THE

PHILOSOPHICAL MAGAZINE,

OR

ANNALS

OF

CHEMISTRY, MATHEMATICS, ASTRONOMY, NATURAL HISTORY, AND GENERAL SCIENCE.

BY

RICHARD TAYLOR, F.S.A. F.L.S. M. Astr. S. &c.

AND

RICHARD PHILLIPS, F.R.S. L. & E. F.L.S. &c.

"Nec aranearum sane textus ideo melior quia ex se fila gignunt, nec noster vilior quia ex alienis libamus ut apes." Just. Lips. *Monit. Polit.* lib. i. cap. 1.

VOL. IV.

NEW AND UNITED SERIES OF THE PHILOSOPHICAL MAGAZINE AND ANNALS OF PHILOSOPHY.

JULY—DECEMBER, 1828.

LONDON:

PRINTED BY RICHARD TAYLOR, RED LION COURT, FLEET STREET:

AND SOLD BY LONGMAN, REES, ORME, BROWN, AND GREEN; CADELL; BALDWIN AND CRADOCK; SHERWOOD, GILBERT, AND PIPER; SIMPKIN AND MARSHALL; UNDERWOOD; W. PHILLIPS; HARDING; HIGHLEY, LONDON: — AND BY ADAM BLACK, EDINBURGH; SMITH AND SON, GLASGOW; AND HODGES AND M'ARTHUR, DUBLIN.

is the newer process less complicated and expensive, but I have never yet found tartaric acid free from lime, and this base remains combined with the titanic acid. If during the treatment of the titaniferous iron by the sulphuretted hydrogen the heat is not very strong, the titanic acid obtained will render the washings milky, and will partly pass through the filter; but this will not occur if the heat be sufficiently great.

Hydrogen gas does not succeed so well as sulphuretted hydrogen: the oxide is indeed reduced, but the titanic acid obtained by this process is always ferruginous. Muriatic acid does not give a better result.

The time occupied in the operation now described may be shortened by fusing the titaniferous iron with sulphur in an earthen crucible. The mass is to be treated with concentrated muriatic acid, which removes much of the iron; but some remains with the titanic acid, and nearly as much as in rutile; by treating this impure acid with sulphuretted hydrogen as above described, it is obtained pure at one operation.—*Annales de Chimie*, xxxviii. 133.

ARTIFICIAL FORMATION OF UREA. BY M. F. WOHLER.

M. Wohler has already shown, that when cyanogen is made to act upon solution of ammonia, there are obtained, besides several other products, oxalic acid, and a white crystalline substance, which occurs also whenever the attempt is made to combine cyanic acid with ammonia by double decomposition. On prosecuting his inquiries, M. W. found that by the combination of cyanic acid with ammonia, urea was formed; this is a remarkable fact, as offering the artificial formation of organic matter, and even animal matter, by means of inorganic principles.

The white crystalline substance is most readily obtained by decomposing cyanate of silver by a solution of muriate of ammonia, or cyanate of lead by liquid ammonia; it is colourless, transparent, and crystallizes in the form of small rectangular quadrilateral prisms without any distinguishable pyramids. Neither potash nor lime evolves any trace of ammonia from this substance. Acids do not, as with the cyanates, disengage either carbonic or cyanic acid: it does not, like the cyanates, precipitate the salts of lead and silver; it is therefore evident that it contains neither ammonia nor cyanic acid. Most acids have no marked action on this substance, but the nitric acid when added to a concentrated solution gives a precipitate in the form of brilliant scales. These crystals are extremely acid, and were at first supposed to be a peculiar acid, but when decomposed by bases, nitrates of those bases were obtained; and by alcohol, the white crystalline matter was obtained unchanged in its properties: these properties, when compared with those of pure urea obtained from urine, indicated that this substance, or cyanate of ammonia, is absolutely identical with urea; a conclusion which is strengthened by the properties assigned to urea in the writings of Proust, Prout, and others. M. Wohler states some facts with respect to urea (and also with regard to this artificial substance,) which he

he says have not been previously noticed. When natural or artificial urea is decomposed by heat, there is produced, besides a large quantity of carbonate of ammonia, towards the end of the operation a smell of cyanic acid resembling that of acetic acid, precisely as occurs during the distillation of cyanate of mercury or uric acid, and especially urate of mercury. By the distillation of urea, a white substance is also obtained, the properties of which are under examination.

If cyanate of ammonia be similar to urea, then the composition of the former as obtained by calculation should resemble that of the latter; assuming one atom of water in cyanate of ammonia, as in all ammoniacal salts which contain any, and adopting Prout's analysis of urea as the most correct, it consists of

Azote.....	46·650	4 atoms.
Carbon	19·975	2
Hydrogen	6·670	8
Oxygen	26·650	
	99·945	

Cyanate of ammonia should consist of 56·92 cyanic acid, 28·14 ammonia, and 14·74 water, which give as its elements:

Azote.....	46·78	4 atoms.
Carbon	20·19	2
Hydrogen	6·59	8
Oxygen	26·64	

By the combustion of cyanic acid by means of oxide of copper, two volumes carbonic acid gas, and one volume of azote are obtained; but by the combustion of cyanate of ammonia, there should be procured equal volumes of these gases, which is what Prout actually found in the combustion of urea.—*Annales de Chimie*, April 1828.

NATIVE IRON IN THE UNITED STATES.

In the second volume of the Phil. Mag. and Annals, at p. 71, will be found an account of a variety of native iron found on Canaan mountain in Connecticut, extracted from Silliman's Journal. In the last Number of that Journal, which we have lately received, are the following particulars of the situation in which the iron was found, and of the probable existence of a mass of native iron at that spot. They are contained in Prof. E. Hitchcock's "Miscellaneous Notices of Mineral Localities."

"Sept. 6th, *Canaan, Connecticut.*—This is an interesting region, both to the geologist and mineralogist. We were attracted thither, principally by the hope of discovering the spot from which the native iron was obtained, that was recently announced in this Journal. We called upon Major Burrall, who, in search of the iron which he formerly obtained from this mountain, had recently visited it again, in company with his son, Mr. Wm. Burrall, a graduate of Yale-College, and Dr. Reed. Major B. not being able to go with us to the spot, the two other gentlemen just named, conducted us. About two miles north of the meeting-house, in the south parish in Canaan,

is