

hydroxyglutamic acid or for hydroxylysine in wool, and the above considerations are naturally confined to existing data.

A second point in the communication under consideration raises the question whether hydroxylysine may not be a constituent of wool. Speakman and Hirst found 0.94-1.11 per cent of amino nitrogen in the wool they examined; the  $\epsilon$ -amino groups of 2.8 per cent lysine would account, however, for only 0.27 per cent. They included 0.82 per cent as being derived from 10.2 per cent of arginine, making 1.09 per cent in all, in agreement with their experimental findings. The guanidine group of arginine does *not*, however, yield nitrogen with nitrous acid under the usual conditions.

Van Slyke and Birchard<sup>12</sup> have shown that in most proteins the free amino nitrogen corresponds very closely to one-half of the lysine nitrogen, and in the present case it may be concluded that wool probably contains hydroxylysine or other diamino acid in addition to lysine.

Our uncertainty as to the composition of the keratin molecule (only one complete analysis is upon record, that of Abderhalden and Voitnovici<sup>13</sup> in 1907) makes it imperative that trustworthy quantitative chemical evidence should be available to test the newer physical theories of keratin structure now being advanced.

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<sup>1</sup> Speakman and Hirst, *NATURE*, **128**, 1073, Dec. 26, 1931.

<sup>2</sup> Marston, Council of Sci. and Ind. Res., Commonwealth of Australia, *Bulletin*, **38**; 1928.

<sup>3</sup> Fischer, "Untersuchungen über Aminosäuren, Polypeptide und Proteine", **1**, 1899-1906; **2**, 1907-1919; Springer, Berlin.

<sup>4</sup> Osborne, *J. Amer. Chem. Soc.*, **24**, 140; 1902.

<sup>5</sup> Osborne and Gilbert, *Amer. J. Physiol.*, **15**, 333, 1905-1906.

<sup>6</sup> Osborne, Leavenworth and Brautlecht, *Amer. J. Physiol.*, **23**, 180; 1908-1909.

<sup>7</sup> Dakin, *Biochem. J.*, **12**, 290; 1918.

<sup>8</sup> Luck, *Biochem. J.*, **18**, 679; 1924.

<sup>9</sup> Andersen and Røed-Müller, *Biochem. Z.*, **70**, 442; 1915.

<sup>10</sup> Vickery and Block, *J. Biol. Chem.*, **86**, 107; 1930.

<sup>11</sup> Stewart and Rimington, forthcoming publication in *Biochem. J.*

<sup>12</sup> Van Slyke and Birchard, *J. Biol. Chem.*, **16**, 539; 1913-1914.

<sup>13</sup> Abderhalden and Voitnovici, *Z. physiol. Chem.*, **52**, 368; 1907.

### Preparation of Anhydrous Chlorides and Metallic Couples

DURING investigations involving the Grignard reagent it was noticed that, when the magnesium was in contact with lead chloride under ether, bubbles of gas were evolved, which were found to arise from traces of water in the ether.

This led to the investigation of the action of water on a metallic salt (chloride, sulphate, nitrate, etc.) when mixed with a metal lower in the electropotential series than the metal of the salt.

It was found, especially in the case of the chloride, that reaction in many cases occurred with explosive violence, the more electro-positive metal replacing the less electro-positive metal of the salt. Typical cases of such violent reactions were given by zinc and aluminium respectively when in contact with (a)  $\text{HgCl}_2$ , (b)  $\text{PbCl}_2$ , (c)  $\text{Cu}_2\text{Cl}_2$ , etc. Such mixtures are very effective for detecting the presence of traces of water in organic liquids.

These observations led to heating the mixtures to ascertain whether in cases of volatile chlorides a simple method of preparation were possible, and it was found that when excess of aluminium was heated with lead chloride a quantitative yield of aluminium chloride was obtained. When excess of aluminium is not taken, a yellow crystalline substance (probably a double chloride of lead and aluminium) is formed along with the aluminium chloride. The reaction takes place very readily and can be carried out in a

soft glass test-tube. Aluminium and cuprous chloride, also aluminium and silver chloride, react easily to give aluminium chloride. For syntheses by the Friedel Crafts' reaction, the aluminium chloride can be quantitatively distilled over by connecting the test-tube with a bent metal tube to the reaction vessel. Instead, the mixture may be placed in the reaction vessel itself and gently warmed; the aluminium chloride condenses on the side of the flask, and the metallic residue can be shaken out of the vessel. The chloride is then washed down the side of the vessel with the organic solvent, or dislodged by means of a glass rod.

Zinc and stannic chlorides are readily prepared by the action of (a) zinc on cuprous chloride, (b) tin on cupric oxychloride. The cupric oxychloride is prepared by fusing ordinary hydrated cupric chloride on a tray, the fused mass being ground up in a mortar and transferred to a distillation flask. Powdered tin is dropped into the flask, the neck being closed by a cork wrapped in tin-foil. On gently heating, anhydrous stannic chloride distils over and is collected in a test-tube placed on the side arm. In this way anhydrous stannic chloride in excellent yield can be very quickly prepared.

Zinc and cuprous chloride when left on a filter paper react, causing the paper to ignite. When magnesium and cuprous chloride were heated together an explosion occurred; the flask was shattered and coated with copper.

Another point of interest is that effective couples can be made in this way. For example, in the preparation of diphenyl methane,<sup>1</sup> instead of adding aluminium mercury couple, an effective nascent couple is obtained by adding a little aluminium and mercuric chloride. The yield was quite as good as that obtained by the usual method, with the further advantage that the couple prepared in situ is always effective, and is more certain in its action than the ordinary couple.

Observations indicate that oxychlorides may in some cases be better than normal chlorides, for the use of the former involves the possibility of a thermite as well as a displacement reaction.

At present the application of the above facts for widening the scope of reactions is being investigated.

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<sup>1</sup> Cohen, Hirst, *Trans. Chem. Soc.*, **67**, 826; 1897.

### Degree of Weathering of Soils

IN the modern study of soils, there is an urgent need for methods of analysis which will express quantitatively the fundamental properties and genetic relationships of the material examined. We are venturing to suggest a provisional method whereby an approximate estimate may be obtained of the extent to which chemical weathering has proceeded in a given soil.

Assuming that the clay fraction separated in mechanical analysis represents that portion of the soil which has resulted from processes of chemical weathering—the so-called weathering complex—and that the remainder of the soil consists of unweathered minerals, such as feldspars, and unweatherable minerals, such as quartz, the proportion of the total alumina of the soil present in the clay fraction should give a rough measure of the degree to which chemical weathering has proceeded. Since the principal clay-forming minerals are complex aluminosilicates, a soil which has reached the end-point of weathering