

This article was downloaded by:

On: 28 January 2011

Access details: *Access Details: Free Access*

Publisher *Taylor & Francis*

Informa Ltd Registered in England and Wales Registered Number: 1072954 Registered office: Mortimer House, 37-41 Mortimer Street, London W1T 3JH, UK



## Phosphorus, Sulfur, and Silicon and the Related Elements

Publication details, including instructions for authors and subscription information:

<http://www.informaworld.com/smpp/title~content=t713618290>

### The Physicochemical Properties of Ammonium-Exchanged Aluminum Dihydrogen Triphosphate Dihydrate

Aki Hayashi<sup>a</sup>; Yasuhiro Yamamoto<sup>a</sup>; Kenichi Kouzuma<sup>a</sup>; Hirokazu Nakayama<sup>a</sup>; Mitsutomo Tsuhako<sup>a</sup>

<sup>a</sup> Kobe Pharmaceutical University, Japan

Online publication date: 27 October 2010

**To cite this Article** Hayashi, Aki, Yamamoto, Yasuhiro, Kouzuma, Kenichi, Nakayama, Hirokazu and Tsuhako, Mitsutomo(2002) 'The Physicochemical Properties of Ammonium-Exchanged Aluminum Dihydrogen Triphosphate Dihydrate', *Phosphorus, Sulfur, and Silicon and the Related Elements*, 177: 8, 1913 – 1914

**To link to this Article:** DOI: 10.1080/10426500213316

**URL:** <http://dx.doi.org/10.1080/10426500213316>

PLEASE SCROLL DOWN FOR ARTICLE

Full terms and conditions of use: <http://www.informaworld.com/terms-and-conditions-of-access.pdf>

This article may be used for research, teaching and private study purposes. Any substantial or systematic reproduction, re-distribution, re-selling, loan or sub-licensing, systematic supply or distribution in any form to anyone is expressly forbidden.

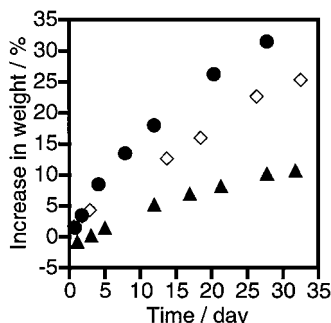
The publisher does not give any warranty express or implied or make any representation that the contents will be complete or accurate or up to date. The accuracy of any instructions, formulae and drug doses should be independently verified with primary sources. The publisher shall not be liable for any loss, actions, claims, proceedings, demand or costs or damages whatsoever or howsoever caused arising directly or indirectly in connection with or arising out of the use of this material.

## THE PHYSICOCHEMICAL PROPERTIES OF AMMONIUM-EXCHANGED ALUMINUM DIHYDROGEN TRIPHOSPHATE DIHYDRATE

*Aki Hayashi, Yasuhiro Yamamoto, Kenichi Kouzuma,  
Hirokazu Nakayama, and Mitsutomo Tsuhako  
Kobe Pharmaceutical University, Japan*

(Received July 29, 2001; accepted December 25, 2001)

Ammonium-exchanged aluminum dihydrogen triphosphate dihydrate ( $\text{NH}_4^+/\text{AlP}$ ) can be obtained by the reaction of layered aluminum dihydrogen triphosphate dihydrate and ammonia solution at  $8^\circ\text{C}$ .  $\text{NH}_4^+/\text{AlP}$  shows two phases with different interlayer distances ( $8.9 \text{ \AA}$  for phase I and  $11.9 \text{ \AA}$  for phase II). Phase II irreversibly transformed to phase I under the relative humidity of 32%. When phase I was kept under the relative humidity of 0%, the interlayer distance decreased to  $7.9 \text{ \AA}$ .  $^{31}\text{P}$  MAS NMR spectra and elemental analysis suggested it to be anhydrous  $\text{NH}_4^+/\text{AlP}$ .<sup>1</sup> Phase I can adsorb considerable amounts of gaseous carboxylic acids and formaldehyde at  $40^\circ\text{C}$  as shown in Figure 1. The amount of adsorption for anhydrous  $\text{NH}_4^+/\text{AlP}$  was similar as that of phase I and was greater than that of phase II.



**FIGURE 1** Adsorption of ◇;  $\text{HCHO}$ , ●;  $\text{CH}_3\text{COOH}$ , ▲;  $\text{CH}_3\text{CH}_2\text{COOH}$  by phase I.

Address correspondence to Aki Hayashi, Kobe Pharmaceutical University, 4-19-1 Motoyamakita-machi, Higashinada-ku, Kobe, Hyogo, 658-8558, Japan. E-mail: ahayashi@kobepharma-u.ac.jp

Formaldehyde adsorption accompanies Cannizzaro reaction in the interlayer region for any phases as evidenced by  $^{13}\text{C}$  CP/MAS NMR spectra. On the other hand, adsorbed carboxylic acids coexist with ammonium ion in the interlayer region.

## REFERENCE

- [1] A. Hayashi et al., *J. Inclusion. Phenom.*, **34**, 401 (1999).