Synthesis of Condensed 1,3,4-Thiadiazines

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It is known that derivatives of 1,3,4-thiadiazines show the various physiological activity. The potentially biologically active condensed 1,3,4-thiadiazines with a six-membered ring can be prepared using cyclization of thiosemicarbazones of α-halogen cycloketones.

It was found that the cyclization of thiosemicarbazones of α-halogen cyclohexanones can not be performed due to the axial orientation of halogen in these compounds. However, the formation of condensed 1,3,4-thiadiazines was observed when thiosemicarbazones of six-membered cycloketones react with bromine.

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\begin{align*}
\text{NNHCSNH}_2 & \quad \text{Br} \quad \text{Br}_2 \\
\text{X} & = \text{CH}_2, \text{NCH}_2, \text{C}_6\text{H}_5
\end{align*}
\]

The structures of heterocyclic compounds were confirmed by IR spectra and \(^1\)H and \(^{13}\)C NMR spectra.