

Amine and Amide

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Amine

- **Amines** are organic compounds in which one or more H in ammonia, NH_3 , is replaced with alkyl or aromatic groups.



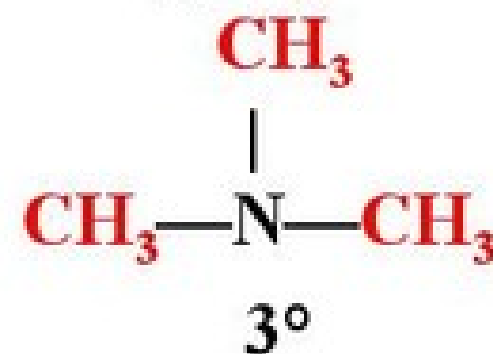
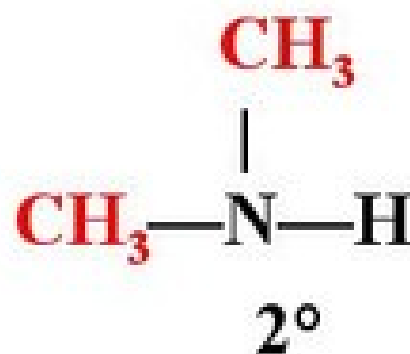
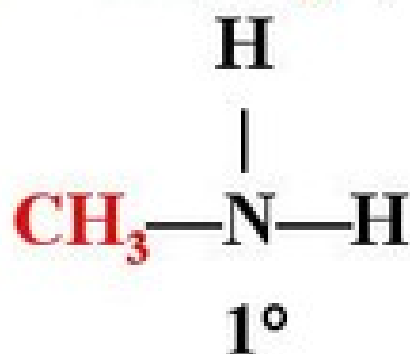
ammonia



Classification of Amines

Amines are classified as primary, secondary, or tertiary.

- In a **primary** (1°) amine, one carbon group is bonded to the nitrogen atom.
- A **secondary** (2°) amine has two carbon groups.
- A **tertiary** (3°) amine has three carbon groups.



Boiling Points of Amines, Alcohols, and Alkanes

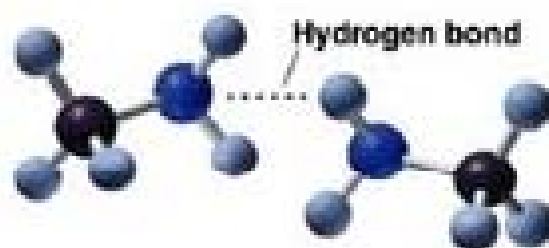
Table 19.1 Comparison of Boiling Points (°C) of Amines, Alcohols, and Alkanes

NH ₃	-33		
1 Carbon Atom		3 Carbon Atoms	
CH ₄	-162	CH ₃ —CH ₂ —CH ₃	-42
CH ₃ —NH ₂	-7	$\begin{array}{c} \text{CH}_3 \\ \\ \text{CH}_3\text{—N—CH}_3 \end{array}$	3
CH ₃ —OH	65	CH ₃ —CH ₂ —NH—CH ₃	36
2 Carbon Atoms		CH ₃ —CH ₂ —CH ₂ —NH ₂	48
CH ₃ —CH ₃	-89	CH ₃ —CH ₂ —CH ₂ —OH	97
CH ₃ —NH—CH ₃	7		
CH ₃ —CH ₂ —NH ₂	17		
CH ₃ —CH ₂ —OH	79		

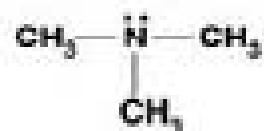
The boiling points of amines are higher than alkanes, but lower than alcohols of similar mass.

Hydrogen Bonding for Amines

- The polar N-H bond provides hydrogen bonding in 1° and 2° amines, but not 3°.
- However, the N-H bonds in amines are not as polar as the O-H bonds in alcohols.

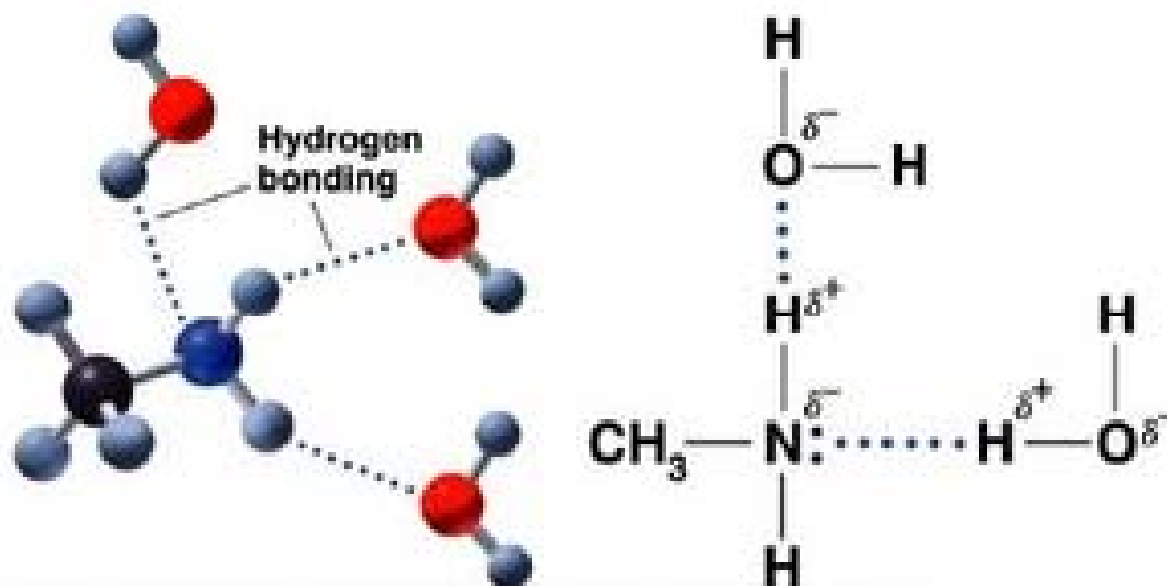


No hydrogen bonds in 3° amines

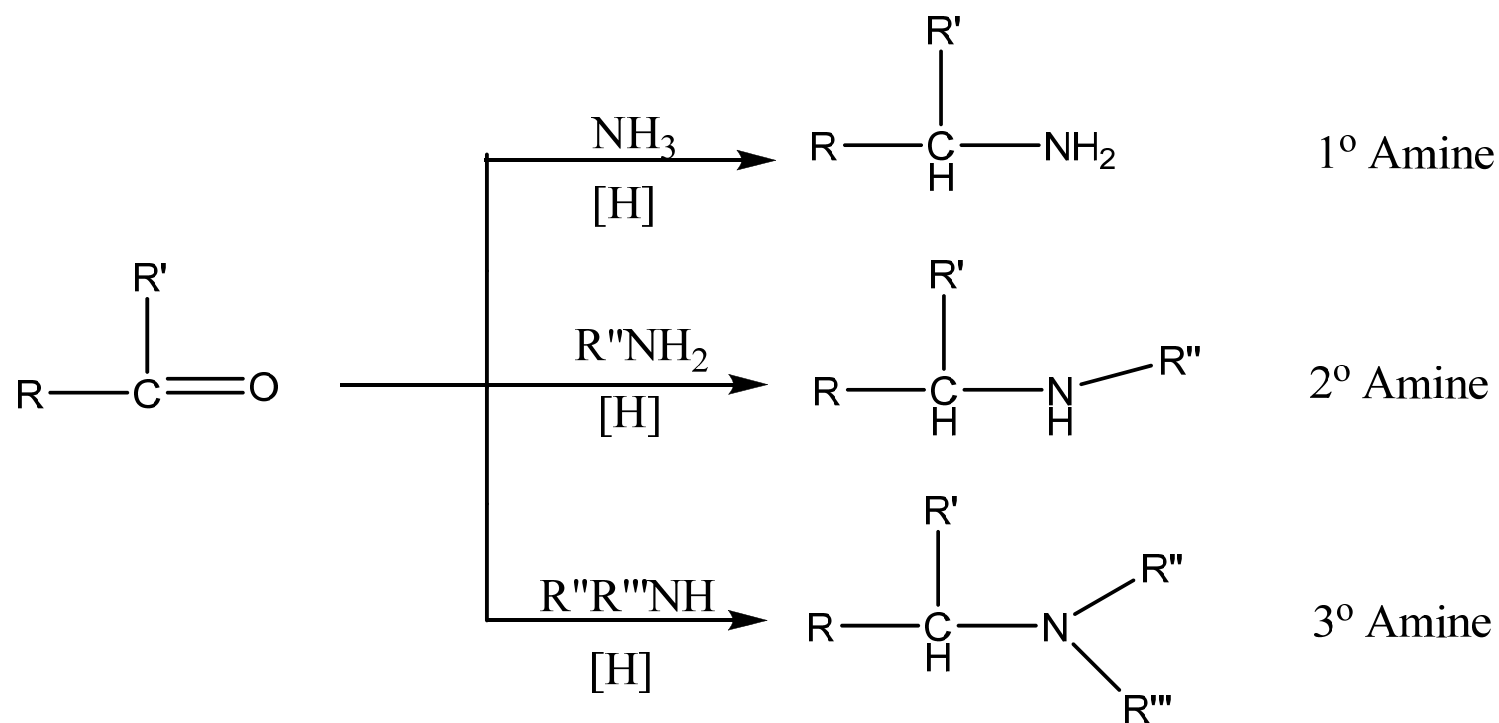


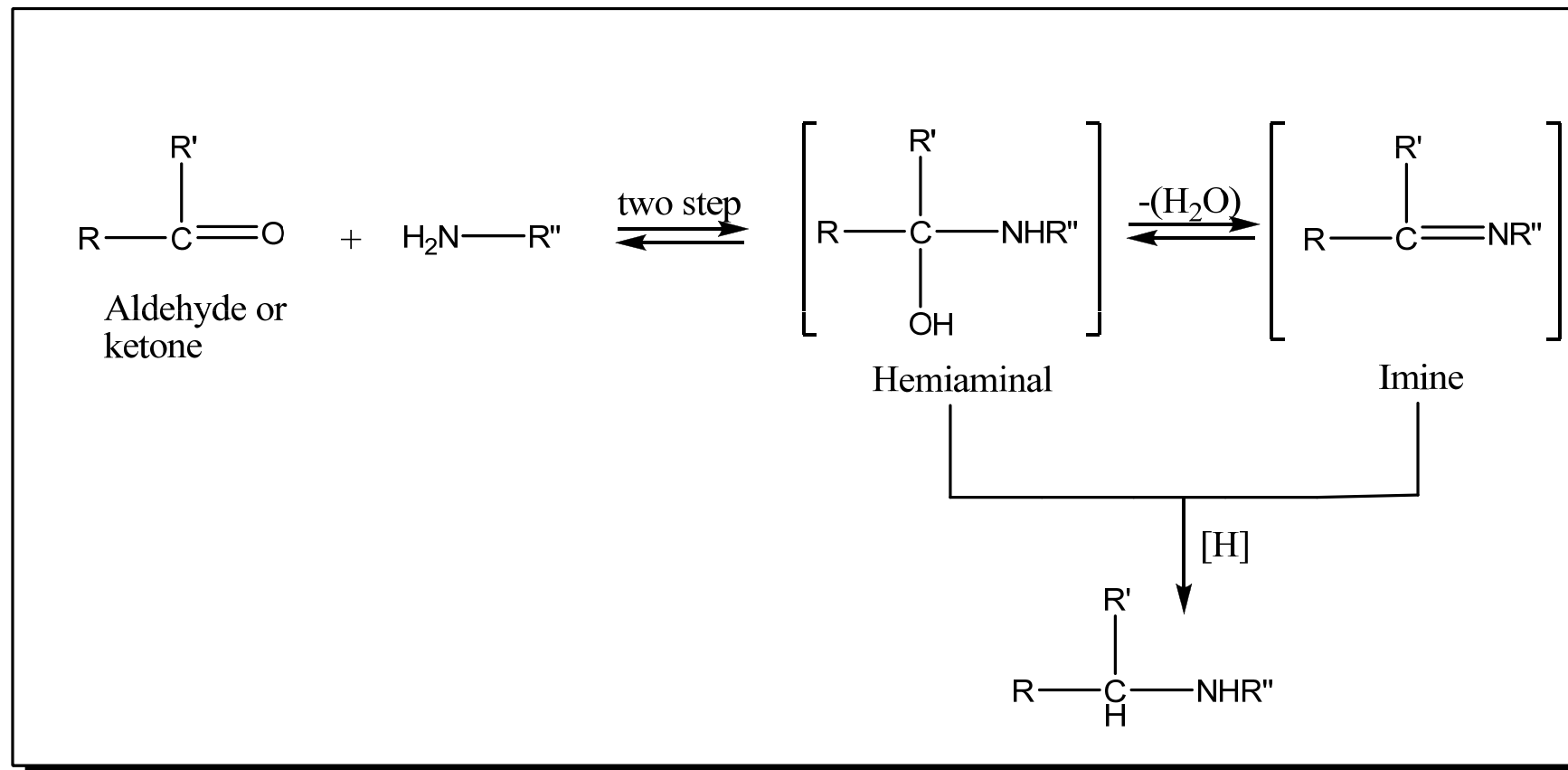
Solubility in Water

- Amines with 1-5 carbon atoms are soluble in water.
- The N atom in amines forms hydrogen bonds with the polar O-H bond in water.



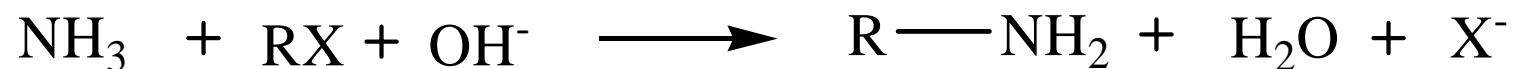
การเตรียมสารประกอบเอมีน



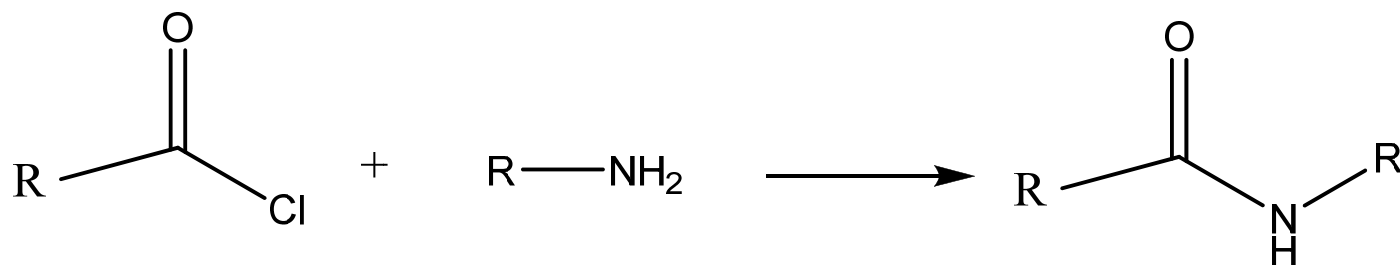


ปฏิกิริยาเคมีของเอมีน

1 ปฏิกิริยา alkylation ของ เอมีน



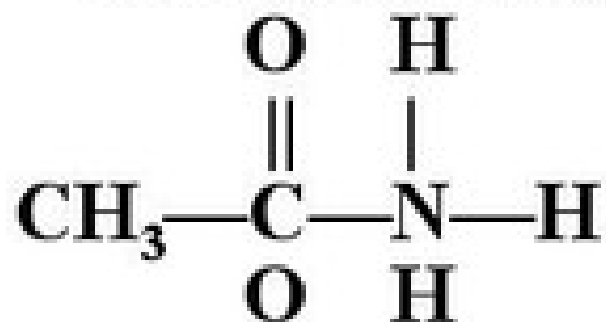
2 ปฏิกิริยากับแอซิดคลอไรด์



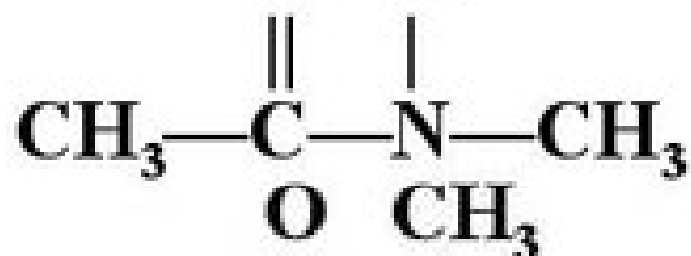
Amide

Classification of Amides

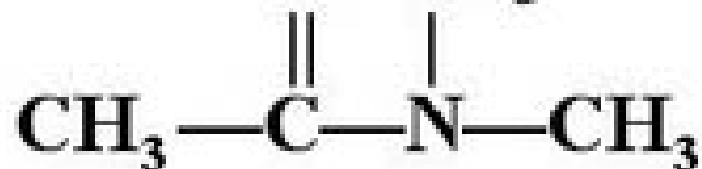
- Amides are classified according to the number of carbon atoms bonded to the nitrogen atom.



Primary (1°) amide



Secondary (2°) amide

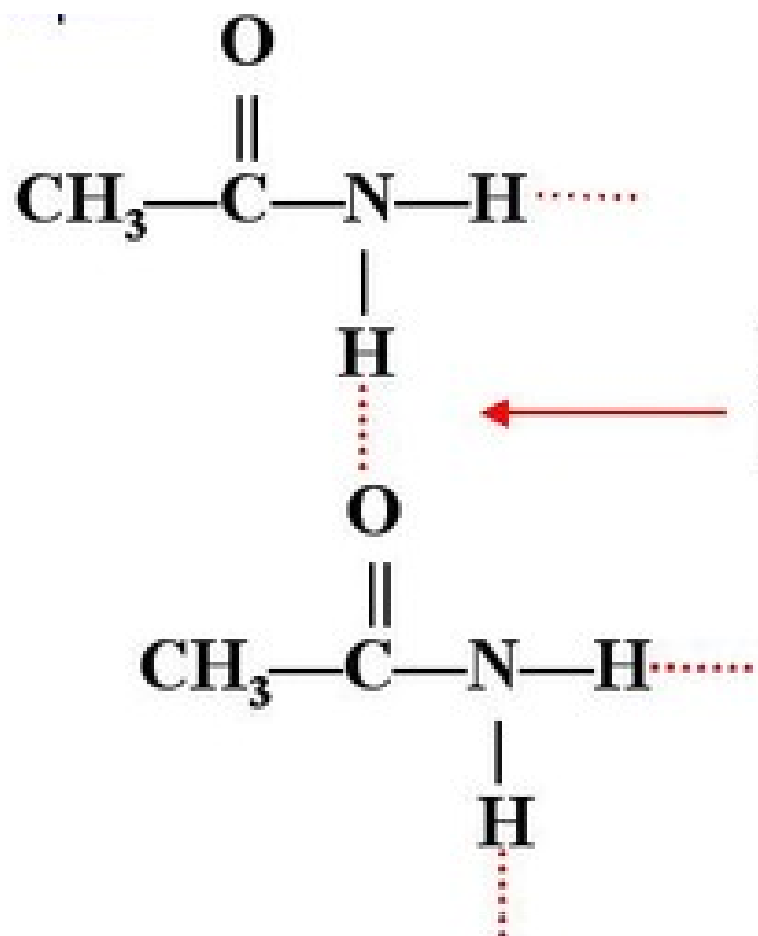


Tertiary (3°) amide

Physical Properties of Amides

- **Hydrogen bonds form in primary and secondary amides, but not tertiary amides.**
- **The melting points of primary amides are higher than secondary amides, which have higher melting points than tertiary amides.**
- **All amides can form hydrogen bonds with water.**
- **Amides with 1-5 carbon atoms are soluble in water.**

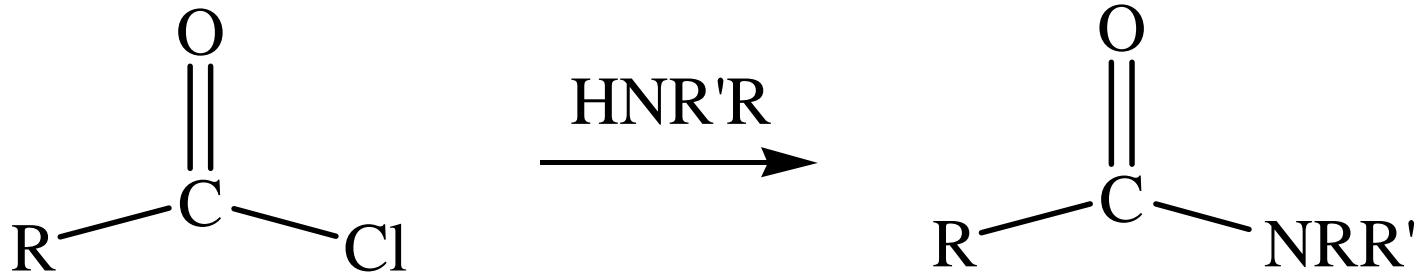
Hydrogen Bonding of Amides



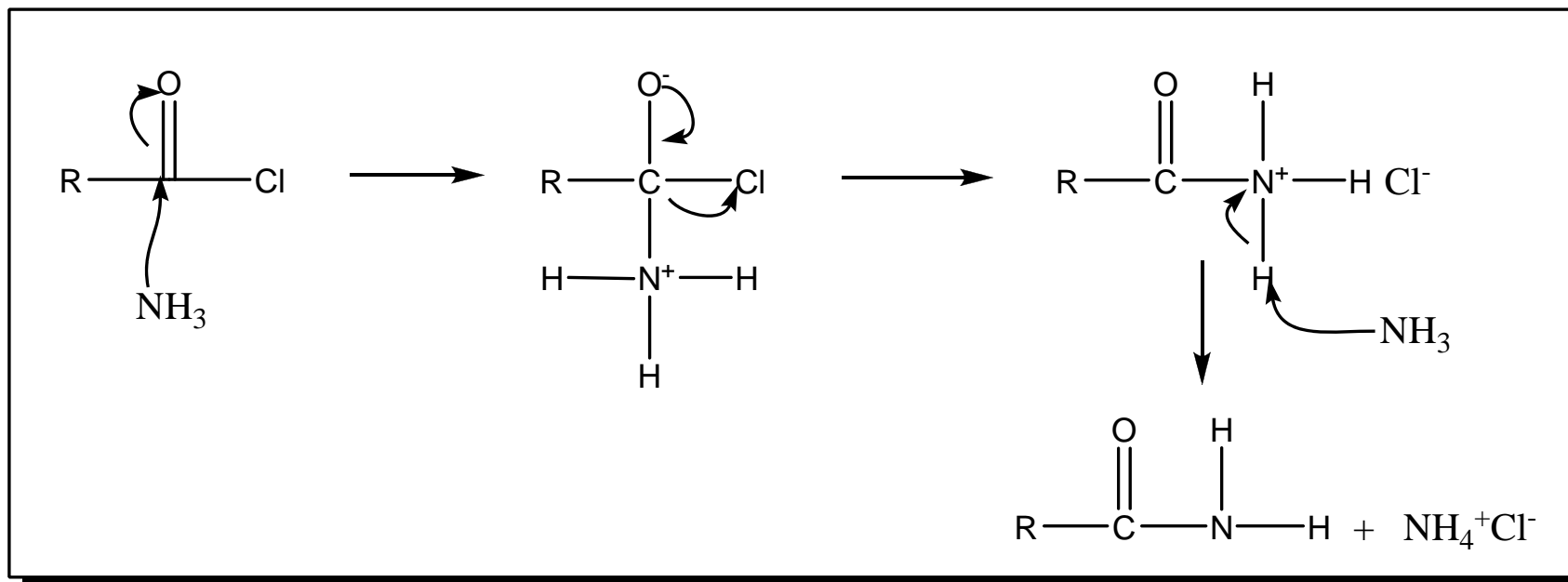
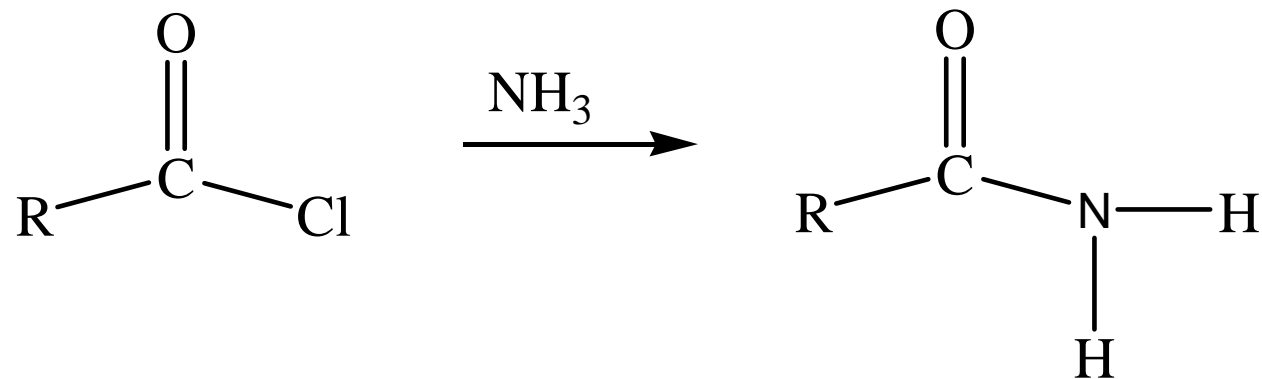
Hydrogen bonding occurs
between primary amides.

การเตรียมสารประกอบเอไมด์

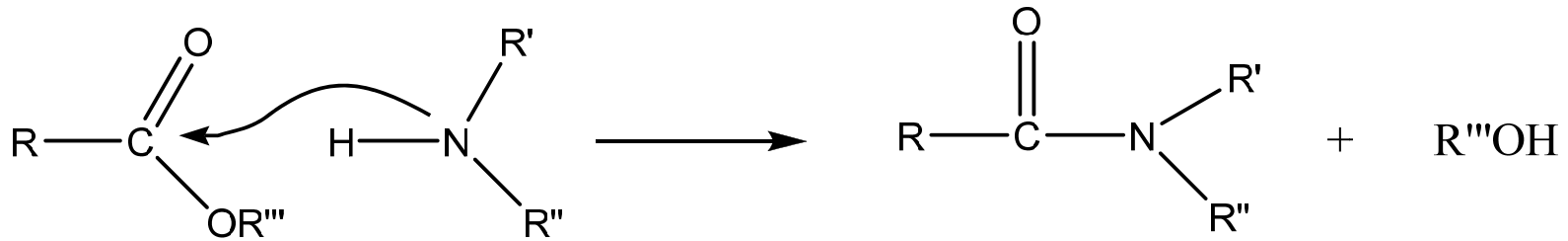
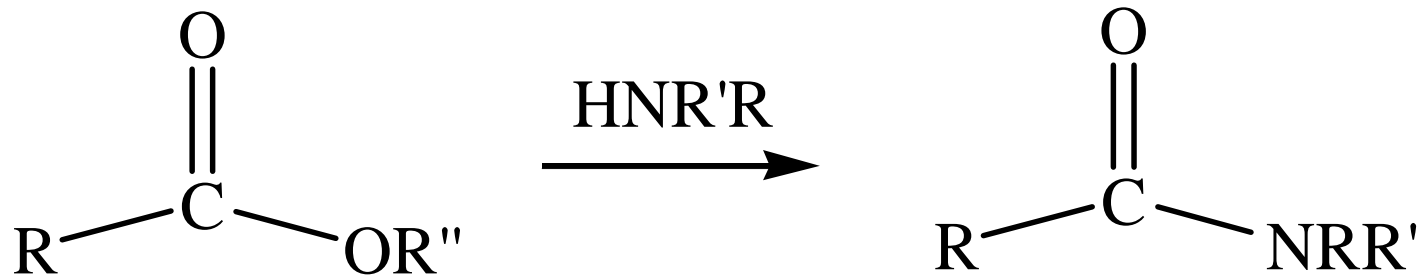
1 เตรียมจากแอซิดคลอไรด์



SORACHAI SAE-LIM



2 เตรียมจากเอสเทอร์



ปฏิกิริยาเคมีของเอไมด์

