

〈Regular Article〉

The Release of Formaldehyde upon Decomposition of Imidazolidinyl Urea

Keiji KAJIMURA*, Takahiro DOI, Takaomi TAGAMI, Shuzo TAGUCHI

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Abstract

The release of formaldehyde (FA) due to imidazolidinyl urea (IU) decomposition was investigated. The purpose of this study is to examine the conditions necessary to inhibit FA release or to remove the released FA. The release of FA was dependent on pH value and temperature. The release was markedly increased in a highly alkaline buffer compared with that in an acidic buffer. When an IU solution (0.1 w/w%) prepared with an alkaline buffer (pH 10.0) was stored at 25°C, the concentration of FA reached about 90 ppm after 24 h. On the other hand, under acidic conditions (pH 2.0), it was only about 30 ppm. When an IU solution (0.3 w/w%) prepared with a weakly acidic buffer (pH 6.0) was incubated at 60°C, the concentration of FA reached about 140 ppm after 10min. On the other hand, when it was incubated at 25°C, it was only about 80 ppm after 60 min. Homemade cosmetics (a lotion, gel, and conditioner) were made (with 0.1 w/w% IU) and stored at a constant temperature of 25°C for 30 days. In most of them, the concentration of FA increased as time advanced. However, in a cosmetic that contained urea a reduction in FA concentration was observed from the 2nd day. A similar FA reduction was recognized in commercially manufactured cosmetics containing urea and IU. In addition, when a test aqueous solution containing a mix of FA and urea was stored at 25°C for 15 days, decreases in the concentrations of both compounds were noticed with time. The use of urea to chemically remove the released FA from cosmetics was effective.

Key words: imidazolidinyl urea, formaldehyde, urea, release, hydrogen ion concentration.