





These results indicate that the *N*-formylation of phthalimides occurs generally in good yields without resort to the chain length. Since hydrazine is strong nucleophile, the transformation reaction is expected to be applicable to wide range of compounds with the other variety of protective groups resistant to nucleophile. In addition, since the *N*-formyl group was cleaved easily with 2 M-HCl under reflux to give primary amine,¹⁾ *N*-alkylformamides are alkyl primary amine equivalents in synthetic organic chemistry.

Upon consideration of the probable reaction mechanism, any combination of two of three reagents, e.g., phthalimide and DMF or hydrazine and DMF turned out not to generate active intermediate for the group transfer reaction to the third molecule added later to the initial reaction mixture. Furthermore, it was found that compounds with the alkyl primary amino group were not *N*-formylated in the presence of hydrazine in DMF. These preliminary results suggest that a certain intermediate constituted by formylated phthaloylamide-hydrazine complex is formed probably through "basicity dependent group transfer"⁴⁾ process between phthalimide, hydrazine, and DMF. For elucidation of the transformation mechanism, further investigation is requisite.

There has been known the *N*-formylation of aromatic primary amines with DMF in the presence of NaOMe.⁵⁾ This method, however, is not applicable to alkyl amines at all. The effective *N*-formylation methods of alkyl primary amines known hitherto, particularly in connection with peptide chemistry, are based in principle on employment of formic acid.⁶⁾ Therefore, the present transformation reaction not only provides new approach to *N*-formylation of alkyl primary amines, but also extends feasibility of phthalimide protective group in synthetic organic chemistry, taking into account of recent advances in the preparative methods of phthalimides.^{1,2,7)}

References

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