

CHEMICAL NOTES

THAT the statement of the "law of isomorphism" given by Mitscherlich is not applicable to all cases of isomorphous salts has been recognised for some time. M. Klein has recently described certain pairs of salts which crystallise in identical forms, but are not of similar chemical composition; thus *tungstoboric acid*, $9\text{WO}_3 \cdot \text{B}_2\text{O}_3 \cdot 2\text{H}_2\text{O}$, is isomorphous with *silicotungstic acid*, $12\text{WO}_3 \cdot \text{SiO}_2 \cdot 4\text{H}_2\text{O}$. M. Klein proposes to state the *law of isomorphism* in the following terms:—"Isomorphous bodies have either similar chemical composition, or exhibit only small differences in percentage composition; they contain either a common group of elements, or groups of elements of identical chemical formation which form by far the greater part of their weight" (*Compt. Rend.* xcv. 781).

THE rare metal thorium has been obtained in some quantity and in a pure state by Nilson. The properties of this metal are described in *Compt. Rend.* xcv. 727 *et seq.*: the sp. gr. is 11, and the atomic weight 232.36.

F. M. RAOULT (*Compt. Rend.* xcv. 1030) has studied the reduction of freezing-point of a liquid caused by the solution in it of a solid substance. He concludes that a molecule of any compound dissolved in 100 molecules of any liquid of a different nature lowers the freezing-point of the liquid by a nearly constant amount (about $0^{\circ}.62$). This law, he asserts, is general if it is admitted that physical molecules may be composed of two, and in some few cases of three chemical molecules.

WROBLEWSKI (whose experiments have been already referred to in these notes) states (*Ann. Phys. Chem.* [2], xix. 103) that if a little water is introduced into a tube containing CO_2 , the whole cooled to 0° , the pressure increased till the CO_2 liquefies, and then suddenly released, care being taken that the pressure does not fall below 12.3 atmospheres, a thin opaque solid forms on the surface of the water, which solid is a definite hydrate of carbon dioxide. Further experiments are detailed, showing that the probable formula of this hydrate is $\text{CO}_2 \cdot 8\text{H}_2\text{O}$.

M. SPRING continues his investigation on the influence of great pressure on chemical action (*Berichte*, xvi. 324). He has succeeded in preparing definite arsenides of zinc, lead, tin, cadmium, copper, and silver.

A NEW method for preparing the paraffins ($\text{C}_n\text{H}_{2n+2}$) has been found by Herr Köhlein, a student in Prof. Lothar Meyer's laboratory at Tübingen; the method consists in heating together pure dry aluminium chloride and the normal iodide of the paraffin radicle required; e.g. AlCl_3 and $\text{C}_3\text{H}_7\text{I}$ yield pure C_3H_8 ; AlCl_3 and $\text{C}_2\text{H}_5\text{I}$ yield pure C_2H_6 , &c.

AFTER having published his important work on the etherisation of alcohols, Prof. Menshutkin now publishes in the *Journal of the Russian Chemical Society* a new paper on the methods of qualitative determination of aniline and analogous bases which have no alkaline reaction, as well as of triethylamine and similar bases, and of ammonia. All these methods are a generalisation of the method of alkalimetry, and the discovery of them has afforded the author the possibility of studying the classic reaction of the permutation of bases in solutions of their neutral salts. This last is the subject of his first paper. The reaction being made under the most simple unvarying physical conditions, M. Menshutkin begins with the study of complete permutations, and shows that the theory of Berthollet as to the influence of the chemical mass is not true with regard to aniline, which is completely substituted in salts by bases whose temperature of combination with hydrochloric acid is greater than for aniline; the same is true with regard to triethylamine, which is also substituted completely, notwithstanding the increase of its chemical mass, and to ammonia. These researches have led the author to a new method of titration by means of the alcoholate of barium, and to a means of studying the formation and dissociation of acetylanilide, as well as of the amides.

ON THE SUPPOSED PRE-CAMBRIAN ROCKS OF ST. DAVID'S¹

THE author began by briefly narrating the circumstances under which he had been led to study the geology of St. David's. He had visited the district twice—first in company

¹ Abstract of a paper read at the Geological Society by Archibald Geikie, F.R.S.

with Mr. B. N. Peach, with whose cooperation nearly all the field work was done, and again in conjunction with Mr. W. Topley. The paper was divided into two parts, the first being mainly controversial, and the second descriptive.

According to Dr. Hicks, there are at St. David's three distinct pre-Cambrian formations: the "Dimetian," consisting of crystalline, gneissic, and granitoid rocks; the "Arvonian," formed of felsites, quartz-porphyrines, hällfintas, and other highly-silicated rocks; and the "Pebidian," composed of tuffs, volcanic breccias, and basic lavas. He regards the "Arvonian" as later than and unconformable to the "Dimetian," and the "Pebidian" as younger than, and unconformable to both; and he asserts that the basement conglomerate of the Cambrian system lies quite unconformably on all these rocks, and is in great part made up out of their waste.

Taking up each of these groups in the order of sequence assigned to them, the author maintained that the "Dimetian group" is an eruptive granite, which has disrupted and altered the Cambrian strata, even above the horizon of the supposed basal conglomerate. He described a series of natural sections where this relation is exposed, particularly one on the coast at Ogof-Llesugn, where the conglomerate has been torn off and involved in the granite, and has been intensely indurated, so as to become a kind of pebbly quartzite. No other rock occurs within the granite mass except dykes of diabase, which rise through all the rocks of the district, but are especially abundant in the granite. The veins of finer granite, so general in granite areas are conspicuous here. In short, whether studied in hand specimens or on the ground, the rock is so unmistakably an eruptive mass that the author could not understand how this view, which was that expressed on the Geological Survey maps, should ever have been called in question. The manner in which it has risen across the bedding of successive horizons in the Cambrian series proves that, instead of being a pre-Cambrian gneiss, it must be much younger than all the Cambrian rocks of the district.

The "Arvonian group" consists of quartziferous porphyries, or elvans, associated with the granite, and of the metamorphosed strata in their vicinity. Reference was made to natural sections where the actual intrusion of the elvans across the bedding of the rocks could be seen.

The "Pebidian group" comprises a series of volcanic tuffs and breccias, with interstratified and intrusive lavas. The author maintained that this group forms an integral part of the Cambrian system as developed at St. David's. It has been broken through by the granite and porphyries, and is therefore of older date. Instead of being covered unconformably by the Cambrian conglomerate, as asserted by Dr. Hicks, the volcanic group is overlain quite conformably by that rock; and seams of tuff are interstratified with the conglomerate and occur on various horizons above it. The conglomerate, instead of being mainly composed of fragments of the rocks beneath it, consists almost entirely of quartz and quartzite, only 4 per cent. of fragments having been found to have been derived from some of the projecting lava islands underneath it.

From the evidence now brought forward, the author contended that as the names "Dimetian," "Arvonian," and "Pebidian" had been founded on error of observation, they ought to be dropped out of geological literature.

In the second part of his paper the author gave the results of the survey which he had made of the district with Messrs. Peach and Topley, and of his study of a series of more than 100 thin slices of the rocks collected at St. David's. He found that he could corroborate generally the descriptions of previous writers on the microscopic structure of the rocks, and that investigation with the microscope amply confirmed the deductions he had drawn from observations in the field.

1. *Order of Succession of the Rocks.*—The following rock-groups in the Lower Cambrian series are recognisable at St. David's, and are given in descending order:—

4. Purple and greenish grits, sandstones, and shales.
3. Green and red shales and sandstones, with thin tuffs (*Lingulella primæva*).
2. Quartz conglomerate.
1. Volcanic group (tuffs, schists, lavas).

The volcanic group forms the oldest part of the Cambrian series at this locality. The bottom is not reached, but about 1800 feet are visible. It consists mainly of purplish-red, green, grey, and pale tuffs, with occasional breccias and bands of olivine-diabase. Analyses of some of these rocks had been