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HETEROCYCLES AS MASKED FUNCTIONAL MONOMERS

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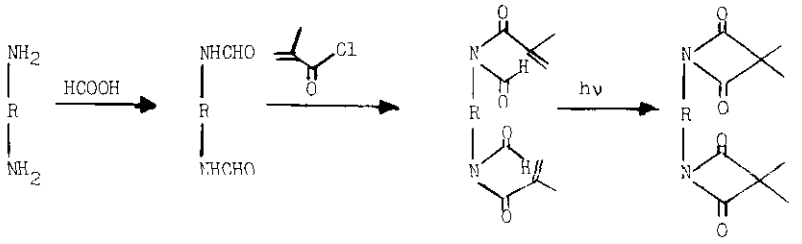
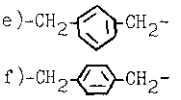
Bis-heterocyclic molecules are ideal monomers for producing condensation polymers by an addition process. The polymerization reaction involves ring-opening processes, and no volatile byproducts are generated. This paper describes the synthesis of model compounds.

Reaction of aliphatic diamines with formic acid yield bis-N-formyl compounds I, which upon further reaction with methacryloyl chloride give the bis-amide derivatives II. Cyclization to the bis-azetidine-2,4-diones III in ethanol is readily accomplished using sunlight.



R= a)-$(CH_2)_2$-
b)-$(CH_2)_6$-
c)-$(CH_2)_{12}$-
d)-$(CH_2)_3O(CH_2)_4O(CH_2)_3$-



Ring-opening reaction with aliphatic diamines occurs rapidly at room temperature to give polyamides. For example, reaction IIIb with hexamethylenediamine affords a nylon-6,3 derivative. The reaction of III with dioles and macrodioles is significantly slower. Base catalysts, such as sodium carbonate accelerates this reaction and poly(ester amides) are synthesized in this manner.