Question #74869, Chemistry / General Chemistry / Completed

What is the balanced equation for the reaction of HF with water?

A. 2HF + H2O → OH + H3F2
B. HF + H2O → H3O + F2
C. 2HF + H2O → OH+ + H3F2–
D. HF + H2O → H3O+ + F–
E. None of the Above

Solution

The ionization can be described as a pair of successive equilibria:

$$H_2O + HF \rightleftharpoons [H_3O^+ \cdot F^-]$$

$$[H_3O^+ \cdot F^-] \rightleftharpoons H_3O^+ + F^-$$

meaning that HF is extensively dissociated, but that the tight ion pairs reduce the thermodynamic activity coefficient of H3O+, so that the solution is effectively less acidic. But still there ions of H3O+ + F– as the products.

Answer: D.