CONSTANT-VOLUME COMBUSTION PERFORMANCE OF MIXED CHARGE OF FOAMED PROPELLANT WITH NITRAMINE PROPELLANT

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INTRODUCTI

Foamed propellants based on polymer bonded nitramine explosives show high burning rates due to their porous structure and showed great potential for combustible cartridge case. Thus, the in-depth study of the co-combustion behavior of the foamed propellant and matching propellant is necessary. Closed bomb tests were used to study the co-combustion performance of nitramine propellant (RGD7) and surface coated nitramine propellant (SC-RGD7) mixed with foamed propellant. The influence of foamed propellant's proportion in mixed charges on the combustion behavior was studied and analysed.

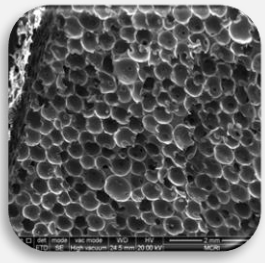
INTRODUCTION

The foamed propellants based on polymer bonded nitramines have several superiorities like variable energy content, high burning rate, good heat resistance and low vulnerability. Nowdays, the energy content of foamed propellants is variable from 900 J/g to 1300 J/g. Among these foamed propellants, the high energy foamed propellants are suitable for caseless ammunition or monolithic charge, and the lower energy propellants are desired to be the alternate for traditional combustible cases which were very inflammable and hypergolic in gun chamber.

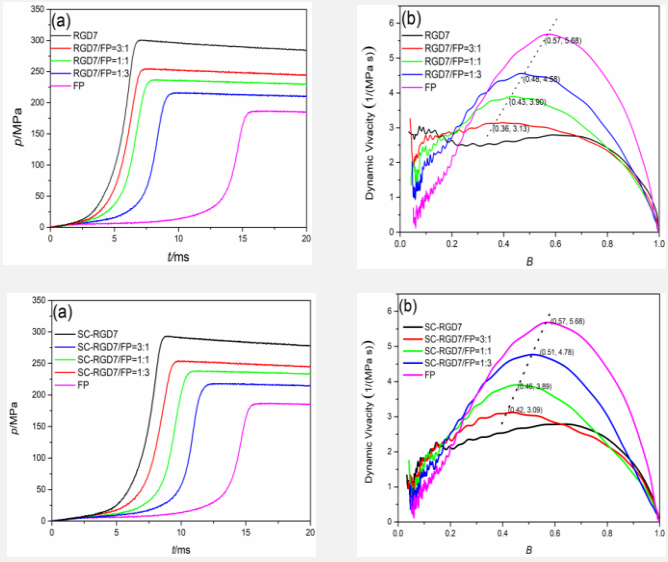
The improvement of performance of ballistic components depends on the understanding of the combustion behavior taking place during the ballistic cycle. While, the presence of combustible case complicates the burning process, in that it differs in its combustion characteristics from the traditional propellant, and the combustible case is a porous materials. The burning characteristics of these porous materials showed specialties compared to standard gun propellants and it was usually considered that the burning behavior of foamed propellants deviates from Vieille's law and the combustible material was simply converted to a certain mass of main charge according the value of force content.

FOAMED MATERIAL

INNER STRUCTURE

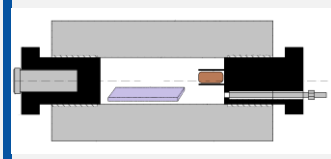


THE INFLUENCE OF FOAMED PROPELLANT ON COMBUSTION OF NITRAMINE PROPELLANT——GOOD PROGRESSIVITY

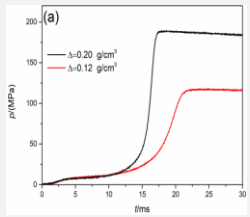


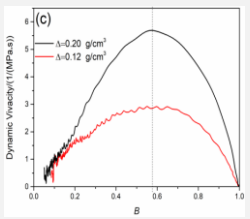
▲*p-t* and *L-B* curves of foamed combustibles materials with 7-perf propellants

COMBUSTION OF FOAMS



▲*closed bomb test*





▲*p-t* and *L-B* curve of foams

CONCLUSIONS

Foamed propellants presented a significant difference in inner structure and burning characteristics, in comparison with the traditional 7-perf nitramine propellant. Foamed propellants presented good burning case.

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