difficulty. Sodium vapour attacks all silicates. Sodium distils near the temperature of fused salt. If not volatilised, it forms a conducting bridge from the kathode. It attacks iron, though slowly. Hot porcelain and earthenware conduct electrolytically—as, by the way, the maker of electric frying-pans knows—hot chlorine attacks metals, even when dry, and hot carbon cannot be exposed to the air. In addition, sodium and perhaps chlorine are soluble in hot salt, and traces of sulphate in the salt act as carriers. I could a tale unfold if I read out laboratory notes of sodium experiments on a fairly large scale. The difficulties are all incidental, though, and I have little doubt electrolytic sodium at a few pounds per ton will be in the market soon, and will affect profoundly many chemical and metallurgical industries.

In metallurgy, electrolytic solution processes are in use or on trial for the more valuable metals, such as copper and nickel. The reaction between chlorine and metallic sulphides at high temperatures brings the whole domain of sulphide ores under our sway. Thus a sulphide, say galena, is treated with chlorine, which gives off the sulphur as sulphur, which is condensed and sold, making chloride of lead. The silver is extracted by stirring with a little lead, and the fused salt is then electrolysed, yielding pure desilverised lead and chlorine. The process is thus self-contained, yielding sulphur, lead and silver. It is specially applicable to mixed refractory ores which are now nearly valueless and very plentiful, and contain much metal content, such as the mixed lead-zinc sulphides of America or Australia. These reactions have been proved on the large or ton scale, and there is no technical difficulty. Unfortunately, mine people are somewhat ignorant of electrical matters, and it is exceedingly difficult to get them to understand or appreciate a process like this, capable though it may be of paying good dividends on very large capitals indeed.

Our limit in electrolysis in this country is almost entirely human inertia. Commercial and financial people do not understand it, and fight shy of it. But our technical people are nearly as bad. The pure physicist, as a rule, takes no interest in electrolysis or physical chemistry, and thinks it belongs to the chemical classroom on the other side of the passage. The chemist thinks it is higher mathematics and will have none of it, the mathematician thinks it may be an exercise in differential equations; but they are all agreed that it is a sort of continental fungus which flourishes with no roots, and that it is beneath the attention of a scientific man to know enough about it to give a reason for the broad statement that it is all nonsense.

DUTY-FREE ALCOHOL FOR SCIENTIFIC PURPOSES.

TEACHERS of organic chemistry have often expressed the opinion that alcohol used for purposes of education and research should be relieved of the heavy duty levied upon it. Two years ago, attention was directed to the need for action in the matter, and at the Glasgow meeting of the British Association in 1901, a committee was appointed, with instructions to approach the Board of Inland Revenue, with the object of endeavouring to secure the removal of this tax upon scientific work. As the result, the following regulations have been issued by the Board and published in the daily Press:—

Regulations for the Use of Duty-free Spirit at Universities, Colleges, &c.

(1) An application must be made by the governing body or their representatives, stating the situation of the particular university, college, or public institution for research or teaching, the number of the laboratories therein, the purpose or purposes to which the spirits are to be applied, the bulk qnantity likely to be required in the course of a year, and, if it amounts to fifty gallons or upwards, the name or names of one or more sureties, or a guarantee society to join in a bond that the spirits will be used solely for the purpose requested and at the place specified.

(2) The spirits received at any one institution must only be used in the laboratories of that institution, and must not be distributed for use in the laboratories of any other institution, or used for any other purpose than those authorised.

(3) Only plain British spirits or unsweetened foreign spirits of not less strength than 50 degrees over proof (*i.e.* containing not less than 80 per cent. by weight of absolute alcohol) may be received duty free, and the differential duty must be paid on the foreign spirits.

(4) The spirits must be received under bond either from a distillery or from an Excise or Customs general warehouse and (except with special permission) in quantities of not less than nine bulk gallons at a time. They will be obtainable only on presentation of a requisition signed by the proper supervisor.

(5) On the arrival of the spirits at the institution, the proper Revenue officer should be informed, and the vessels, casks or packages containing them are not to be opened until he has taken an account of the spirits.

(6) The stock of spirits in each institution must be kept under lock in a special compartment under the control of a professor or some responsible officer of the university, college or institution.

(7) The spirits received by the responsible officer of the institution may be distributed by him undiluted to any of the laboratories on the same premises.

(8) No distribution of spirits may be made from the receiving laboratory to other laboratories which are not within the same premises.

(9) A stock book must be provided and kept at the receiving laboratory in which is to be entered on the debit side an account of the bulk and proof gallons of spirits received with the date of receipt, and on the credit side an account of the bulk and proof gallons distributed to other laboratories. A stock book must also be kept at each other laboratory, in which must be entered on the day of receipt an account of the bulk and proof gallons of spirits received from the receiving laboratory.

These books must be open at all times to the inspection of the Revenue officer, and he will be at liberty to make any extract from them which he may consider necessary.

(10) The quantity of spirits in stock at any one time must not exceed half the estimated quantity required in a year where that quantity amounts to twenty gallons or upwards.

(11) Any contravention of the regulations may involve the withdrawal of the Board's authority to use duty-free spirits.

(12) It must be understood that the Board of Inland Revenue reserve to themselves full discretion to withhold permission for the use of duty-free spirit in any case in which the circumstances may not seem to them to be such as to warrant the grant of it.

J. B. MEERS,
Secretary.

Inland Revenue, Somerset House, W.C., November 17.

NOTE.—"Proof Spirit" is defined by law to be such spirit as at the temperature of 51° Fahrenheit shall weigh $\frac{12}{13}$ths of an equal measure of distilled water.

Taking water at 51° Fahrenheit as unity, the specific gravity of "proof spirit" at 51° Fahrenheit is 0·92308. When such spirit is raised to the more usual temperature of 60° Fahrenheit, the specific gravity is 0·91984.

To calculate the quantity of spirits at proof in a given quantity of spirit over or under proof strength:—Multiply the quantity of spirit by the number of degrees of strength of the spirit, and divide the product by 100. The number of degrees of strength of any spirit is 100 *plus* the number of degrees overproof, or *minus* the number of degrees underproof.

EXAMPLE:—19·8 gallons of spirits at 64·5 overproof
100 + 64·5 = 164·5 proof strength.
164·5 × 19·8 ÷ 100 = 32·571
taken as 32·5 gallons at proof.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

OXFORD.—In connection with the School of Geography, Mr. Mackinder will lecture weekly during Hilary term on the historical geography of Europe, Mr. Dickson will lecture on surveying and mapping and on the climatic regions of the globe; he will also give, in conjunction with Mr. Darbishire, practical instruction in military topography; Mr. Herbertson will lecture on the British Isles, the regional geography of continental Europe, and on types of land forms, mountains and coasts; Dr. Grundy will lecture on the historical topography of Greece, and Mr. Beazley on the period of the great discoveries, 1480–1650.

SIR WILLIAM COLLINS has accepted the invitation to stand as the Liberal candidate for London University at the ensuing Parliamentary by-election.