SUMMARY AND OUTLOOK
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The goal of the present study has been to understand the role of a syn-axial group in the stereoselectivity of an alkylation reaction. We have successfully synthesised regiochemically, and stereochemically pure trans-C\textsubscript{10} substituted decalone and trans C\textsubscript{7a}-substituted hydrindanone \(\beta\)-ketoesters by following known protocols but developing new synthetic routes for better yields. Alkylations were conducted with two alkylating agents possessing varying degree of steric requirement and electrophilicity viz., methyl iodide, benzyl bromide using potassium carbonate in acetone. The analysis of the result indicate that syn-axial ester functionality promotes \(Z\)-alkylation to the extent almost to that of hydrogen case, pointing out to electrostatic hyperconjugative, stereoelectronic effects by that group. Results obtained were analysed on the basis of various theories which are put forward for predominant axial selection in cyclohexanone reactions. As a logical, extension, role of the solvent in the stereoselectivity of alkylation reaction was studied. The present studies clearly show that the polarity of the solvent does not have major impact on the stereoselectivity of the reaction. This result is in glarring contrast to the known role of the solvents in regioselectivity (\(\text{C vs.O}\)) of the alkylation reaction. As stereochemically pure trans-ring junction products were
required a major synthetic effort was devoted. In this process, we found that NaBH₄/NiCl₂.6H₂O/MeOH, HCOONH₄/ Pd-C/MeOH are two convenient reagents for the reduction of cyclic α,β-unsaturated carbonyl compounds. We found that the ratios of the hydrogenated products were quite different from the conventional catalytic hydrogenation results, indicating the operation of different mechanism. Particularly, noteworthy in this study is the hitherto difficultly made trans-7α-methyl/ester hydrindanones in substantial quantities. It appeared logical to us that the alkylation study could be extended to C₁₀-cyano substituted trans-decalone- and C₇α-cyano hydrindanone β-ketoesters. The cyano group could offer similar level of inductive effects as that of an ester group but has substantial lower steric requiemnets and therefore would shed light on polar/electrostatic influence by a syn-axial substituent. We could not actually synthesise coveted compounds as our synthetic efforts met dead ends. However, the efforts which were made in this work is shown in Schemes I and II.
Scheme 1

Scheme 2