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Thermogravimetric evaluation of novel antimicrobial phthalimido aromatic 1,3,4-oxadiazole derivatives as stabilizers for rigid PVC

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ABSTRACT

A series of novel N-aryl phthalimides containing the aromatic 1,3,4-oxadiazole system has been synthesized starting from their corresponding precursors phthalimido aromatic hydrazide derivatives via a thermally induced cyclodehydration reaction. The synthesized derivatives' structures were elucidated on the basis of elemental analyses, FTIR, ^{1}H-NMR, and mass spectroscopy. They were screened for antibacterial activity against *Bacillis subtilis* and *Streptococcus pneumonia*e as Gram-positive bacteria and against *E. coli* as Gram-negative bacteria and for antifungal activity against *Aspergillus fumigatus*, *Geotricum candidum* and *Syncephalastrum racemosum* fungi by agar well diffusion method. They showed good antimicrobial activity as judged by their high inhibition zone diameter and low minimum inhibition concentration. They are more potent against Gram-positive bacteria than against Gram-negative bacteria. Some of the prepared derivatives displayed comparable or even better antibacterial and antifungal activities than the reference bactericides or fungicides. These derivatives were evaluated as thermal stabilizers for rigid PVC using thermogravimetric analysis under a nitrogen atmosphere. They exhibited improved heat stabilizing effects relative to dibasic lead carbonate (DBLC), cadmium-barium-zinc (Cd-Ba-Zn) stearate complex and di-n-octyltin bis (isooctylmercaptoacetate) (n-octyltin mercaptide, n-OTM) reference thermal stabilizers as shown by their higher initial decomposition temperature and higher residual weight percent at particular temperatures. Their stabilizing efficiency is also illustrated by lower rates both of discoloration as well as degree of chain scission of the polymer during degradation. The stabilizing efficiency increased with the introduction of electron donating substituent groups in the aromatic ring of 1,3,4-oxadiazole part of these derivatives.