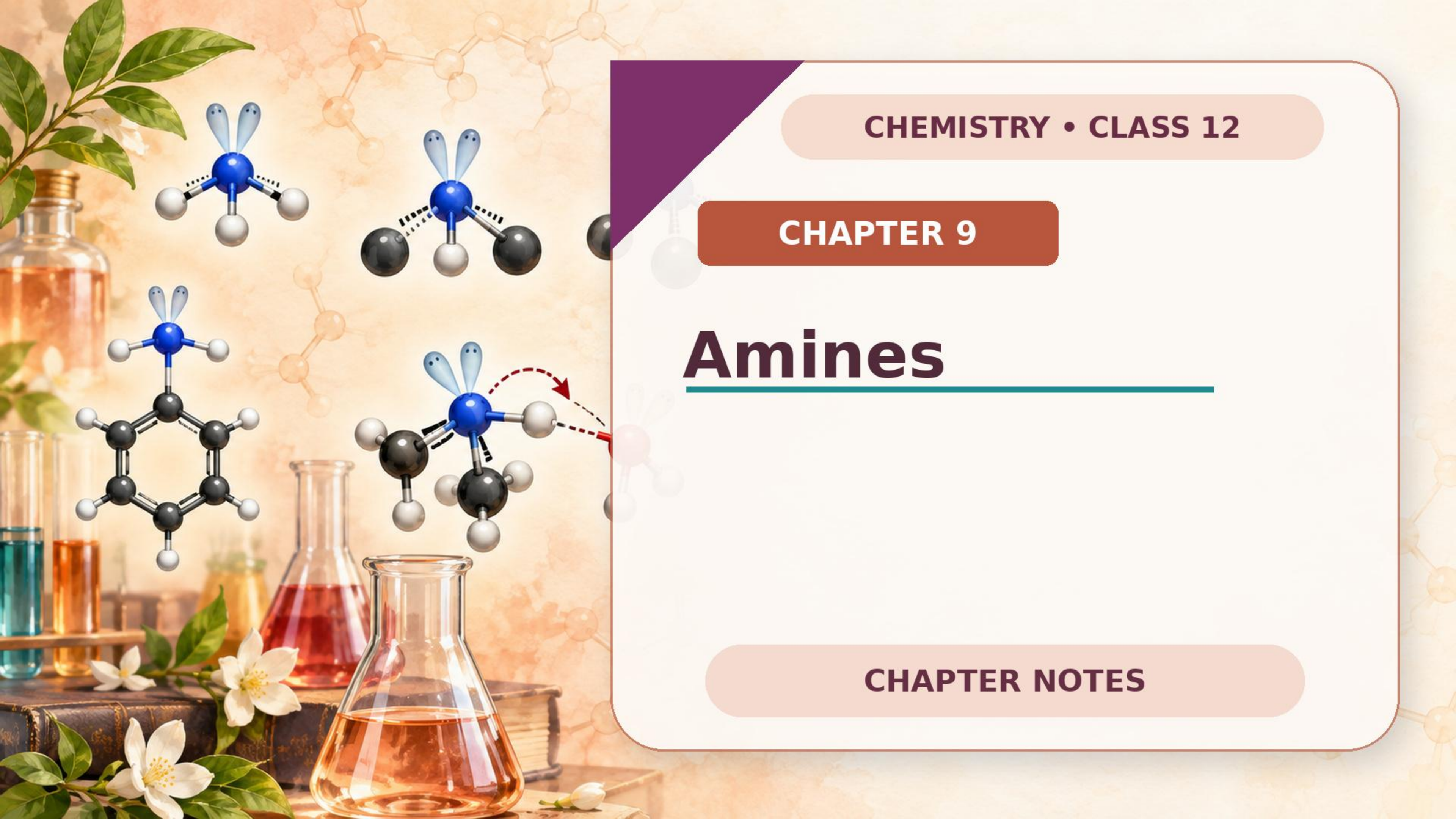


The background features a collage of chemistry-related images. On the left, there are glass bottles and test tubes containing liquids of various colors (orange, blue, red). In the foreground, a large Erlenmeyer flask contains an orange liquid. Green leaves and white flowers are scattered around the glassware. On the right side, there are several ball-and-stick molecular models. One model shows a central blue atom (Nitrogen) with two white atoms (Hydrogen) and two black atoms (Carbon). Another model shows a central blue atom with three white atoms and one black atom. A third model shows a central blue atom with two white atoms and two black atoms, with a red dashed arrow indicating a reaction or movement. The overall theme is chemistry and organic chemistry.

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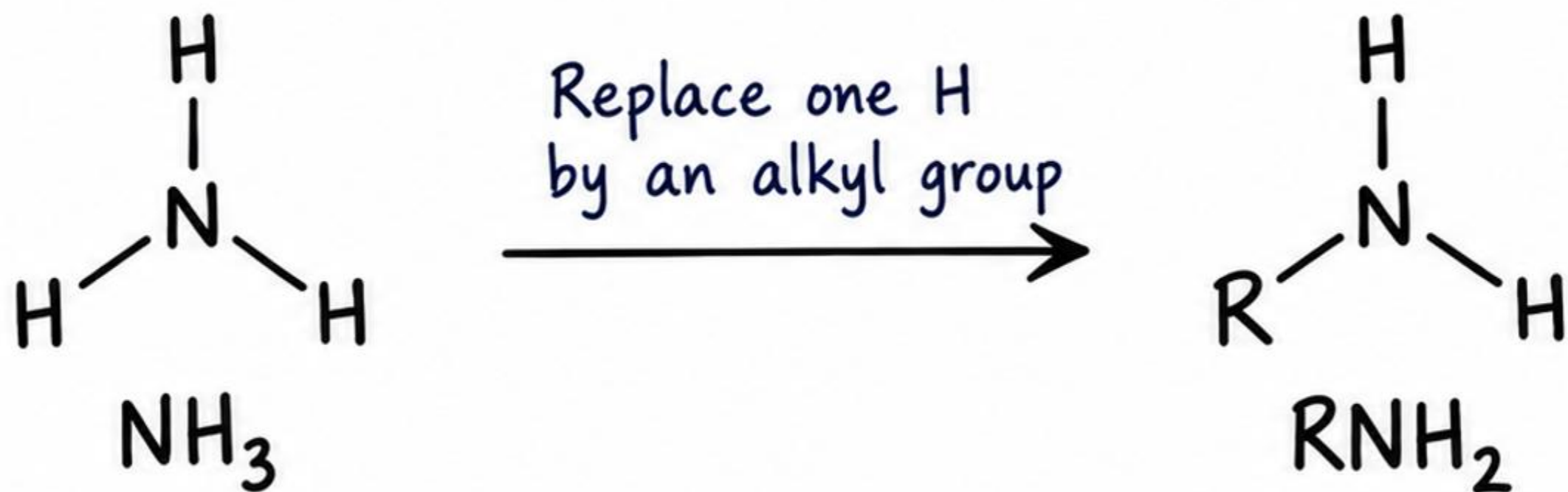
CHAPTER 9

Amines

CHAPTER NOTES

AMINES – OVERVIEW AND IMPORTANCE

Amines are derivatives of ammonia, NH_3 , in which one or more H atoms are replaced by alkyl or aryl groups.



They occur in proteins, vitamins, alkaloids and hormones.

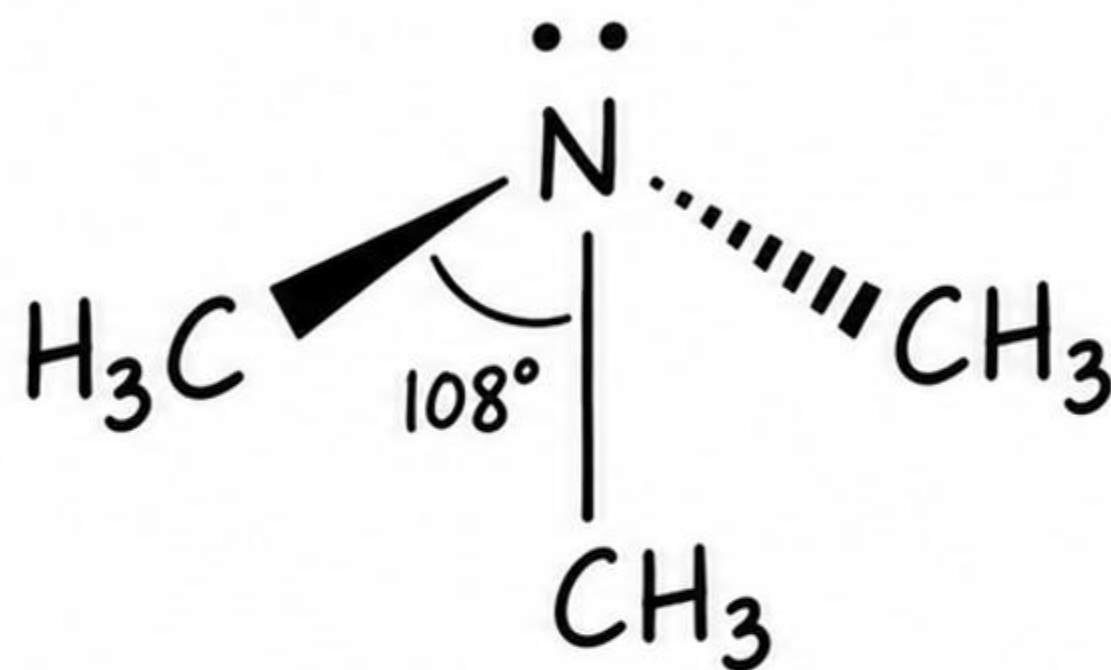
Uses: medicines, dyes, polymers and agrochemicals.

Quaternary ammonium salts are used as surfactants.

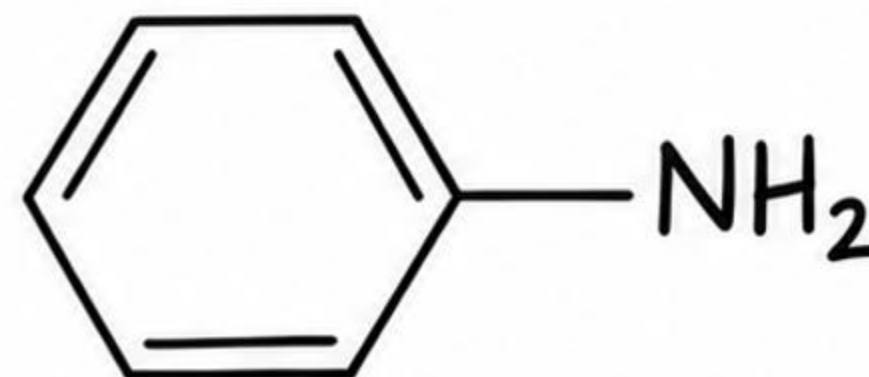
STRUCTURE AND SHAPE OF AMINES

- In simple alkylamines, nitrogen is approximately sp^3 -hybridised.
- It makes three σ bonds and has one lone pair.
- The molecular shape is trigonal pyramidal.
- The C-N-C angle in trimethylamine is about 108° .
- In aniline, the lone pair interacts with the ring, so this simple alkylamine model needs qualification.

Trimethylamine $(CH_3)_3N$



Aniline $(C_6H_5NH_2)$

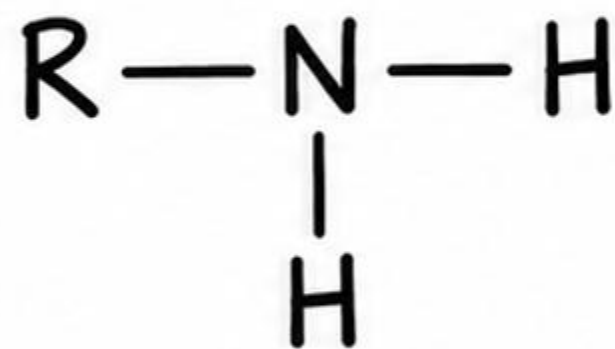


CLASSIFICATION OF AMINES

Count carbon groups directly bonded to nitrogen.

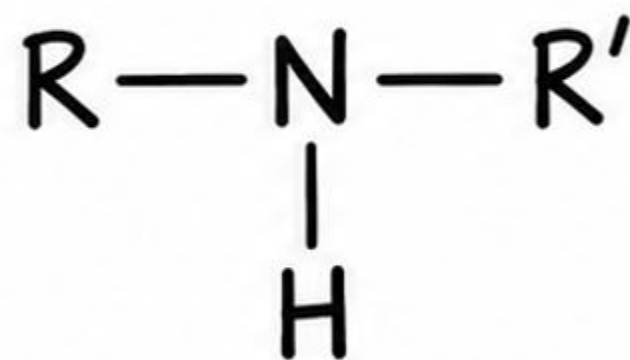
Primary, 1°:

RNH_2 ; one carbon group.



Secondary, 2°:

R_2NH ; two carbon groups.

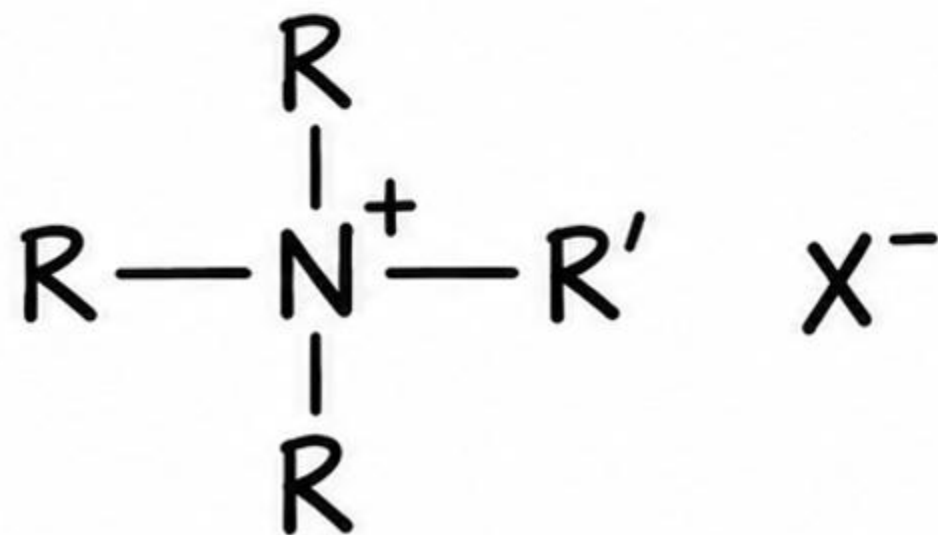


Tertiary, 3°:

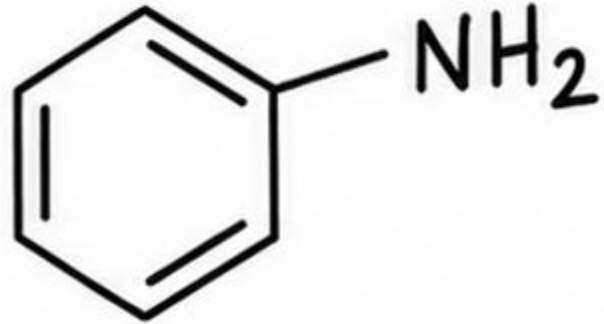
R_3N ; three carbon groups.



$\text{R}_4\text{N}^+\text{X}^-$ is a quaternary ammonium salt, not a primary, secondary or tertiary amine.



SIMPLE, MIXED AND AROMATIC AMINES

- Simple amine:
identical carbon groups on N; example $(C_2H_5)_2NH$.
- Mixed amine:
different groups; example $CH_3NHC_2H_5$.
- Aliphatic amine:
N is attached to alkyl groups; $CH_3CH_2NH_2$.
- Aromatic amine:
N is directly attached to an aryl group;  , $C_6H_5NH_2$, aniline.
- Benzylamine, $C_6H_5CH_2NH_2$, has N separated from the ring by CH_2 .

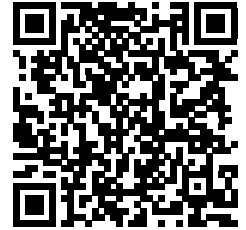


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