pH calculations using Ka and Kb

**2019**

Two solutions of equal concentration were prepared: one of ethanoic acid, CH3COOH, and one of ammonium chloride, NH4Cl.

p*K*a(CH3COOH) = 4.76 p*K*a(NH4+) = 9.24

The ethanoic acid solution has a [H3O+] of 1.78 × 10–3 mol L–1.

Calculate the concentration of the ethanoic acid solution.

**2018**

When sodium ethanoate, CH3COONa, is dissolved in water, the resulting solution has a pH greater than 7 due to the production of hydroxide ions, OH–, as shown in the equation below.

CH3COO– + H2O ⇌ CH3COOH + OH–

p*K*a(CH3COOH) = 4.76 *K*a(CH3COOH) = 1.74 × 10–5

Calculate the pH of a 0.420 mol L–1 CH3COONa solution.

**2017**

1. Ammonia, NH3, is a weak base. p*K*a(NH4+) = 9.24 *K*a(NH4+) = 5.75 × 10–10

(i) Calculate the pH of a 0.105 mol L–1 NH3 solution.

(ii) Dilute hydrochloric acid, HCl, is added to the NH3 solution until the ratio of NH3 to NH4+ in the

solution is 5:1. Determine the pH of this solution.

**2016**

Ethanamine, CH3CH2NH2, is a weak base.

(i) Write an equation to show the reaction of ethanamine with water.

(ii) Calculate the pH of a 0.109 mol L–1 solution of ethanamine.

p*K*a(CH3CH2NH3+) = 10.6 *K*a(CH3CH2NH3+) = 2.51 × 10–11

**2015**

Methylammonium chloride, CH3NH3Cl, dissolves in water to form a weakly acidic solution.

*K*a(CH3NH3+) = 2.29 × 10–11Calculate the pH of 0.0152 mol L–1 CH3NH3Cl solution.

**2014**

Hypochlorous acid has a p*K*a of 7.53. Another weak acid, hydrofluoric acid, HF, has a p*K*a of 3.17.

A 0.100 mol L–1 solution of each acid was prepared by dissolving it in water.

Compare the pHs of these two solutions. *No calculations are necessary.*

**2013** *(edited)*

20.0 mL of ethanoic acid has a concentration of 0.0896 mol L–1

p*K*a (CH3COOH) = 4.76

Calculate the pH of the ethanoic acid before any NaOH is added.

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