

WORKINGGROUP PROPULSION

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**THE
POTASSIUMNITRATE - SUGAR
PROPELLANT**

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INTRODUCTION

Developed in the U.S. during the fifties, this propellant known as "CARAMEL CANDY" has never reached the success of the famous zinc and sulphur, although its higher specific impulse. The reason why is quite obvious. Between these two propellants there are a lot of differences as far as preparation and useage is concerned. While zinc and sulphur is easy to fabricate by mixing both powders, the potassiumnitrate and sugar propellant needs a lot more attention. Not only the preparation is more difficult, the propellant has also to be melted at the right temperatures, after which it can be poored into the rocket motor, but also the ignition and the inhibition of the propellant surface have to fulfil certain criteria. Apart from this , a higher degree of accuracy at manufacturing has to be taken into account, as well as a good knowledge of the ballistic properties of the propellant is necessary.

Besides these problems, which are in itself very interesting from a technical and scientific point of view, the higher specific impulse and the lower propellant cost are worth mentioning.

Potassiumnitrate and sugar can be considered as a real composite propellant.

After rockettesting by amateurs was forbidden in the U.S. a lot of work was done by the Brasilian group S.E.F. In Europe only the B.V.R.O. showed some interest in this propellant. The first experiments started in 1975 and they led to the development of the so-called NEBEL rockets. A total of 35 rockets have been tested by the B.V.R.O. of which 8 failed.

Although it was foreseen to use this propellant in the second stage of the twenty kilometer project of N.E.R.O. and B.V.R.O., we came to the conclusion that sorbitol has more interesting properties than sugar and has to be preferred. Nevertheless we think that potassiumnitrate and sugar is still very interesting and that a description of five years of testing can contribute to a better understanding of the behaviour of this and alike propellants.