

Miners' lamp glasses.

Parts		Parts	
6) Sand ...	65.0	Potassium nitrate	3.0
Alumina (Al ₂ O ₃)	1.0	Sodium carbonate	14.0
Calcium carbonate	0.6	(Na ₂ CO ₃)	...
Arsenious oxide	2.0	Boric anhydride	24.0
(As ₂ O ₃)	...	(B ₂ O ₃)	...
Antimony oxide	1.0		
(Sb ₂ O ₃)	...		

A colourless and fusible glass withstanding rapid changes of temperature exceptionally well.

Parts		Parts	
(7) Sand ...	65.0	Potassium nitrate	3.0
Alumina (Al ₂ O ₃)	1.0	Anhydrous borax	26.68
Calcium carbonate	0.6	(Na ₂ B ₄ O ₇)	...
Arsenious oxide	2.0	Boric anhydride	5.5
(As ₂ O ₃)	...	(B ₂ O ₃)	...
Antimony oxide	1.0		
(Sb ₂ O ₃)	...		

The same glass as (6), but the ingredients have been varied to avoid the use of so much boric anhydride, which is at present apparently difficult to obtain on a commercial scale.

Resistance-glass.

Parts		Parts	
(8) Sand ...	65.0	Sodium carbonate	10.2
Alumina (Al ₂ O ₃)	2.5	(Na ₂ CO ₃)	...
Magnesia (MgO)	5.0	Borax anhydrous	13.0
Zinc oxide (ZnO)	8.0	(Na ₂ B ₄ O ₇)	...

A glass almost identical in its general behaviour with Jena resistance glass; withstands changes of temperature well, but, like Jena, is not suitable for working before the blowpipe. It darkens and tends to devitrify; operations—such, for instance, as sealing side tubes into flasks—are difficult, if permanent and neat joints are required.

Formula No. 3, recommended for pharmaceutical purposes, ampoules, etc., may be substituted for the resistance glass with advantage, as the ampoule glass lends itself very well to blowpipe work, and is also especially resistant chemically.

Alternative for combustion tubing.

Parts		Parts	
(9) Sand ...	72.0	Potassium nitrate	3.0
Alumina (Al ₂ O ₃)	10.0	(KNO ₃)	...
Calcium carbonate	11.0	Sodium carbonate	11.2
(CaCO ₃)	...	(Na ₂ CO ₃)	...
Magnesia (MgO)	0.5	Borax anhydrous	7.2
		(Na ₂ B ₄ O ₇)	...

This glass is capable of withstanding high temperatures and rapid changes of temperature; works well before the blowpipe, and is free from the chief defect of Jena glass—namely, the readiness with which it becomes cloudy, and finally quite opaque after prolonged use.

By slight modifications of this formula, almost any degree of hardness can be obtained.

In formulas (8) and (9) substances such as magnesia (MgO) and zinc oxide (ZnO) can be added in the form of carbonates if the actual percentages of MgO and ZnO respectively present in the carbonates are known.

Soft soda-glasses suitable for tubing and for X-ray bulbs.

Parts		Parts	
(10) Sand ...	68.0	Potassium nitrate	14.5
Alumina (Al ₂ O ₃)	4.0	(KNO ₃)	...
Calcium carbonate	12.8	Sodium carbonate	26.0
(CaCO ₃)	...	(Na ₂ CO ₃)	...

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Parts		Parts	
(11) Sand ...	68.0	Potassium carbonate	10.0
Alumina (Al ₂ O ₃)	4.0	(K ₂ CO ₃)	...
Calcium carbonate	12.8	Sodium carbonate	26.0
(CaCO ₃)	...	(Na ₂ CO ₃)	...

These glasses do not lose their easy-working qualities after repeated heating and blowing, and are plastic over a long range of temperature. They require a temperature of at least 1400–1500° C. for complete incorporation of the ingredients in order to obtain that homogeneity which is necessary for resistance to rapid changes of temperature and ease of working before the blowpipe.

No. (10), containing potassium nitrate, is considered the better of the two, and is more easily incorporated.

The committee considers that the formulas obtained and the work done on the various glasses justify it in the opinion that there is now information available for the manufacture of all the important glasses used in the laboratory and for industrial purposes, which have hitherto been mainly obtained from abroad.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

LONDON.—Prof. T. G. Brodie, professor of physiology in the University of Toronto, will deliver a course of four lectures on "The Gases of the Blood" at King's College, London, on May 31, June 2, 7, and 9. These lectures take the place of those previously announced; they are free to medical students, to internal students of the University, and to medical men on presentation of their cards.

MR. A. G. R. FOULERTON has been appointed lecturer in public health at the London (Royal Free Hospital) School of Medicine for Women, in succession to Prof. W. J. Simpson, resigned.

THE Education Committee of the County Council of the West Riding of Yorkshire has arranged a summer vacation course for teachers, which is to be held at Bingley Training College from August 4 to 18 next. Four evening lectures will be given during the course, including one by Mr. Mackinder on how much geography and history can be taught within the limits of the elementary school. The general course makes provision among numerous other subjects for lectures on the teaching of informal domestic work in schools, and the special courses include lectures on animal and plant life. The primary object of the courses is to increase the educational spirit and efficiency of persons teaching in the West Riding, and to enable them to supplement their knowledge of the various subjects, and of the most approved methods of teaching them. All particulars of the course, including time-tables, are given in the "Bingley Vacation Course Syllabus," copies of which may be obtained on application to the Education Department, County Hall, Wakefield.

ON March 6, Lord Hardinge, Viceroy of India, presided over the annual convocation of Calcutta University, and delivered an address in his capacity of Chancellor of the University. The address is printed in the issue of the *Pioneer Mail* for March 12. The Chancellor referred to the increased interest which has arisen in Indian universities in the teaching of science subjects. University inspection combined with an ordered procedure in affiliation has considerably raised the standard of instruction in the colleges. Some of the laboratories attached to these institutions can now compare favourably with any in the world. The teaching staffs have been strengthened. The

advanced students produce papers dealing with subjects of research which are accepted by leading scientific journals in Europe. In the past years the Government of India has contributed generously to the capital requirement of the University of Calcutta, which also draws an annual sum, the capitalised value of which is 36½ lakhs, and generous gifts have been received recently from the late Sir Taraknath Palit and Dr. Rashbehari Ghosh. In Bombay the contributions of few public-minded citizens to the proposed Royal Institute of Science have totalled nearly 25 lakhs, while Sir Chinubhai Madhav Lal has endowed the Institute of Science of Ahmedabad with six lakhs, giving a further two lakhs to the Gujerat College, with which it is associated. Lord Hardinge also dealt with the question of university buildings and libraries. The universities of India have recently made laudable efforts, which have been substantially aided by the Government, to provide for themselves local habitations in the shape of buildings befitting their dignity, and libraries where their alumni may learn the use of books and the methods of investigation and research which collections of books alone make possible. Calcutta has not been behindhand. Thanks to the generosity of the Maharaja of Darbhanga, the University is now possessed of a handsome library. The students of the Law College are accommodated in a hostel towards which the Government contributed three lakhs. The Government has also made a grant of eight lakhs for the purchase of a valuable site which abuts on the University buildings, and the acquisition of which should permit of further extension.

SOCIETIES AND ACADEMIES.

LONDON.

Physical Society, March 26.—Dr. A. Russell, vice-president, in the chair.—Prof. A. W. Porter and F. Simeon: The change of thermal conductivity with fusion. The change in question was determined for mercury and for sodium by finding the temperatures at different points of a cylinder of the metal contained in a glass tube. The ends of the cylinder were maintained at such temperatures that the metal was liquid half-way down its length, the remaining part being solid. The temperatures were taken by means of thermo-electric junctions inserted in narrow tubular depressions which had been formed in the glass tube by forcing a knitting needle down into the locally heated glass. The ratio of the thermal conductivity for solid and liquid was estimated from the slope of tangents drawn to the temperature-curve on each side of the melting point. The values of these ratios are of the same order as the ratio of the corresponding values of the electrical conductivities. The mean value for mercury is 3.91, and for sodium 1.31.—Dr. J. A. Fleming: An instrument for the optical delineation and projection of physical curves such as hysteresis, resonance, and characteristic curves. This instrument is designed for projecting on to a screen or photographing on a plate such curves as magnetic hysteresis, resonance, or characteristic curves which can be performed slowly, or are non-periodic or non-repetitive.—Dr. P. Phillips and J. Rose Innes: The stability of some liquid films. The authors give a simple method of calculating the equilibrium form of a thin film which is a surface of revolution. They then consider the stability for certain kinds of displacement of three classes of such films, viz., the sphere, the cylinder and the catenoid. The mathematics used is quite elementary throughout and the

treatment is rigorous.—Prof. A. W. Porter and E. Talbot Paris: A demonstration of the green-flash of the setting of an artificial sun. A large disc of card mounted so that it can be slowly rotated has a hole, 1 in. in diameter, cut in it about 2 in. from the periphery. This is covered with red gelatine films, and is illuminated from behind so as to form an artificial sun. The front of the disc is covered with white Bristol board and is moderately illuminated by a lamp in front. This sun is viewed through a rectangular aperture (4 in. wide) in a blackened board, the lower edge of the aperture serving as the horizon. When the disc is rotated the artificial sun sets and green after-images are obtained of characters varying according to the amount that the eye has been exposed to the bright sun. If the sun is not viewed until immediately before the complete setting the after-image represents simply the disappearing segment to which it is due. The authors claim that this phenomenon is what is often described as the green-flash at sunset, though they are ready to admit that other (but probably rarer) phenomena also go under the same name.

MANCHESTER.

Literary and Philosophical Society, March 23.—Mr. F. Nicholson, president, in the chair.—T. A. Coward: A note on the behaviour of a blackbird—a problem in mental development. The author referred to the habit of certain birds—individual, not specific—which when stirred by spring rivalry will fight with their own reflections as seen in windows, and spoke, in particular, of a male blackbird which for more than a month has been daily assaulting its own image in a particular window. A blackbird, presumably the same, behaved in a similar way at the same window all through last spring. Attention was directed to the psychological problem presented by a bird with an excellent memory but without any apparent power of learning by experience. The recollection of this visionary antagonist was stimulated by the seasonal sexual activity and died down with the normal waning of this force.—A. W. Rymer Roberts: Two cases of parallelism in the Aphidæ. Parallel series of aphids may co-exist on the same or on different plants, having the same ancestry but differing in habits and sometimes also in form. The phenomenon was first brought in prominence by Cholodkovsky's recent researches on Chermes. Though there exists some doubt, in the light of more recent research, whether the instances principally relied upon are not those of distinct biological species, other instances have been discovered of as many as four parallel forms being descended from the winter-form on the secondary host-plant in certain species of Chermes. Parallelism exists also in other groups, as in the Pemphiginæ, two instances observed being (1) *Thecabius affinis*, a species migrating between poplars and Ranunculus, and (2) *Hamamelistes tullgreni*, so far only found on birch. *T. affinis* has been found continuing to live over the winter on Ranunculus after the migrating individuals have returned to the poplar. *H. tullgreni* has been observed in England for the first time during the past year. Certain of its forms resemble scale insects. It has so far only been found upon birch, but winged individuals fly from that to some other plant, leaving wingless individuals to continue the race on the birch, both being descended from a single ancestress by parthenogenesis.

EDINBURGH.

Royal Society, March 1.—Prof. Hudson Beare, vice-president, in the chair.—H. Levy: The resistance of a fluid to a body moving through it. In this paper