned to earth, we analyzed the closed recycling component and got the real data of harmful gases of Tiangong 1 cabin after more than a year in orbit flight. **Conclusion:** The equipment can collect quantitative harmful gases in the spacecraft cabin, which provide a good approach to assess air quality for manned spacecraft. The equipment also can be applied to the other spacecraft in the future.