Preparation of Potassium Nitrate-Sorbitol Composite Sugar Propellant(KNSB CSP)

on

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1 Overview

Proper generation of KNSB CSP is essential as any fault of the product will affect the quality of the results from the Static Tests and eventually an avoidable yet catastrophic failure in the actual launch of the Solid Rocket Motor(SRM).

This report will highlight an example of a correct procedure during KNSB CSP's production and provide a basis on future experiments, tests and launches.

2 Apparatus and Reagents

- 1889.68 g Fine Potassium Nitrate(KNO3)
- 1453 g Liquid Sorbitol
- Casting Mold
- Casting foil
- Stopwatch
- Skillet
- Induction Oven
- Electric Balance
- Silicon Spatula
- Gloves
- Face Mask
- Goggles

3 Method

The skillet was weighed on the electric balance before 1453 g of liquid sorbitol were added to it. The skillet, now with liquid sorbitol, was transferred to the induction oven that was set at 240°C. As the sorbitol was boiled, 1889.68 g of fine potassium nitrate were weighed on the electric balance as the casting molds were being assembled and lined with casting foil. After 30 minutes had elapsed on the stopwatch, the temperature was reduced to 180°C and the stirring of the sorbitol began, while checking its color. After 5 minutes, the temperature was further reduced to 90°C after a color change from colorless to light caramel was noticed. Small amounts of potassium nitrate were added while stirring the contents in the skillet and the temperature was increased to 120°C. After 20 minutes, after the potassium nitrate was added, temperature was reduced to 60°C while stirring. After 10 minutes, the mixture turned pale yellow in color and the temperature was raised to 90°C in preparation for casting. The prepared KNSB CSP was then transferred to the casting molds.[1]

4 Conclusion

Through this brief report, we have successfully described the procedure for the synthesis of KNSB CSP and no major errors should be encountered if the procedure if followed to the tee.

References

[1] R. Nakka, *Knsb propellant*, Jul. 2023. [Online]. Available: `https://www.nakka-rocketry.net/sorb.html`.