

slightly decreased infra-red transparency, but this may be due to small amounts of impurities that are usually found in such glasses.

Sir William Crookes, in his work published in 1914, showed that many oxides conferred on glass the property of absorbing the infra-red rays to varying extents. Most of these oxides also gave a distinct colour to the glass. He also showed that by far the most effective material for this purpose was iron oxide melted into the glass under reducing conditions. In his work Crookes measured the infra-red radiation transmitted through his glasses by the total heating effect. His general conclusions have recently been confirmed by the work of Gehlhoff, Schmidt, and Thomas, who have determined the infra-red transmissions at various wave-lengths.

Several heat-absorbing glasses are available. They all employ iron oxide in the reduced condition, the only essential difference being the means that are employed to obtain the iron oxide in the ferrous state. Generally the iron and its reducing agent are introduced together by using iron oxalate as Crookes did. Recently, however, attempts have been made, with a certain degree of success, to use inorganic reducing agents, which retain a greater proportion of the iron in the ferrous state. Such glasses are blue-green in colour, instead of the green of ordinary iron-containing glasses.

Measurements show that the heat absorption of

glasses of this type is to a certain extent related to the colour of the glass, but there is no close parallel, as is shown in the accompanying table.

LIGHT TRANSMISSION AND HEAT ABSORPTION OF VARIOUS GLASSES, 2.5-3.0 MM. THICK.

Glass.	Percentage heat absorption.	Percentage light transmission.		
		Red.	Green.	Blue.
H. (Clear) . . .	74	59	72	71
T. (Clear) . . .	72	59	71	71
C. (Cath.) . . .	93	17	36	35
A. (Clear) . . .	79	59	75	75
5. (Experimental)	86	50	70	69
12. (Experimental)	93	25	45	44

As a last type of glass to be considered, there is a very interesting glass which has the power of absorbing all visible rays but transmitting infra-red rays. Such a glass, of course, appears black in thickness of 2 mm. and upwards, but in very thin sections it has a reddish amber colour. As a means of invisible signalling, this glass has almost, if not quite, superseded Wood's glass, since infra-red rays are easier to produce in quantity than ultra-violet rays; they also have the great advantage of carrying farther, as they are not so easily absorbed by the atmosphere. For burglar alarms and apparatus of that type, this glass has an interesting field of usefulness.

British Industries Fair.

THE British Industries Fair, 1931, to which brief reference was made in our last issue (p. 281), has exceeded its previous records in the total area occupied by the stands, in the number of exhibitors, and probably, also, so far as the evidence is available at the time of writing, in the number of overseas and home buyers, as well as of the general public, that have visited it. The integrated effort to demonstrate visually the extent, variety, and quality of the products of British industry required this year no less than four separated, but not unrelated, exhibitions: for the light industries, at Olympia, London; for the heavy industries, at Birmingham; for textiles, at the White City, London; and for artificial silk goods, at the Albert Hall, London. In the critical industrial period through which the country is now passing, the Fair was a remarkable and bold achievement, and tribute must be paid to the Department of Overseas Trade, to the Birmingham Chamber of Commerce, and to the various trade and industrial organisations, as well as to individual firms, that co-operated in its organisation. Information is not yet available, but will be eagerly awaited, as to the business orders that have been received for British goods, as the direct result of the Fair.

It will not be possible to review, even cursorily, the exhibits shown at the four separate sections of the Fair mentioned above, but it may be worth while to record a general impression of the exhibi-

tions at Olympia. It is difficult to believe that any visitor could thoughtfully go through the Fair without being greatly impressed by the vast range, the great variety, the excellent quality, and often, be it said, the great beauty of the goods displayed. Despite the disheartening aspect of our unemployment figures and the faintness of our hopes of an early industrial revival, the evidence that Olympia afforded of the vigour and quality of so many British industries was reassuring and uplifting. An industrialist, recently returned from journeying overseas, related that, in foreign countries and in the British dominions overseas, he had again and again noted how confident was the expectation that, whatever might happen in other countries, Great Britain at least would win through the difficulties of the world slump. What could be seen at Olympia went far to justify this confidence. In the heavy industries and in the great staple exporting industries, Great Britain has been for so long in the forefront that the quality of their products has almost come to be taken for granted; but even in those lighter industries associated in the popular mind with foreign manufacture—for example, toys and certain kinds of fancy goods—the exhibits at Olympia provided striking evidence of the progress that has been made by British manufacturers.

The grouping of the exhibits according to industries was not only convenient for the buyer and

visitor; it necessarily created a series of mass effects also, so that it was impossible to escape getting, from each group, a general impression of the respective industry as a whole. In this regard, the china, earthenware, stoneware, and glassware exhibits formed a notable display, which included, it may incidentally be noted, some remarkably beautiful developments in decorative glassware. It is well worth the consideration of future exhibitors how they may develop what may be called the organised group exhibit. There can be no doubt that, so far from exhibitors losing anything by close association of their exhibits with those of similar, and even competitive, firms, they gain in mere advertisement value from the mass effect produced by the associated exhibit. The individual firm must ultimately benefit from any good impression created of the whole industry of which it is a constituent.

In this connexion, special praise should be given to the exhibit of the British scientific instrument manufacturers, which this year excelled, in area, in the number of exhibitors, and in the range and variety of exhibits, the achievement at last year's Fair. The total effect of the two great contiguous stands on which the British optical and scientific instrument manufacturers had arranged their exhibits was an assurance of the vitality and a guarantee of the future of this important British industry. Perhaps one of the most striking features of these associated exhibits was the manifestation of the extent to which scientific instruments are being used in all sorts of other industries in which, not so very long ago, they were unknown. In order to direct attention to this modern development, the exhibiting manufacturers published a brochure, for distribution at the Fair and otherwise, on scientific instruments in industry, from which it is interesting and encouraging to learn *inter alia* that ninety per cent of the cinematograph-taking lenses used at Hollywood are of British manufacture, and that an equal or even a greater percentage of the best cinematograph projectors used in the United States are fitted with British lenses. The exhibits on the combined stand of specimens of optical glass, of photographic lenses, and of prismatic binoculars lent point to the remarkable tribute paid to the superiority of certain British over corresponding foreign optical products in a letter by Dr. C. V. Drysdale, Director of Scientific Research at the Admiralty, which appeared in the *Times* of Feb. 14. That letter, as its writer claimed, but confirmed and amplified the statement made in a letter in the *Times* of Oct. 19, 1925, from Dr. Drysdale's predecessor in office, Dr. (now Sir Frank) Smith:

"It is a commonly held belief that optical instruments and optical glass of British manufacture are inferior to the instruments and glass produced by certain well-advertised Continental firms and sold in large quantities in this country. I wish to state that this belief is erroneous, and that it is based on prejudice rather than upon a knowledge of the facts. Comparative tests made with rigid accuracy in the

laboratory, and trials under stringent service conditions, prove that British optical instruments and glass are inferior to none."

We have not space to notice, by way of example, more than a few of the instruments exhibited by the British scientific instrument manufacturers. Various types of temperature indicating and recording instruments, for use in industry, were shown by the Cambridge Instrument Co., Ltd., and by Negretti and Zambra. The display of microscopes by R. and J. Beck, Ltd., W. Watson and Sons, Ltd., James Swift and Sons, Ltd., and Charles Baker ranged from the simple student's form to the elaborate research microscope, and included types designed specially for industry. Adam Hilger, Ltd., showed, besides an interferometer, a colorimeter and a spectrograph, a 'stelescope' which has been produced for the rapid identification, by visual observation by unskilled labour, of different varieties of steels. Newton and Co. showed an epidiascope, ingeniously fitted with mirrors so as to increase the illumination of the object to be projected; and Charles Baker had an epidiascope fitted with a fan to prevent the evil effects of overheating. Among the navigating instruments shown, reference may be made to a dead-beat compass shown by Henry Hughes and Son, in which increased steadiness and damping are secured by an ingenious use of fine radial filaments. Messrs. Ross, Ltd., exhibited, besides their great range of photographic lenses, a cinematograph projector and a telescope of exceptionally light design, in which the body tube is of light fabric instead of metal, and which was mounted on a light and easily folded tripod. Ensign, Ltd., had an interesting and recently designed aerial camera.

Of the other scientific exhibits displayed at Olympia, mention must be made of the Chemical Section. The Imperial Chemical Industries, Ltd., relied mainly, as last year, on a small cinema in which films were shown of the manufacture of some of their typical products, as well as of the social welfare work associated with the various units of this great organisation. The stands of the gas companies and of the various chemical manufacturing firms showed almost a bewildering range of exhibits, from the simplest raw materials to the most refined analytical reagents and 'fine' chemicals. Hopkin and Williams, Ltd., for example, showed a collection of radioactive uranium-bearing minerals and the products obtainable from them, and also an exhibit of barium sulphate for X-ray diagnosis.

It would be but random selection to refer further to particular exhibits. Taking the Fair, as it could be seen at Olympia, as a whole, it was a noteworthy and encouraging demonstration that Great Britain is still in the forefront of the manufacturing nations of the world. It is to be hoped that all the thoughtful planning, the careful organisation and the zealous co-operation that went to the making of the Fair will have their merited reward in a great and needed stimulus to British industry.