

New Stabilizers for NC-Propellants

Evaluated in Rocket Propellants

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UNIQUE KNOW-HOW

MULTIFACETED RANGE

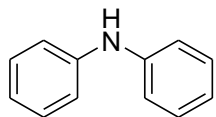
Introduction

Scope of study

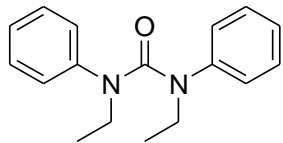
Experimental Method

Results

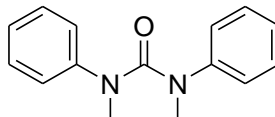
Conclusions



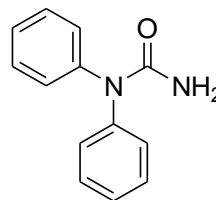
Diphenylamine



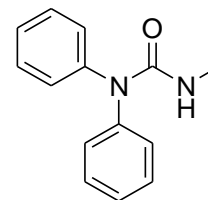
Centralite I



Centralite II



Akardite I



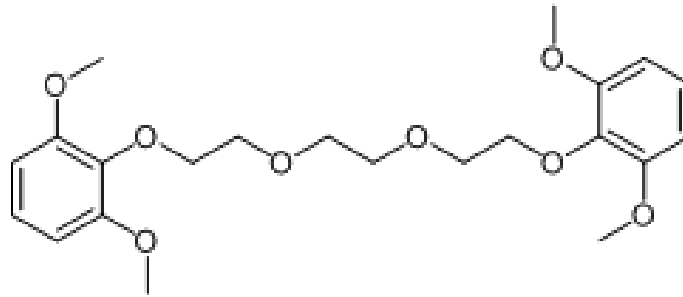
Akardite II

- **Prone to form N-nitrosoamines**
 - Carcinogenic
- **Restrictions**
 - Local
 - REACh

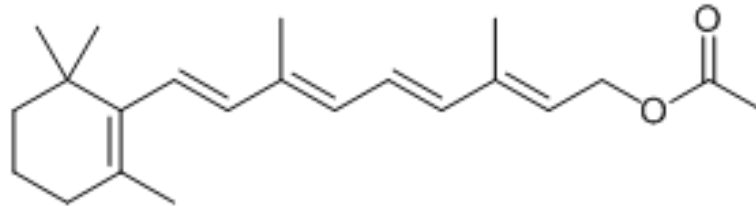
- **Development of new stabilizers**
 - Screening and testing by FOI
 - No aromatic amine motif
 - Positive if gelatinizing effect
 - Based on Syringol especially investigated

- **Test stabilizers in real propellant composition**
 - Two promising stabilizers
 - Rocket motor propellant (double base)
 - Investigating chemical and ballistic stability
 - Akardite II and Centralite I used as reference

- **Stab-5**
 - Based on Syringol
 - Shown good stabilizing effect
 - Has shown gelatinizing effect
 - Lower toxicity profile



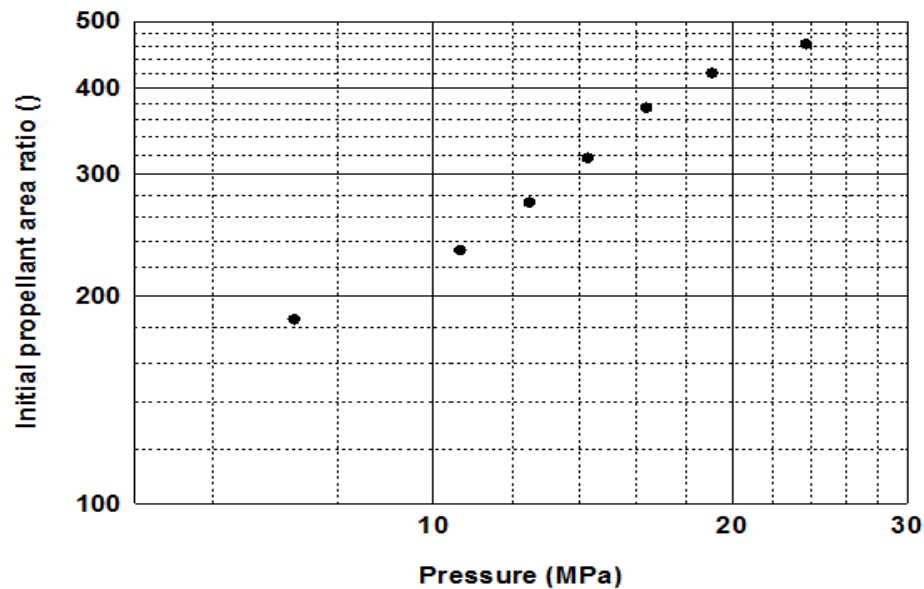
- **Vitamin A acetate**
Shown good stabilizing effect
Classified GRAS by FDA



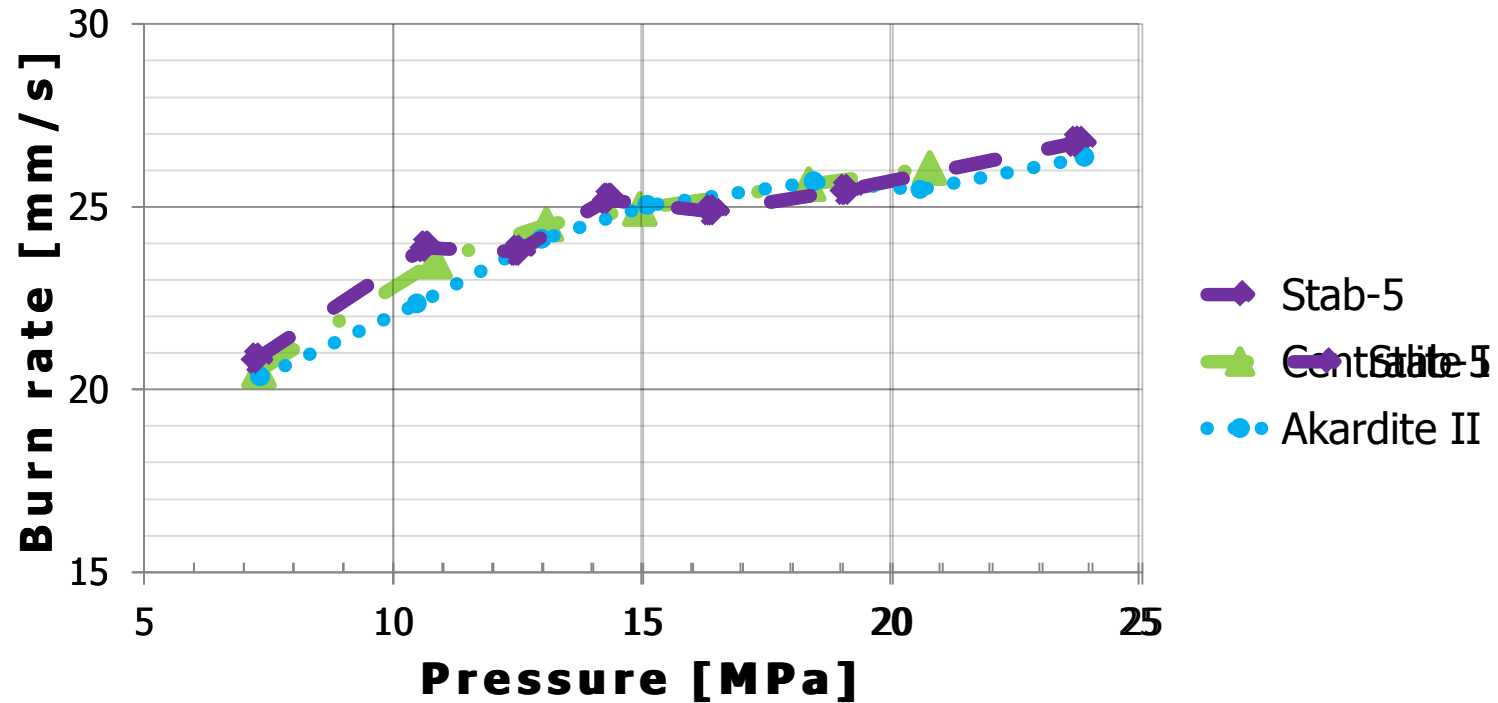
- **Composition of propellant (weight-%)**
 - Nitrocellulose 48.5%
 - Nitroglycerine 44.0%
 - Plasticizer 2.5%
 - Ballistic modifiers 2.5%
 - Stabilizer 2.5%
- **Mixing**
 - Premixed paste lot of 100 kg (without stabilizer)
 - 9 kg mixing batches of propellant with each stabilizer
- **Differential roll milling**
 - 3 kg batches
- **Ram extrusion**
 - 2 kg batches



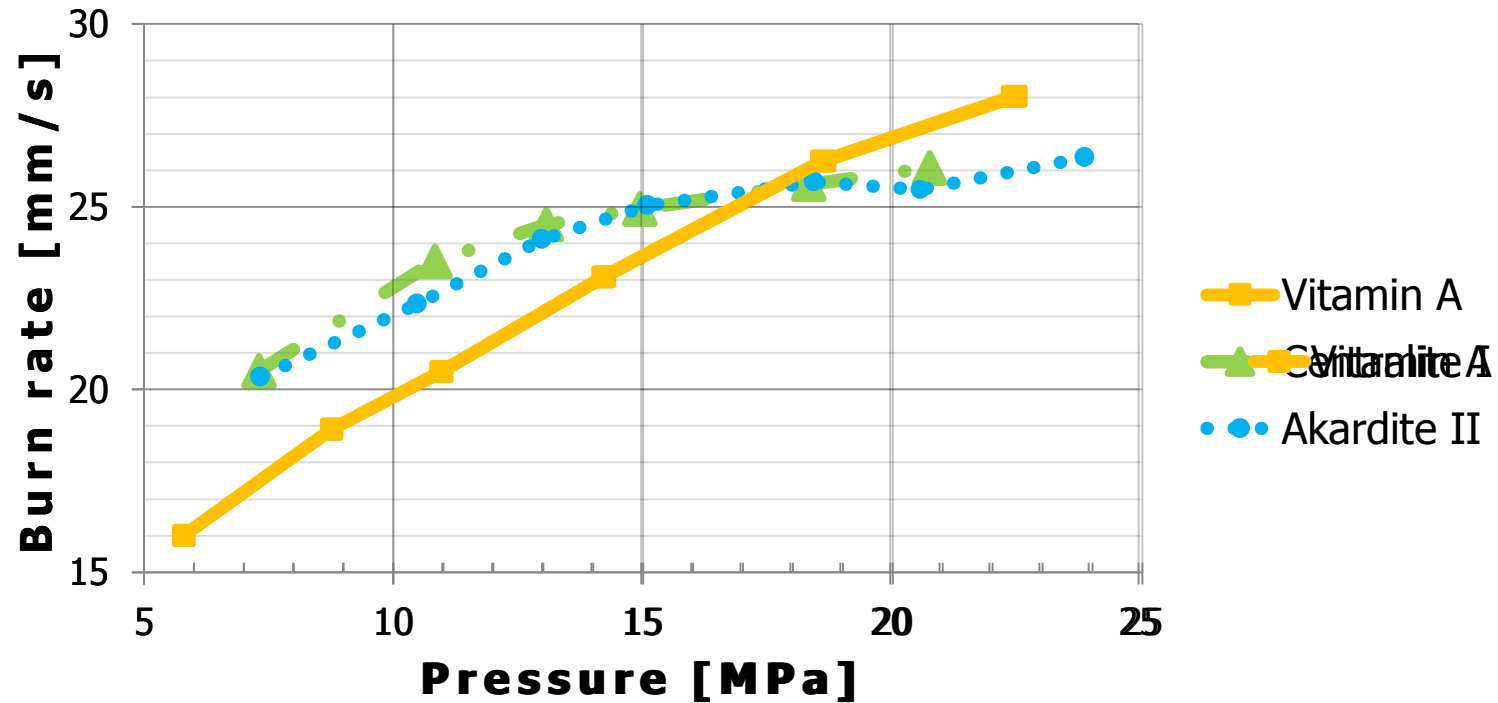
- **Investigated over designated pressure range**
 - Different nozzles
 - Pressure range is dependent on product application



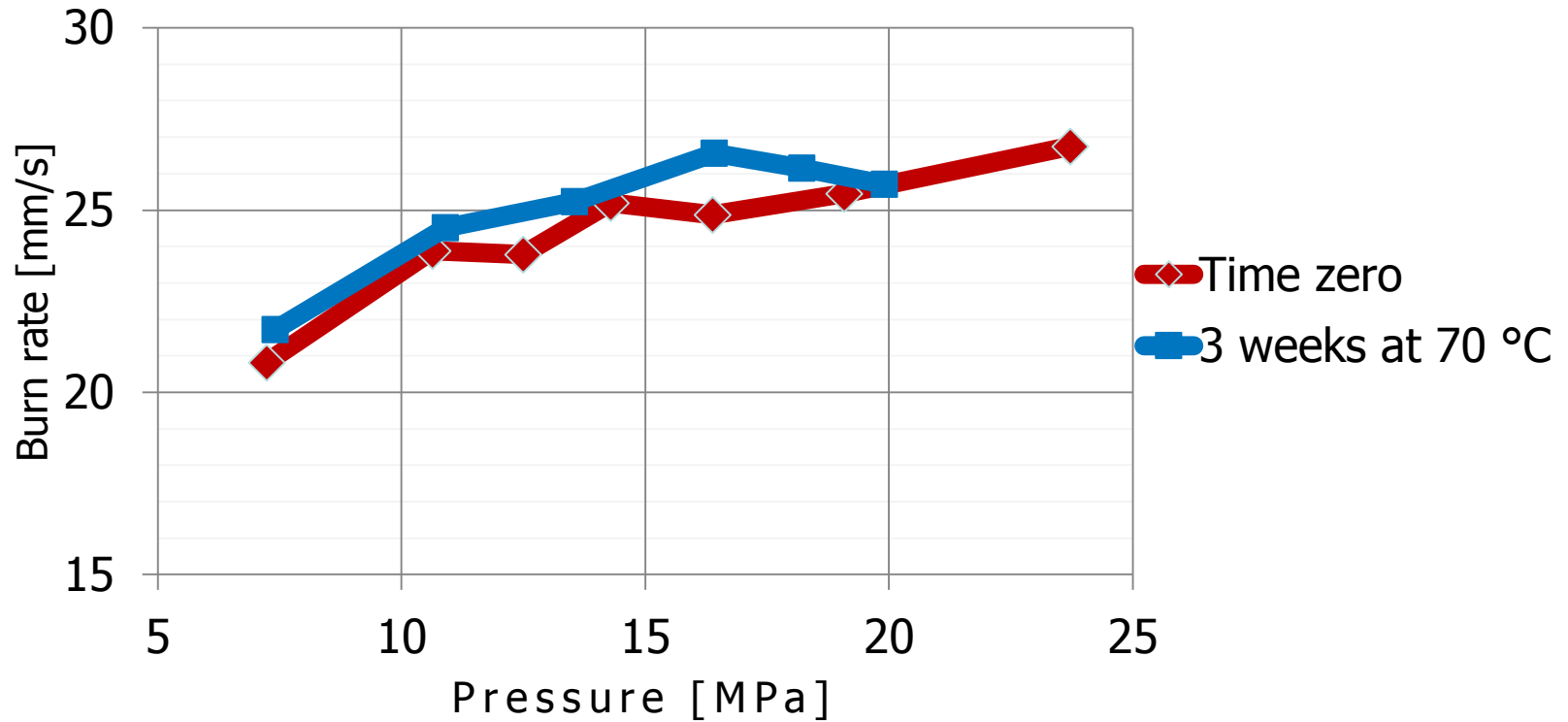
Firing chamber measurements

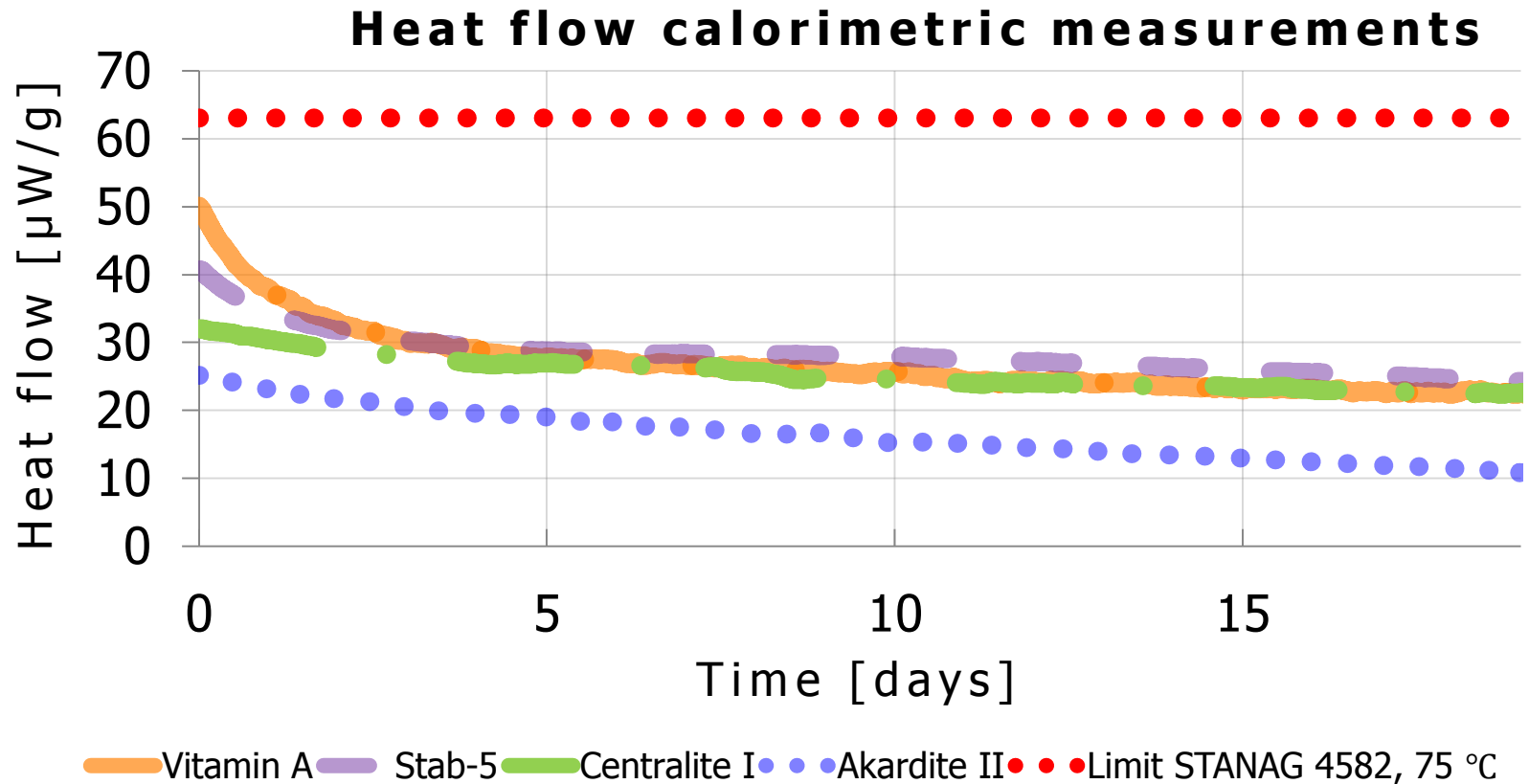


Firing chamber measurements



Ageing of Stab - 5





- **Both Stab-5 and Vitamin A are good stabilizers**
- **Stab-5 does not adversely effect the burning rate**
- **Vitamin A alters the burning behavior too much**

Future work

- **Further test with rocket motor propellant composition**
 - Scale-up
 - Mechanical properties



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A MEMBER OF



- **Questions?**