Pengaruh penambahan antioksidan AO 2246 pada aging properties propelan padat komposit berbasis polibutadiena = Influence of antioxidants AO 2246 on aging properties of composite solid propellant based polibutadiene

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Abstrak

Perubahan sifat propelan padat komposit selama penyimpanan mempengaruhi kinerja roket secara keseluruhan. Penambahan zat antioksidan berupa senyawa fenol tipe AO 2246 dipilih untuk memperkecil perubahan sifat propelan karena aging. Empat komposisi propelan dengan variasi jumlah AO 2246 sebesar 0 ndash; 1 berat binder dibuat dan disimpan selama 260 hari pada suhu 27°C dan 60°C. Karakterisasi propelan meliputi kekerasan, densitas, kuat tarik, sifat termal, dan kecepatan bakar dilakukan sebelum dan setelah aging.

Hasil penelitian menunjukkan semakin besar jumlah antioksidan, semakin kecil perubahan sifat propelan selama aging dan semakin lama umur pakai propelan. Penambahan AO 2246 sebanyak 1 terhadap berat binder memberikan hasil optimal dalam memperkecil perubahan sifat propelan yaitu penurunan elongasi sebesar 33,95 ; kenaikan kuat tarik 35,08 ; dan penurunan nilai energi aktivasi 8,34 selama penyimpanan 60 hari pada suhu 60°C. Sedangkan perubahan kekerasan, densitas, dan kecepatan bakar propelan pada tekanan 6 MPa masing-masing sebesar 8,94 ; 0,64 ; dan 5,81 untuk penyimpanan suhu 60°C selama 260 hari.
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The property changing of composite solid propellants during their storage affect the rocket performance as a whole. The addition of phenol compound phenol, type of AO 2246 as an antioxidant was selected to minimize the property changing of the propellants due to aging process. Four variations of AO 2246 i.e 0 ndash 1 wt to binder were added to the propellants and these four propellants were stored for 260 days at a temperatures of 27°C and 60°C. Propellant characterization included hardness, density, thermal properties, tensile strength, and burning rate was conducted before and after aging.

The results showed that the greater amount of the antioxidants, the smaller the property changing and the longer the service life of propellants. The addition of 1 wt to binder of AO 2246 provided optimal results. The elongation decreased of 33.95 increased in tensile strength 35,08 , and decreased in 8,34 for 60 days storage at the temperature of 60°C. While the change in density, hardness, and burning rate of propellant at a pressure of 6 MPa were 8.94 0.64 and 5.81 respectively at storage temperature of 60°C for 260 days.