

Acid/Base Properties of a Pharmaceutical Compound

Many pharmaceutically interesting compounds are weak acids or weak bases, a fact of some importance when preparing them for use by the public. For example, if the active ingredient in a nasal spray is too acidic, then the preparation might include an additional ingredient to neutralize some of the acid; after all, no one wants to spray something as acidic as, say, lemon juice up his or her nose!

Pseudoephedrin is a central nervous system stimulant used in many cold and allergy tablets. In its molecular form it is a weak base (it is an amine), which, for convenience, we may represent as B. In water, the following equilibrium reaction exists



The Merck Index reports that a 0.030 M solution of pseudoephedrin has an equilibrium pH of 11.44. What is the value of K_b for this compound?

Because its base form is only slightly soluble in water, pseudoephedrin typically is dispensed in its weak acid form, HB^+ . Pseudoephedrin hydrochloride, therefore, is an ionic compound consisting of protonated pseudoephedrin, HB^+ , and Cl^- as a counter ion. The formula for this often is written as $\text{B}\cdot\text{HCl}$; don't confuse this with the strong acid HCl . A solution of pseudoephedrin hydrochloride, therefore, is acidic due to the presence of HB^+ . Write the K_a reaction responsible for making the solution acidic and report the value for K_a .

Suppose you dissolve three tablets of Sudafed[®], each containing 30.0 mg of pseudoephedrin hydrochloride, in 200.0 mL of water. What is the pH of the resulting solution? The molar mass for pseudoephedrin hydrochloride is 201.7 g/mol.