Keggin-Type Heteropoly-11-molybdo-1-vanadophosphoric Acid Supported on Montmorillonite K-10 Clay as a Catalyst for the Synthesis of Indeno[1,2-*b*]quinolinones: A Solvent-Free Approach

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Quinolines have long been known for their abundant biological activities, including antiplasmodial, cytotoxic, antibacterial, antiproliferative, antimalarial and anticancer properties.[1,2] Consistent with their versatility, they behave as useful ligands for the preparation of organic light-emitting diode phosphorescent complexes.[3,4] In this paper, we focus on the synthesis of indeno[1,2-*b*]quinolinones by the condensation reaction of 1,3-diones, amines and aldehydes (Schemes 1 and 2). We were in part motivated by recent reports on this condensation in the presence of a variety of catalytic materials.[5–14] Although useful in their own right, some of these reports include operational procedures with lengthy reaction times, low yields, or the use of expensive catalysts; and we sought a simple method with green characteristics. For this, we considered the catalytic activity of Keggin, Dawson and Preyssler-type heteropoly acid (HPA), due to their low volatility, low corrosiveness, and high activity.[15–19] The classical disadvantages of an HPA are its low surface area (1–10 m^2/g) and the problem of separation from the reaction mixture. These can be remedied when the HPA is supported on clay materials and used in the reaction as a heterogeneous catalyst. Recently we have reported the catalytic applications of HPA supported on clay materials for the synthesis of a number of heterocycles.[20–23] The present work demonstrates this approach for the synthesis of indeno[1,2-*b*]quinolinones *via* the one-pot three-component condensation reaction of 1,3-indanedione, naphthylamines and substituted aldehydes under solvent-free conditions at 100 °C using the HPA heteropoly-11-molybdo-1-vanadophosphoric acid, $H_4[PVMo_{11}O_{40}]$, supported on montmorillonite K-10 clay as a catalyst. The catalyst is abbreviated as PVMoK-10 (see Experimental section). On a 1 mmole scale, using 50 mg of catalyst, the reaction was typically complete within one hour, with yields in the range of 67–72%. Our preparative results are summarized in Tables 1 and 2. We note that yields were not particularly sensitive to the nature of the substituent groups on the aldehyde unit. During work-up, the catalyst was readily separated from the product and could be re-used.