

☒ Not
Sure

144. Aspirin, an acid, has a pK_a close to 3. The lumen of the stomach has a pH close to 2. Aspirin is effective when taken orally because it:

a

- ☐ A. becomes a charged molecule, easily passing over the cell membranes of the stomach lining to enter the blood.
- ☐ B. becomes a charged molecule that does not pass over the cell membranes of the stomach lining, so that it remains in the digestive tract.
- ☒ C. remains a neutral molecule, able to traverse the cell membranes of the stomach lining to enter the blood.

C is the best answer. Aspirin is an acid, and it donates its proton in a basic environment. Upon donation of its proton, a negative charge arises. When the $pH = pK_a$, the acid donation is at 50% equilibrium. When the $pH < pK_a$ for an acid, the majority of the acid molecules retain their protons (the environment is more acidic, not conducive to giving up a proton) and remain neutral. One can infer from the passage, and from outside knowledge, that neutral molecules are able to traverse the lipid bilayer without resistance. This leads to efficient absorption of the drug into the bloodstream, where it can travel to the problem spot in the body. Choices A and B are incorrect, because the molecule does not become charged, but remains neutral. Furthermore, a charged molecule encounters a high resistance as it tries to cross the lipid bilayer, because a charged portion of a molecule maximizes its exposure to water, making it hydrophilic. The hydrocarbon portion of lipids are very hydrophobic. Like dissolves like, leaving charged molecules unable to cross the bilayer. Choice D is incorrect, because neutral molecules are able to cross lipid bilayers, and they can enter the blood circulation and not remain in the digestive tract. **The best answer is C.**
- ☐ D. remains a neutral molecule, unable to traverse the cell membrane, so that it remains in the digestive tract.