# In Class Problem—Fish Kill
Acid–Base Chemistry

CENG 340–Introduction to Environmental Engineering
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Concentrations of NH_3 (a weak acid) that are higher than 0.2 mg/L are toxic to fish.

Effluent from a wastewater treatment plant (WWTP)—with pH = 7 and a total ammonia concentration of 5 **mg-N**/L—is discharged to a stream that is popular with fisherman. Ammonia consists of two species: NH_4^+ (a weak acid) and NH_3 (its conjugate base). The concentrations of NH_4^+ and NH_3 are related to each other through the following equilibrium reaction:

$$[NH_4^+] \stackrel{K_a}{\rightleftharpoons} [NH_3] + [H^+]$$
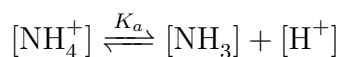
where $K_a = 10^{-9.3}$, or $pK_a = 9.3$.

1. You've been asked to use the total ammonia data reported above to calculate the concentration of NH_3 in the WWTP effluent to ensure that $[NH_3]$ is lower than 0.2 mg/L.