

It is not easy to distinguish these two mechanisms, as in one case of an oxidized electrode which exhibited short time-lags, a microphotograph taken at a magnification of 500 showed that parts of the oxide stood out in relief above the metallic surface. Presumably, such electrodes could also behave as simple roughened electrodes without any oxide. Hence, it is probable that both mechanisms play a part in producing electron emission, together with auto-electronic emission from any sharp irregularities on the cathode.

F. LLEWELLYN JONES.

Department of Physics,
University College,
Swansea. Nov. 17.

- ¹ Paetov, *Z. Phys.*, **140**, 770 (1939).
² Druyvesteyn and Penning, *Rev. Mod. Phys.*, **12**, 117 (1940).
³ Cobine and Easton, *J. Appl. Phys.*, **14**, 321 (1943).
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Negative Resistance-Temperature Coefficient of Thin Evaporated Films of Bismuth

In the course of work on vacuum bolometers, it has been noticed that films of bismuth evaporated on to a backing film of celluloid (both with thickness of the order of 1 micron) possessed a negative resistance-temperature coefficient. In order further to study the property, films of bismuth were evaporated on to microscope slides, washed and wiped but not otherwise cleaned. In every case these showed a negative resistance-temperature coefficient, which diminished with increasing thickness of film.

The pressure in the evaporation chamber was about 10^{-8} mm. mercury. It should be noted that mercury vapour was present during the evaporation, as a mercury diffusion pump was used without a trap.

In these circumstances some deposition occurred on the backs of the slides (about 2.5 per cent of that on the front). The values of the coefficient α obtained for the first slide (back and front coats), and for each of four successive coats on the second slide are tabulated below. The values for the second, third and fourth coats separately were calculated from the measurements made of the resistance at each stage, the layers being treated as independent conductors in parallel.

The values of the coefficient obtained from thin films of other metals, evaporated under similar conditions, are added for comparison. The estimated thicknesses for these indicate only their order of magnitude.

Layer	Estimated mean thickness (microns)	α ($^{\circ}\text{C}^{-1} \times 10^{-4}$)
Bismuth:		
1st slide: front	~1	-27.7
back	~0.03	-20.8
2nd slide: front		
Layer 1	1.5	-31.2
1 + 2	3.1	-29.1
1 + 2 + 3	4.7	-23.0
1 + 2 + 3 + 4	6.5	-16.8
2	1.6	-27.0
3	1.6	-13.4
4	1.8	-8.7
Iron: on glass	~1.5	+19
Nickel: on glass	~1	+16
Lead: on glass	~2	+29
Gold: on celluloid	~2	+11.7

It is clear that such modified values of the coefficient must be regarded in applying theoretical considerations^{1,2} to the selection of bolometer materials.

T. J. TULLY.

Physics Department,
The Royal Cancer Hospital (Free),
London, S.W.3. Nov. 1.

- ¹Baker, E. B., and Robb, C. D., *Rev. Sci. Inst.*, **14**, 356 (1943).
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Nomenclature of Triterpene Alcohols

In the early literature dealing with the isolation and characterization of triterpene alcohols it is not uncommon to encounter the use of different names for the description of a single substance, and one of the functions which contemporary papers in this field can usefully perform is the straightening out of this confusion and the establishment of an agreed nomenclature. From this aspect, the recent observations of Zimmermann¹ would appear to be somewhat unfortunate. This author, in extension of his valuable generalization which seeks to correlate, for a given plant source, triterpene structure with type of pigment present, describes the isolation from the marguerite of a monohydric triterpene alcohol which, he claims, is identical with a sample of taraxasterol prepared from the chamomile². This claim of identity is made on the basis of melting-points and mixed melting-points of the alcohols and their acetates, and may be regarded provisionally as valid (no analytical or optical rotatory data are given).

Taraxasterol has been known, as Zimmermann points out, by a variety of names, but in publications^{3,4} prior to those of Zimmermann this particular name was adopted, for the reason that it was the name given to the substance on the first occasion⁵ of its isolation in undoubted purity and adequate characterization.

Zimmermann has apparently not seen the publications^{3,4} in question, because he has reverted to the use of the name 'α-lactucol' for his alcohol, although it has been clearly pointed out that this name, as it occurred in the early literature, was descriptive of mixtures.

It is true that taraxasterol is a triterpene and not a sterol, but there are many cases of substances the names of which end in '-sterol' which are not steroids—lanosterol, to take but one example—and this suffix has long since ceased to carry with it the implication that the molecule of the compound concerned necessarily contains the cholane skeleton.

It is therefore to be hoped that the name 'taraxasterol' will receive general acceptance, on grounds of convention and logic alike, for the designation of this alcohol, which may well be a characteristic triterpene of the Compositae and may thus become of major importance; and that the use of unsuitable synonyms (α-lactucol, α-lactucol, anthesterol) will be discontinued.

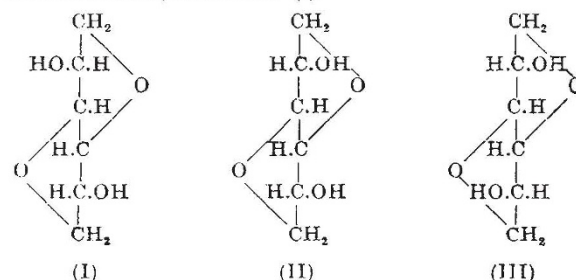
J. C. E. SIMPSON.

Department of Chemotherapy,
Liverpool School of Tropical Medicine,
Nov. 14.

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²Power and Browning, *J. Chem. Soc.*, **105**, 1829 (1914).
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⁴Simpson, *J. Chem. Soc.*, 283 (1944).
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Constitution of the Dianhydrides of Sorbitol and Iditol

THE hexahydric alcohols mannitol, sorbitol and iditol all form dianhydro compounds on being heated with acid reagents. These compounds and the problem of their constitution have interested us for some time, and the structure of dianhydro mannitol (known as isomannide in the older literature) has already been proved to be that of 1:4-3:6-dianhydro mannitol¹ (I).



The elucidation of the structure of dianhydro sorbitol, formed in good yield by the action of acidic reagents on sorbitol, has now been completed by the following synthesis. 3:6-Anhydro glucose² was converted, by hydrogenation over Raney nickel, into 3:6-anhydro sorbitol and this, after selective tosylation followed by acetylation, gave 1-tosyl 2:4:5-triacetyl 3:6-anhydro sorbitol, which, after deacylation and deacetylation, gave dianhydro sorbitol identical with the product of the action of acids on sorbitol. This fact limits the constitution of the dianhydride to two possibilities: (a) 1:5-3:6- and (b) 1:4-3:6-dianhydro sorbitol. (The 1:2-3:6-dianhydro structure is eliminated because of the stability of the compound to alkaline reagents.) The structures (a) and (b) were distinguished by synthesis of the dimethyl derivative of (b), that is, dimethyl dianhydro sorbitol, by a method which ensures that it is the hydroxyls at C₂ and C₆ that become methylated. This was achieved by using the 2:6-dimethyl 3:6-anhydro α-methyl glucoside of Haworth, Owen and Smith³. The substance was first hydrolysed to the free sugar which, upon catalytic hydrogenation, yielded crystalline 2:6-dimethyl 3:6-anhydro sorbitol. Treatment with tosyl chloride and acetic anhydride under the appropriate conditions gave 1-tosyl 4-acetyl 2:5-dimethyl 3:6-anhydro sorbitol; and this, after treatment with alkali, gave 2:5-dimethyl 1:4-3:6-dianhydro sorbitol identical with the product of methylation of the dianhydro sorbitol itself, thus showing it to have the structure represented by (II).

l-Iditol is also readily transformed with acids into dianhydro l-iditol, a reaction which has been noted recently by Fletcher and Goepff⁴. By analogy with the dianhydrides of mannitol and sorbitol, dianhydro l-iditol would be expected to have a 1:4-3:6-dianhydro structure. Proof of this has been obtained through a constitutional synthesis of the enantiomeric compound, 3:4-Ditosyl 1:2-5:6-diacetone mannitol⁵ was partly hydrolysed to 3:4-ditosyl mannitol. By treatment with sodium methoxide this gave dianhydro d-iditol, which yielded crystalline dibenzoyl and dimethyl derivatives. These had identical melting points and specific rotations which were equal but opposite in sign to the corresponding derivatives of the product of acid treatment of l-iditol. Since it is clear that a derivative of iditol has been formed from mannitol, Walden inversion must have occurred at both C₂ and C₆; and since anhydro ring formation must also involve these two carbon atoms, the only possible structure for the anhydride of iditol is 1:4-3:6-dianhydro iditol (III).

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R. MONTGOMERY,
L. F. WIGGINS.

A. E. Hills Laboratories,
University, Edgbaston,
Birmingham, 15,
Oct. 24.

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