

SPACE PROPULSION SYMPOSIUM (C4)
Propulsion Technology (3)

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SAFETY EVALUATION OF HYDROXYL AMMONIUM NITRATE(HAN) BASED
MONOPROPELLANTS FOR THRUSTERS**Abstract**

Propellant loading onto reaction control system(RCS) and propulsion system for launch vehicles or satellites is one of the hazardous operations on launch site because propellant like hydrazine is toxic. That is why operators must wear Self Contained Atmospheric Protective Ensemble(SCAPE) suits during loading operation.

To make this loading operation more safely and provide more efficient propulsion system to launch vehicles and satellites, JAXA has been carrying out research and development about new monopropellant composition : HAN based solution. HAN has low toxicity and said to be one of the "Green Propellant". Therefore, it will not be necessary to wear SCAPE suits. Furthermore, it has approximately 10-20% higher specific impulse, 1.4 times higher density, and lower freezing point and lower toxicity than hydrazine. From these advantages, HAN based solution could be an alternative to hydrazine. On the other hand, pure HAN solution is an explosive, so it is important to use it as a mixture with other materials in order to suppress its reactivity.

In this study, we have carried out some safety evaluation tests such as Tube Test, Critical Diameter Test for some kinds of HAN solution. Tube Test determines the detonability of the propellant composition. Critical Diameter Test determines the critical diameter of a tube filled with propellant that can sustain stable detonation. As a result of these tests, we have found out safe and high performance composition of HAN based solution.