Chemistry. — *"A crystallized compound of isoprene with sulphur dioxide"*. By Mr. G. DE BRUIN. (Communicated by Prof. P. VAN ROMBURGH).

(Communicated in the meeting of June 27, 1914).

As is known from the patent literature [1]) unsaturated hydrocarbons with conjugated double bonds combine in different circumstances with sulphurous acid. Thus, crude isoprene on shaking with an aqueous solution of that acid yields a compound separating in the form of white flakes.

When I mixed isoprene, prepared according to HARRIES's method [2]) (from carvene) and which had been purified by fractionation, the fraction from 34° to 38° being collected separately, with an equal volume of liquefied sulphur dioxide and left this mixture in a sealed tube at the temperature of the room, I obtained after one or two days a considerable quantity of a crystallized product. As a rule the mixture soon turns brown, but sometimes it remains colourless.

Beside the crystals is always formed a viscous, white mass which on drying gets hard and brittle. In some experiments no crystals were deposited, but on pouring the contents of these tubes into a small flask it instantly solidified owing to the formation of a large number of crystals.

The crystalline product may be readily recrystallized from ether. By repeating this operation a few times a pure, white product is obtained melting without decomposition at 62°.5. Presence of moisture is not necessary for the formation of the crystals, anyhow exactly the same result was obtained with tubes filled with sulphur dioxide dried over sulphuric acid, and dry isoprene.

The analysis gave the following results:

0.2016 grm. of the substance (burnt in a close tube with lead chromate) gave: 0.3384 grm. CO_2 and 0.1107 grm. H_2O

0.1612 grm. of the substance gave 0.2814 grm. $BaSO_4$

0.1779 „ „ „ „ „ 0.3156 „ „

Found: 45.77 % C. 6.10 % H. I. 23.97 % S. II. 24.35 % S.

Theory for $C_5H_8SO_2$: 45.46 % C. 6.06 % H. 24.29 % S.

Determination of the molecular weight by means of the lowering of the freezing point in benzene: 0 5491 grm. of substance in 23.806 grms. of benzene gave a lowering of 0°.835. Molecular weight found: 138.

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[1]) D. PAT. B. 59862, kl. 120, Gr. 2, 18 Aug. 1910.

[2]) Ann. **383**, 228 (1911).

Calculated for $C_5H_8SO_2$: 132.

Hence, the crystallized compound is formed from one mol. of isoprene and one mol. of SO_2.

The substance is soluble in water. The aqueous solution has a neutral reaction.

If a solution of the compound in carbon tetrachloride or ether is shaken with a solution of bromine in the same solvent, the colour of the bromine is not discharged; bromine water, however, is gradually decolourised. With dilute alkaline potassium permanganate a reduction sets in at once.

As to the structure of this compound I do not as yet venture to pronounce an opinion. In connexion with THIELE's theory the occurrence of a compound of the formula $CH_2 - C[CH_3] = CH - CH_2$ with a bridge SO_2 would not be improbable.

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Geophysics. — *"The treatment of frequencies of directed quantities".* By Dr. J. P. VAN DER STOK.

(Communicated in the meeting of June 27, 1914).

1. The frequency-curves of barometric heights, atmospheric temperatures and other meteorological quantities assume different and peculiar forms, which can be considered as climatological characteristics and, as the number of available data increases, it is desirable to subject these curves to such a treatment that these characteristic peculiarities are represented by climatological constants.

If we choose for this purpose the development in series-form, the first question is, what treatment is to be chosen for each special case, in conformity with the distinctive features of the quantities under consideration and the limits between which they are comprised. The purpose of this investigation is to inquire, what form is to be chosen for frequencies of wind-velocities independent of direction, and of direction without regard to velocity. Furthermore, to state in how far the observed series of quantities may be regarded as normal- or standard-values, and the problem may be stated also in this way: what is the best form for frequencies of directed quantities assuming the form of linear quantities, and further, how to integrate the expression