

## On the Aluminium Hydroxide Sol Prepared by Autoclave Treatment.

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There are several methods for the preparation of aluminium hydroxide sol. However, nothing seems to have been said about the preparation by autoclave treatment. In this article we should like to give an account of this method.

**Method.** Gelatinous precipitate of aluminium hydroxide is obtained by adding ammonia, a little in excess, into a solution of  $\text{AlCl}_3$  at room temperature under stirring. The precipitate is settled by centrifuging and the clear upper liquid is discarded. The precipitate is washed with water and subjected to centrifuging. This procedure is repeated three or four times until the upper liquid shows no coloration with phenolphthalein, but still shows a distinct reaction of chlorine with  $\text{AgNO}_3$ . The upper liquid and the precipitate are thoroughly mixed and transferred to a beaker of fused quartz. The beaker is placed in an autoclave of steel. The autoclave is then heated at  $190^\circ\text{C}$  for one hour<sup>(1)</sup>. After the autoclave has cooled down to the room temperature, the beaker is taken out, and we find a uniformly turbid sol in the beaker<sup>(2)</sup>.

The sol is stable and does not coagulate after standing over three weeks at room temperature. The sol remains stable for 4 or 5 days after the chlorine contained in it has been removed by dialysis. The dialysis was carried out against water, using a collodion bag, until the water shows no reaction of chlorine with  $\text{AgNO}_3$ .

In preparing the sol, it is necessary to let a small quantity of chlorine remain in the precipitate of aluminium hydroxide. When the precipitate

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(1) For details of experimental technique, Cf. T. Katsurai, *Sci. Papers Inst. Phys. Chem. Research* (Tokyo), **35** (1939), 191.

(2) An example of preparation is as follows. We start by mixing 100 c.c. of 1N  $\text{AlCl}_3$  and 150 c.c. of 1N  $\text{NH}_4\text{OH}$ . The concentration of the sol obtained is found, by chemical analysis, to be 1.0g  $\text{Al}_2\text{O}_3$  per 100 c.c. of the sol.

is washed completely free of chlorine, sol formation does not take place by the autoclave treatment ( $190^{\circ}\text{C}$ –1 hr.). The precipitate remains unchanged at the bottom of the beaker.

This precipitate shows an amorphous pattern when it is studied by means of X-ray. In the experiment Mo  $K\alpha$ -radiation was used, the experimental conditions being; filter= $\text{ZrO}_2$ , voltage= $45\text{kV.}$ , current= $7\text{ mA.}$ , time of exposure= $12\text{ hr.}$ , the distance between the capillary and the film= $50.1\text{ mm.}$

Repeated autoclave treatment ( $190^{\circ}\text{C}$ –1 hr.) of the precipitate, to which is added a small quantity of  $\text{NH}_4\text{Cl}$ , does not cause sol formation.

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