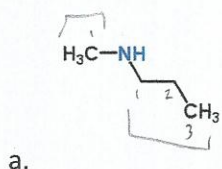


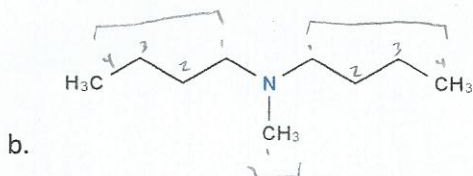
1. Write at least three characteristics of amines that Professor Jablonsky discussed during Wednesday's lecture. (ex. Hydrogen bonding, geometry, electronegativity etc.)

- the N can hydrogen bond
- geometry about the N is trigonal pyramidal
- the H's directly attached to the N (if any are present) can hydrogen bond
- derivatives of ammonia
- the N has one lone pair of electrons

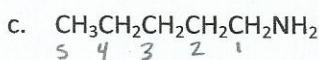
2. For the following amines, (1) classify, (2) give the common name, and (3) give the IUPAC name.



1. secondary (the N is bonded to two carbons)
2. methyl propyl amine
3. N-methyl propanamine

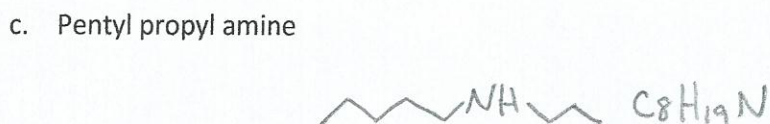


1. tertiary
2. dibutyl methyl amine
3. N-butyl-N-methyl butanamine



1. primary
2. pentyl amine
3. pentanamine

3. Draw and give the molecular formula for each of the following amines. ( $\text{C}_n\text{H}_{2n+3}\text{N}$ )



4. **True / False** Amines cannot hydrogen bond to water. *they can*
5. **True / False** Primary and secondary amines can hydrogen bond to each other.
6. **True / False** Tertiary amines can hydrogen bond to water.
7. **True / False** Tertiary amines have a higher boiling point than primary and secondary amines. *1° + 2° do because they can hydrogen bond to each other*
8. React ethyl amine with water. Then answer the following questions.



- a. What type of ion does the amine form? *ammonium cation*
- b. What is the geometry of this ion? *tetrahedral*

9. React ethyl amine with HBr to form an amine salt. *amine + acid → amine salt*

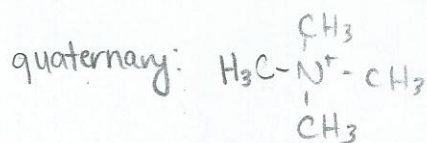
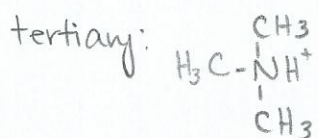
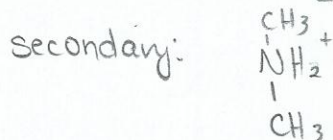
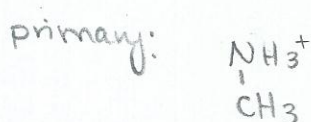


10. Amines are derivatives from **ammonium / ammonia**.

- a. What is the difference between ammonia and ammonium?

*ammonia: NH<sub>3</sub>      ammonia: NH<sub>4</sub><sup>+</sup>*

- b. Draw an example of primary, secondary, tertiary, and quaternary ammonium cations.



\* the amine salt + base → the neutral amine (free base)



reverse reaction