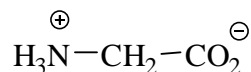
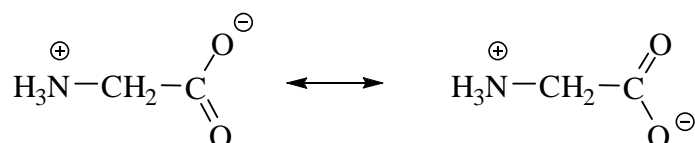


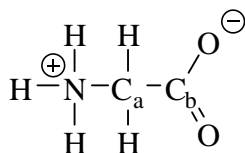
- Glycine,  $\text{NH}_2\text{CH}_2\text{COOH}$ , is the simplest of all naturally occurring amino acids. The  $\text{p}K_a$  of the acid group is 2.35 and the  $\text{p}K_a$  associated with the amino group is 9.78. Draw a structure that indicates the charges on the molecule at the physiological pH of 7.4.



Use your structure to illustrate the concept of resonance.



What are the hybridisation states and geometries of the two carbon atoms and the nitrogen atom in glycine?



**N has 4 bonds and no lone pairs:  $sp^3$  with a tetrahedral geometry.**

**$C_a$  has 4 bonds and no lone pairs:  $sp^3$  with a tetrahedral geometry.**

**$C_b$  has 3 bonds and no lone pairs:  $sp^2$  with a trigonal planar geometry.**

Propionic acid,  $\text{CH}_3\text{CH}_2\text{COOH}$ , has a melting point of  $-20.7\text{ }^\circ\text{C}$  while glycine has a melting point of  $292\text{ }^\circ\text{C}$ . Suggest a reason why these two molecules have such different melting points.

**The major intermolecular force in glycine is ionic bonding between the positively and negatively charged ends of the molecule. The major intermolecular force in propionic acid is hydrogen bonding between the carboxylic acid groups. Ionic bonding is much stronger than H-bonding so glycine has a much higher melting point.**