stances. Lewis has worked chiefly with the electric arc, using electrodes of copper, but it is claimed that the principles involved are applicable to spark and flame spectra, and that the analysis can be made on as little as a milligram of metal, mineral, or ashes of animal or vegetable tissues; further, that good approximate results may be obtained in ordinary practice with no more than average experience.

The ratio mixtures are an extension of the well-known H. S. Brand metals and the R.U. powders detailed in Hilger's booklet No. 94/5. This method, evidently, marks a distinct advance in spectrographic analysis, and it should help to extend the use of the spectrograph in chemical laboratories, in which it is now too rarely employed.

Bulletin No. 169 describes the Müller-Hilger Universal Double Monochromator, which, embodying the principle of double spectroscopic purification, is especially suitable for producing powerful radiations which are strictly monochromatic. The form of construction is original and is the subject of several patents in Great Britain and abroad. Both wave-length setting and focusing are effected simultaneously for the whole instrument by means of a single drum engraved to read in wave-lengths. The optical system is crystallised quartz, and the range of the standard instrument extends from wave-length 0·185 μ in the ultra-violet to 4·0 μ in the infra-red. The relative aperture varies from $F/4$ for 0·185 μ to $F/5·8$ for 4·0 μ. The operative beams are axial and the lenses corrected by means of Hilger's interferometers; so that not only are the isolated parts of the spectrum in accurate focus but also every line throughout the spectrum is of good definition.

Messrs. Adam Hilger, Ltd., have just opened new offices and laboratories at 98 King's Road, adjoining their works. The extensions consist of 4400 sq. ft. of office space and 3400 sq. ft. of additional laboratory space, providing ample room for departments which recently have been much congested. The optical glass department will now be housed in the space formerly occupied by the offices. There are at present seventeen principal sections in the works, with eleven chief technicians and four heads of departments.

William John Macquorn Rankine

IN an oration delivered in the University of Glasgow on June 15 at a meeting "in Commemoration of Benefactors", Sir James Henderson paid a tribute to the memory of Macquorn Rankine, who occupied the chair of engineering from 1855 until his death in 1872. Rankine was once described as "the first really powerful thinker in this country to bring the highest mathematical resources to bear on engineering subjects", while the late Prof. Archibald Barr said that he ranked as "the greatest Professor of Applied Science who has yet appeared".

There is a sketch of Rankine's life in the "Dictionary of National Biography", and another by Tait is included in Rankine's "Miscellaneous Scientific Papers", while an obituary notice by Mayer appeared in NATURE of Jan. 16, 1873, but there is still no complete biography of him. In view of this, Sir James Henderson's tribute, printed in full in the *Engineer* for June 24, will be read with interest.

Rankine, who was born on July 5, 1820, died on Dec. 24, 1872, at the early age of fifty-two years, having, however, accomplished an amount of work seldom surpassed by any one. His works on "The Steam Engine" (1859), "Applied Mechanics" (1859), "Civil Engineering" (1862), "Machinery and Millwork" (1869) and other subjects are among the classics of engineering, while to these must be added many scores of scientific memoirs. As a boy of fourteen he read Newton's "Principia" in the original Latin, and at sixteen gained a medal for an essay on "The Undulating Theory of Light"; and in spite of his being trained and his experience as a civil engineer, mathematical physics always made the strongest appeal to him. His work in this direction claimed the chief part of Sir James Henderson's address.

Up to the year 1848, said Sir James, Rankine seems to have been continuously employed as a civil engineer in various schemes, but in that year there occurred a sudden change which it is impossible to explain. The practical civil engineer suddenly becomes the theoretical physicist, and from 1848 until he became professor in 1855, Rankine's energies seem to have been devoted almost entirely to those researches in molecular physics which gained for him the fellowship of the Royal Society in 1853. His early work on this subject was followed by researches in elasticity, hydrodynamics, and thermodynamics. Rankine's contribution to thermodynamics Prof. Tait described as his greatest work. He laid the foundation of the mathematical science as it is known to-day; he applied the second law to heat engines of all kinds, steam engines, air engines, and explosive engines, while in steam engines he introduced the cycle now known as the Rankine-Clausius cycle, which is used as the ideal for engines and refrigerators using vapours as the working substance, and he pointed out that this law is only a particular case of a wider law applicable to all sciences.

At the conclusion of his address, Sir James endeavoured to recall what manner of man Rankine was, and his remarks helped to emphasise the regret that none of Rankine's contemporaries had written his life.

Utilisation of Empire Timbers

AT a recent meeting of the Royal Society of Arts, Maj. J. R. Cosgrove of the Forest Products Research Laboratory read a paper entitled "Empire Timbers, with special reference to their Uses for Furniture and Decoration" (*J. Roy. Soc. Arts*, vol. 80, No. 4136, Feb. 26, 1932). In introducing the lecturer, the chairman, Sir Richard Allison, said that the lecture was opportune, since "in all directions British citizens are faced with the demand to 'Buy British'. With such a commodity as timber apparently much propaganda is necessary to bring home to potential users the possibilities of Empire supplies, and also the beauties of the many woods available for decorative and furniture purposes." He added that for several years past the architects at the Office of Works have concentrated entirely on Empire hardwoods, having satisfied themselves that all their requirements in connexion with buildings can be adequately met by Empire supplies. It is most satisfactory to have such a declaration publicly made, and it would appear to give force to the opinion recently expressed in these columns that the forest services of the Empire require strengthening rather than curtailment, in order to be able to give an answer to the question as to whether supplies of the, at present, mostly unknown timbers could be extracted in sufficient amounts and placed on the markets at an economic price. Without this certainty, it will remain difficult to overcome old-established preferences.

Maj. Cosgrove correctly said that the past few years seem to have caused a profound change of outlook in the people of the British Empire, and with the appeal

increasingly made to support Empire industries he proposed to discuss certain of the timbers obtainable within the Empire, either from home or overseas, which in some form or other may be used for decorative purposes and in the making of furniture. An approximate calculation showed that the value of timber, excluding pulpwood, entering the British market, amounts annually to £40,000,000–£45,000,000, of which about 30 per cent represents hardwoods, much of which goes into utility and decorative work. Of the totals, therefore, of £30,000,000 for softwoods and £12,000,000 for hardwoods, the Empire's share at present works out to somewhat less than 10 per cent for softwoods and less than 30 per cent of the hardwoods; of which latter, however, a large amount, in value at least, is for teak from Burma. The wide use and popularity of foreign timbers is attributed by Maj. Cosgrove to a number of causes—such as the volume in which supplies have been available, their suitability and relative cheapness, the preparation which has been bestowed upon them in the form of careful manufacture, grading, and conditioning, and so forth. This implies that the timbers in use have an assured position, and that users will as a rule purchase them from descriptions alone and usually without preliminary inspection.

After discussing briefly the value of research work, Maj. Cosgrove enumerated some of the hardwoods, from both the British Empire and foreign sources, which are well known on the markets. He then discussed the possibilities of timbers which are particularly suitable for decoration and furniture from Great Britain, India, British North Borneo, Australia, New Zealand, British West Africa, British Guiana, West Indies, British Honduras, and Canada.

Advances in Stereo-Chemistry

THE sixth Messel Memorial Lecture was delivered before members of the Society of Chemical Industry at Nottingham on July 14 by Sir William Pope. Reviewing "Forty Years of Stereo-Chemistry", Sir William Pope traced the important developments of the present century in this branch of organic chemistry, which about 1890 was comparatively dormant, and had largely remained so since the work of Pasteur, van't Hoff, and Le Bel. Development recommenced with the introduction of an improved technique for the resolution of synthetic mixtures or racemic compounds which followed from the discovery of the sulphonic acids of camphor and their halogen derivatives. The further demonstration that optical activity may be associated with the presence in the molecule of asymmetric atoms of other elements such as sulphur, tin, silicon, phosphorus, as well as the verification among ethylene derivatives of van't Hoff's prediction of the optical activity of allene derivatives of the type *abC:C:Ccd*, led chemists generally to realise that the chemical molecule is spread out in three-dimensional space, and prompted subsequent attempts to ascertain the way in which the properties of compounds are influenced by the shape of the molecules.

Sir William Pope referred to the way in which the conception of the asymmetric carbon atom has tended to divert attention from the conditions of mirror-image isomerism defined by Pasteur. The asymmetric carbon atom covers only one, though the commonest, class of mirror-image isomerism. The fundamental condition is that the molecular configuration may possess any elements of geometrical symmetry except a centre of symmetry or a plane of direct symmetry. Thus the molecular configuration of an optically active compound need not be asymmetric or entirely devoid of geometrical symmetry. In the Hantzsch and Werner theory of the configuration of the eximes, illustrated by Mills, or the optical activity and mirror-image isomerism among diphenyl derivatives, discovered by Kenner, are other examples of the way in which the whole of organic chemistry has acquired a stereo-chemical aspect.

While our knowledge of certain branches of stereo-chemistry is rapidly advancing, the space configuration of the benzene ring and of aromatic compounds in general remains an unsolved problem. Similarly, our knowledge of the combination to a homogeneous crystalline compound of substances with mirror-image configurations is developing but slowly, and little attention has been given to the question of racemic combination between dextro- and laevo-isomerides in the liquid state. Although as yet the novel and powerful methods of modern physics for determining the arrangement of the atoms or even of the components of atoms in solid, liquid, or even gaseous substances, such as X-ray diffraction determinations, the measurement of dipole moments, or the quantitative study of the behaviour of films only a few molecules in thickness, have merely enabled us to confirm the structures assigned on chemical grounds, Sir William Pope suggested that we may be on the verge of fresh developments which will convert the new physical methods into much more searching weapons for the determination of molecular configuration than any formerly at our disposal.

University and Educational Intelligence

CAMBRIDGE.—Applications for the Benn W. Levy research studentship in biochemistry should be addressed to Sir Frederick Gowland Hopkins at the School of Biochemistry before Aug. 1.

A pension of £540 a year has been granted to Sir Joseph Larmor on his retirement from the Lucasian professorship of mathematics, and to Mr. H. A. Roberts on his retirement from the secretaryship of the Appointments Board.

At Clare College, Mr. E. T. C. Spooner, University demonstrator in pathology, has been elected to an official fellowship.

At King's College, E. S. Shire has been elected to an R. J. Smith studentship, and A. G. D. Watson and D. Purdie to Harold Fry studentships.

Dr. P. A. M. Dirac has been elected Lucasian professor of mathematics in succession to Sir Joseph Larmor, who retires on Sept. 30.

EDINBURGH.—At a meeting of the University Court on July 18, Mr. W. L. Edge, fellow of Trinity College, Cambridge, was appointed lecturer in the Department of Mathematics, in succession to Dr. E. L. Ince, who has resigned.

The Cameron prize in practical therapeutics has been awarded to Prof. Edward Mellanby, professor of pharmacology, University of Sheffield, in recognition of his discoveries regarding the therapeutic actions of the fat-soluble vitamins.

LONDON.—The following appointments to University readerships have been made, to take effect from Oct. 1: experimental pathology (Lister Institute of Preventive Medicine), Dr. E. W. Hurst, formerly pathologist to the Millbank Research Fund at the Lister Institute; mathematics (Imperial College—Royal College of Science), Dr. W. H. McCrea, lecturer in mathematics in the University of Edinburgh; pathological chemistry (the Cancer Hospital), Dr. J. W. Cook, research chemist in the Research Institute of the Cancer Hospital. The title of University reader was conferred on the following in respect of posts held at the colleges indicated: geography, Dr. Hilda Rodwell Ormsby (London School of Economics); civil engineering,