Question #79162

At 25 oC phosphoric acid, H3PO4, has the following equilibrium constants: H3PO4(aq)+H2O(I)H2PO4-(aq)+H2O(I)HPO42-(aq)+H2O(I) \rightleftharpoons \rightleftharpoons H3O+(aq)+H2PO-4(aq)H3O+(aq)+H2O(I)HPO42-(aq)H3O+(aq)+H2O(I)) HPO42-(aq)H3O+(aq)+PO43-(aq) Ka1Ka2Ka3===7.5×10-36.2×10-84.2×10-13

What is the pH of a solution of 0.900 M KH2PO4, potassium dihydrogen phosphate?

The right answer is 4.67.

Solution:

Potassium dihydrogen phosphate is an ampholyte [1], so the formula of pH for it is equal to [2]:

$$pH = \frac{pK_{a,H_3PO_4} + pK_{a,H_2PO_4^-}}{2} = \frac{-\log(7.5 * 10^{-3}) - \log(6.2 * 10^{-8})}{2} = 4.67$$

So, the right answer is 4.67.

References:

[1] https://en.wikipedia.org/wiki/Amphoterism

[2] <u>http://theochem.ki.ku.dk/~axhun/pHnoter.pdf</u>