**Introduction**

*N*-Hydroxyphthalimide (1, NHPI, Figure 1) is a white crystalline powder that has been used for the preparation of *O*-alkyl hydroxylamines, the functionalization of alkenes, halogenation of alkanes, the Ritter-type reactions of alkylbenzenes, and for the oxidation of alkylbenzenes, acetals, alkenes, and sulfides. Some other applications are described below.

![Figure 1](image)

**Abstracts**

(A) The ‘Mitsunobu-like’ reaction between a supported NHPI derivative using imidazole as a base followed by treatment with methylamine gives the corresponding primary or secondary *O*-alkyl hydroxylamines isolated in very high purity and in good yields.

(B) The silyl-hydroxylation of olefins bearing electron-withdrawing groups is accomplished by the reaction of NHPI with a silane. The trialkysilyl radical adds to the olefin to form an intermediate that, when trapped by molecular oxygen, forms the corresponding alcohol. The silyl-hydroxylation of olefins takes place with yields ranging from 61–99% and with very good selectivity.

This reagent is not very expensive, it is air-stable, and does not need particular conditions for storage, but precautions must be taken for its manipulation, because it can be very irritating to the eyes and the skin.

**Preparation**

This phthalimide derivative can be prepared by treating phthalic anhydride with hydroxylamine or hydroxylammonium sulphate under basic or neutral conditions.

![Scheme 1](image)
(C) The difficult oxidation of ethers to the related oxygen-containing compounds is accomplished with N-hydroxyphthalimide under an NO atmosphere. This reaction gives good and selective conversion of benzylic ethers to the corresponding aldehydes.\(^\text{13}\)

(D) The radical addition of masked aldehydes (1,3-dioxolanes) to electron-deficient alkenes is achieved using NHPI and benzoyl peroxide as polarity reversal catalyst in yields ranging from 46–88%. The tandem version of the reaction was also carried out using the same mild conditions.\(^\text{14}\)

(E) The metal-free catalytic aerobic oxidation of primary olefins by the in situ generation of peracetic acid from acetaldehyde is carried out by mixing all the reagents in the presence of N-hydroxyphthalimide and under an atmospheric pressure of oxygen. The isolated yield of the epoxides goes up to 96%.\(^\text{7}\)

(F) The direct nitration of aliphatic C–H bonds is performed under mild conditions by reacting NHPI with alkanes in a NO\(_2\) atmosphere at 70 °C and in the presence of air. A variety of alkanes were successfully nitrated by this NO/NHPI system in very useful yields.\(^\text{15}\)

References