

to meteorology, with most satisfactory results.' One point in his address must commend itself to many persons who try to keep up with the progress that is being made along the various branches of meteorological science, and that is the plea for maintaining 'a comprehensive outlook on the whole field of investigation,' which is important in these days of intense specialization.

A NEW TEXT-BOOK OF METEOROLOGY.

THE June number of the *National Geographic Magazine* contains an article entitled 'Forecasting the Weather and Storms,' by Professor Willis L. Moore, chief of the Weather Bureau. This article occupies all but three pages of this number. It is illustrated by means of numerous weather maps, storm charts and half-tone prints, and is to form, as we learn, one chapter in a forthcoming book by Dr. Moore, entitled 'The New Meteorology.' The author's experience in the Weather Bureau, and the exceptional facilities at his command, will doubtless result in producing a popular book which will be very widely read.

NOTES.

At a recent exhibition of meteorological instruments held under the auspices of the Royal Meteorological Society in London, one of the most interesting exhibits was a series of twenty-four-hour traces of continuous sunshine, obtained on the Antarctic expedition of the *Discovery*.

Consular Report for February, 1905, contains a report by the American consul at Nottingham, England, on the fogs of that district, their relation to commerce, business and health, and the suggestions that have been made regarding the dispelling of fogs.

A PAPER by Forel in the *Archives des Sciences physiques et naturelles* for March, 1905, summarizes the observations of Bishop's ring which followed the Mont Pelée eruption of May 8, 1902.

PROFESSOR ANGELO MOSSO (*Atti dei Lincei*, XIV., (1)), has made experiments on the effect of carbon dioxide as a remedy for mountain sickness, and recommends that about

eight per cent. of CO₂ should be added to the compressed oxygen which is taken for use during high balloon ascents.

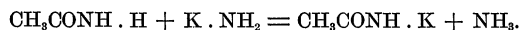
R. DE C. WARD.

NOTES ON INORGANIC CHEMISTRY.

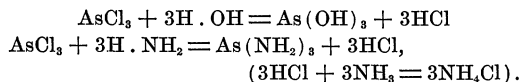
SOLUTIONS IN LIQUID AMMONIA.

THE modern theories of solution are based almost exclusively upon phenomena taking place in aqueous solution. It is true that the action of other solvents, especially the organic, has been studied, as well as that of liquid ammonia, and to a lesser extent of liquid hydrogen chlorid, sulfid and fluorid. But this work has contributed little to the theory of solutions in general, nor have the theories of solution in water been to any considerable extent successfully applied to other solvents. During the past eight years Professor E. C. Franklin, now of Stanford University, has done much work on solutions in liquid ammonia, and in a recent *Journal* of the American Chemical Society he has brought forward a rather notable generalization, which brings the liquid ammonia solutions into line with water solutions. It has long been recognized that liquid ammonia stands near water as a solvent. It is an associated liquid with a fairly high dielectric constant. While inferior generally to water as a solvent, it has marked power of ionization, the more dilute ammonia solutions being even better conductors of electricity than aqueous solutions of the same concentration. As water from the standpoint of solution is to be looked upon as a compound of H ions and OH ions, so ammonia is a compound of H ions and NH₂ ions. When acids are dissolved in liquid ammonia they form, as a matter of course, ammonium salts, but nevertheless they retain true acid properties. They discharge the color of phenolphthalein; they dissolve metallic sodium and some other metals with the evolution of hydrogen and the formation of metallic salts; they dissolve certain metallic oxids and basic salts which are insoluble in the liquid ammonia. Here the acid ion seems to be not H, but NH₄, or as we may write it, NH₃.H. It is, however, by no means im-

possible that in aqueous acids we have present, not the ion H , but OH_3 or $OH_2 \cdot H$. In each case the hydrogen ion would be associated with a molecule of the solvent. Besides these compounds which act as acids in water, there are other compounds not acids in aqueous solution, which act as acids in ammonia. Such, for example, are the acid amids and imids. In acetamid we may, perhaps, assume the ions CH_3CONH and H ; in urea the ions H_2NCONH and H , as well as $CO(NH)_2$ and $2H$. Here the NH seems to play the same part as the oxygen atom of the hydroxyl of acetic or carbamic acid. When sodium is dissolved in liquid ammonia, it gradually decomposes it with the evolution of hydrogen and the formation of sodium amid, $NaNH_2$. The reaction is of course exactly analogous to the action of sodium on water with the formation of sodium hydroxid, $NaOH$. The interesting point is that sodium amid in ammonia solution is a base, just as sodium hydroxid in water. It colors phenolphthalein and neutralizes the ammonia acids. Just as aqueous bases contain the OH ion, the ammonia bases contain the NH_2 ion. When the bases react upon acids in liquid ammonia, salts are formed, which may be precipitated when insoluble, or left as crystals on evaporating the ammonia. Thus the reaction between acetamid and potassium amid may be expressed as follows:



Salts of the strongly positive metals, as far as they are soluble, dissolve in ammonia as in water without change. Compounds of the negative elements are more or less completely hydrolyzed by water. The same compounds are 'ammonolyzed' by liquid ammonia. The analogy is shown by comparing the reactions:



As the hydrolysis of $SnCl_4$ gives us not $Sn(OH)_4$ but $SnO(OH)_2$, so the ammonolysis of PCl_3 gives not $P(NH_2)_3$ but $P(NH)NH_2$, and of SiS_2 gives $Si(NH)_2$ rather than $Si(NH_2)_4$. As with hydrolysis so in ammonolysis the reaction need not go to com-

pletion. In such a case we have in aqueous solution the precipitation of basic salts, and so here also are formed ammono-basic salts, which may be more or less de-ammoniated and hence appear as amines, imines or even as nitrils, that is, nitrids. The reaction of the formation of these basic salts is, as would be expected, reversible, and they can, after precipitation, be carried back into solution by an excess of 'ammono-acid,' that is, by an ammonium salt. This method of treatment seems to clear up very satisfactorily the mercury-ammonia compounds which have for nearly three quarters of a century been a stumbling block to chemists. They here appear to be ammono-basic salts, or mixed hydro- and ammono-basic salts, occasionally with ammonia of crystallization. They thus fall completely in line with the many and more familiar hydro-basic compounds of mercury.

It is a large field which has thus been opened by Franklin, and one which will require much work, of great experimental difficulty, before it is satisfactorily worked over, but what has been already done has served to greatly broaden our knowledge of solutions.

J. L. H.

FIRST INTERNATIONAL CONGRESS OF ANATOMISTS.¹

THE first meeting of the Congrès fédératif international d'Anatomie was held in Geneva, and commenced on the morning of Sunday, August 6, by the opening of an exhibition of specimens and appliances illustrating recent progress in anatomy. The congress closed on the evening of Thursday, August 10, when three hundred members and adherents of the congress were entertained by the city of Geneva at an official banquet. The congress represented a conjoint meeting of the five leading anatomical societies—the Anatomical Society of Great Britain and Ireland, Anatomische Gesellschaft, Association des Anatomistes, Association of American Anatomists and the Unione Zoologica Italiana.

¹ From *Nature*.