Procedure for the preparation of 1 grain of KNSB Composite Sugar Propellant

on

Monday, 21st July, 2025

1 Apparatus and Reagents

Reagents
Fine potassium nitrate
Sorbitol solution

Apparatus
Casting mold
Liner
Core rod
Stopwatch
Skillet pan
Induction stove
Electronic balance
Silicon spatula
Grinder
Grease
Plastic container

2 Method

1. Place the skillet pan on the induction stove.
2. Weigh 690.87 g of sorbitol into the skillet pan and set the temperature on the stove to 240°C.
3. As the sorbitol solution comes to a boil, weigh 944.84 g of fine potassium nitrate into the plastic container. Check whether the potassium nitrate is a fine powder. If not, use the grinder.
4. Assemble the casting mold as shown, with the exception of the core rod and top plate.

5. After 30 minutes, reduce the temperature to 180°C and begin stirring the solution while checking for a colour change to caramel.
6. After 5 minutes (or 1-2 minutes longer), reduce the temperature to 90°C and begin adding small amounts of fine potassium nitrate powder, whilst stirring. After 1 minute, increase the temperature to 120°C
7. After all the potassium nitrate powder has been added and 20 minutes have elapsed, reduce the temperature to 60°C while stirring.
8. After 10 minutes, raise the temperature to 90°C in preparation for casting of the pale white slurry obtained.
9. Transfer the contents of the skillet into the casting mold and close it as shown.
10. Set the now casted grain aside for 5 days to a week.

3 Safety Precautions

- Wear PPE (Personal Protective Equipment) while preparing the grain.
- Avoid areas with open flame while preparing the grain and keep a fire extinguisher nearby.
- Work in a well lit and ventilated area.
- Avoid distractions like cell phones or listening to music while cooking.
- Grind potassium nitrate carefully at a low setting to avoid sparking
- Use pure ingredients with minimal contamination to avoid spontaneous detonation