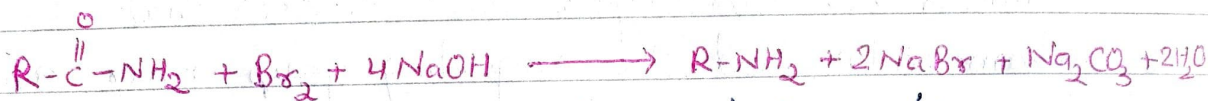


Hofmann Bromoamide Reaction

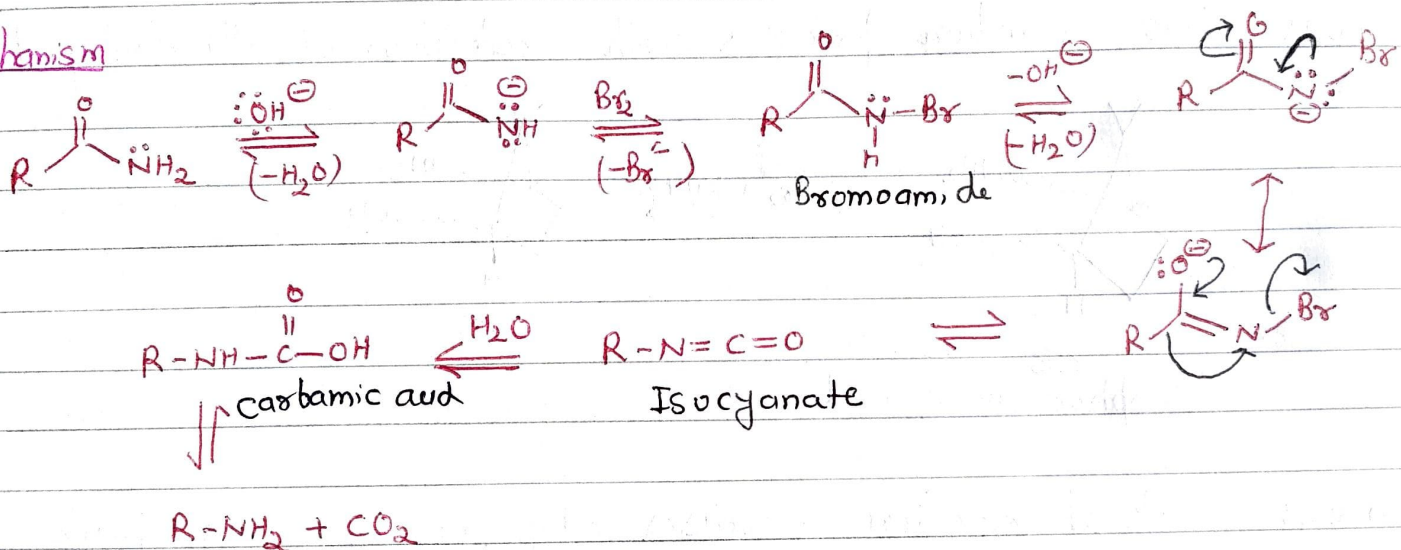
or Hofmann Rearrangement

Hofmann rearrangement is the ~~organic reaction~~ conversion of an amide into a primary amine with one fewer carbon atom by the action of alkaline hypobromite (NaOH solution + Br_2 or Cl_2)



Where R may be aliphatic, aromatic or heterocyclic.

Mechanism



The reaction of bromine with NaOH forms sodium hypobromite in situ, which transforms the primary amide into an intermediate isocyanate, which hydrolyzed to a primary amine, giving off CO_2 .

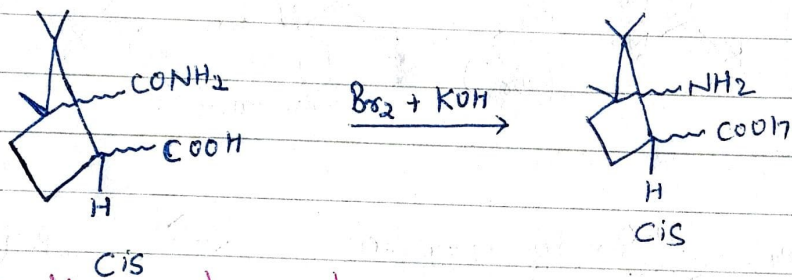
The step by step process is given below-

- (i) Base abstracts an acidic NH proton; yielding an anion.
- (ii) The anion reacts with bromine in an α -substitution reaction to give an N-bromoamide.
- (iii) ~~The~~ Base abstraction of remaining amide proton gives a bromoamide anion.
- (iv) The bromoamide anion rearranges as the R-group attached to the carbonyl carbon migrates to nitrogen at the same time the bromide ion leaves, giving an isocyanate.

- v) The isocyanate adds water in a nucleophilic addition step to yield a carbamic acid.
- vi) The carbamic acid spontaneously loses CO_2 , yielding the amine ~~amide~~ product.

note 1: No crossover products are obtained when two different amides are rearranged. This indicates that the rearrangement is intramolecular and the migrating group never completely separates during the migration.

note 2: This reaction proceeds with retention of the configuration.



Cis
Camphoramidic acid

note 3: Rate of reaction increases when the migrating group is more electron donating and decreases when electron withdrawing.

note 4: If R is an alkyl group with more than 8 carbon, low yields are obtained.