Acetates

Author: *L. Hasenberg* / Editor: *R. Bender*

Aluminium

Aluminium and its copper-free alloys are used in the production of ammonium and aluminium acetate [1]. Thus equipment and instruments made of aluminium (99.5 %) and copper-free aluminium alloys are used when aluminium acetate is prepared from alumina and acetic acid or from aluminium sulfate and barium acetate. Aluminium materials are attacked slightly at temperatures near the boiling point of the acetate solution. Reaction vessels made of aluminium and its copper-free alloys are used also when ammonium acetate is prepared by bubbling ammonia gas through acetic acid (< 90 %) [1].

Corrosion rates around 0.05 mm/a (1.97 mpy) are given for aqueous aluminium acetate solutions of any concentration at 323 K (50 °C) [2–4]. Aluminium is resistant to aqueous ammonium acetate solutions over a relatively wide range of concentrations and temperatures [2–4]: Losses of 0.05 mm/a (1.97 mpy) (maximum) are to be expected at concentrations up to 50 % and temperatures up to 323 K (50 °C). This value is not exceeded in a 10 % solution and at 373 K (100 °C) [4].

Sodium acetate solutions attack aluminium and its copper-free alloys only slightly [2–4]. In aqueous 5 to 20 % solutions, the surface of aluminium is corroded to mat appearance at about 340 K (67 °C); this attack can be largely inhibited by addition of 0.3 to 1 % water glass [1].

A maximum of 0.05 mm/a (1.97 mpy) is dissolved by aqueous solutions and the moist salt at 295 K (22 °C). Losses are somewhat higher at 343 K (70 °C).

Anodically oxidized aluminium is even more resistant to sodium acetate solutions than untreated metal is [1]. Hot water, nickel acetate or a bichromate are used for sealing the anodic oxide layer [5].

Sodium acetate is employed as a corrosion inhibitor in sodium chloride solutions and in ethanol for reducing the uniform attack and pitting of aluminium materials [1, 6, 7].

Potassium acetate solutions hardly attack aluminium and its alloys at 295 K (22 °C). With increasing temperature, the attack increases also in less concentrated aqueous solutions [1]. Losses of less than 0.05 mm/a (1.97 mpy) are given for 10 % potassium acetate solution at 295 K (22 °C) and of more than 1.25 mm/a (49.2 mpy) upwards of 323 K (50 °C).

Aluminium and Silumin® are hardly attacked in neutral calcium acetate solutions up to 373 K (100 °C). If, however, the solution contains free calcium hydroxide, the attack increases markedly [1].

Losses of less than 0.5 mm/a (19.7 mpy) are given at 295 K (22 °C) and of more than 1.25 mm/a (49.2 mpy) upwards of 348 K (75 °C) [1].

Aluminium is not resistant to lead and copper acetate solutions even at room temperature: corrosion rates exceed 1.25 mm/a (49.2 mpy) even in solutions of these acetates in low concentrations [2–4].

Aluminium is also attacked by nickel acetate solutions even at room temperature and is said to lose up to 0.5 mm/a (19.7 mpy) in 10 % aqueous solution [1].