

Burning Rate Performance Study of Ammonium Perchlorate Catalyzed by Heteroleptic Copper(I) Complexes with Pyrazino[2,3-f][1,10]phenanthroline-Based Ligands

Escobar M.A.
Morales-Verdejo C.
Arroyo J.L.
Dreyse P.
Gonzalez I.
Brito I.
MacLeod-Carey D.
Moreno da Costa D.
Cabrera A.R.

Abstract

This contribution describes the catalytic effect of heteroleptic Cu(I) complexes with pyrazino[2,3-f][1,10]phenanthroline-based ligands (C1-7) on the thermal decomposition of ammonium perchlorate (AP). The complexes C2 and C4-7 were synthesized and characterized by NMR, HRMS and, in the case of C7, by X-ray diffraction. The burning rate performance of C1-7 on thermal decomposition of AP was studied by differential scanning calorimetry technique. The effect of the counter ion type, the number of metal centers and ligand substitution was evaluated. These AP+complex mixtures exerted a shift to lower ignition temperatures and an increase in the released heats during thermal decomposition compared with pure AP. The compound C4 showed the higher catalytic effect among the complexes series, and C5 exerted the highest energy release, in contrast to the other evaluated complexes and to the reported compounds CuO, $[\text{Cu}_2(\text{en})_2(\text{HBTI})_2]_2$ and Catocene. © 2021 Wiley-VCH GmbH

Author keywords

Ammonium perchlorate; Burning rate; Copper; Heterogeneous catalysis; N ligands