being made as he is, he is not a liberty lover except in quite small doses. I agree with Dr. Lindsay. But I submit that the Mahatma sees further than either of them. At least the Indian experiment remains one of the few radical ones, that escapes from the compulsions of domination-politics, in our days. I cannot conclude without noting Prof. Hayek's support of that federal union of the whole West, with an Anglo-Saxon nucleus, which I have urged for many years and which now also receives the support of Mr. Walter Lippmann in his "War Aims".

GEORGE CATLIN.

CERAMICS AS INSULATING MATERIALS

Porcelain and other Ceramic Insulating Materials By Dr. Ernst Rosenthal. Vol. 1: Raw Materials, Manufacturing Processes, Testing and Characteristics. Pp. xii+287. (London: Chapman and Hall, Ltd., 1944.) 28s. net.

THE pottery industry is almost virgin territory for the worker in applied science. Despite the trails blazed by J. W. Mellor in Great Britain and H. Seger in Germany, there are still wide tracts quite unexplored. There is still no institution of university status in Great Britain offering a full-time course in ceramics, and the number of qualified chemists and physicists engaged in the pottery industry together scarcely exceeds a baker's dozen. Things seem to be somewhat better in the United States, and there is a number of universities and State colleges at which full-time courses may be followed and degrees obtained in ceramics, usually in the engineering department. Faced with this position, the prospective writer of a book dealing with the scientific and technical aspects of the manufacture and applications of pottery must choose between two alternatives: either he writes for the ceramist and accepts the joy of writing as his main recompense, or he seeks to write a popular work, broadening the range and almost inevitably lowering the level. Dr. Rosenthal has neatly avoided this dilemma by writing a book on ceramics, not primarily for the potter, but for the much more ubiquitous engineer.

The book constitutes a remarkable *tour de force* for a man of science writing in an adopted tongue. Comparatively little trace of foreign terms remains, though the absence of hyphens causes the phrase "felspar containing steatite" to mean just the opposite of what the author intends it to convey, and the extension of this form to "each clay substance containing material" is likely to bewilder the average English reader until he has had time to sort it out. These constructions and some mistranslations, such as precipitation for sediment, subsequent for consecutive, compressor for press, feldspatic for feldspathic, and talcum (though not invariably) for talc, might well have been eliminated by more conscientious proof-reading. A few misspellings have crept in by the same door, though "vacuum plugging" is obviously an invention of the printer's devil.

Where numerical data are given, the author has apparently taken over without conversion the units adopted in the original publication, thus compelling the reader to do a fair amount of mental arithmetic if he wishes to compare the figures given in different

tables. Still more disturbing to the pedant will be the scant attention which has been paid to uniformity and accuracy in the dimensions of physical quantities. Impact strength appears at least once as cm. per kg., while in the footnote to a table of tensile strengths we learn that 100 lb. per in.² = 70.3 gm. per cm. or 7.03 kgm. per cm.². Power factor is stated to be expressed as $\cos \delta = \sin \delta$ (though given correctly later), and phase angle between current and voltage as 90 per cent. We are informed that thermal conductivity of ceramic materials is usually expressed in K. cal. per m.² h. °C. on the Continent, and in Cal. per sec. per cm.² per °C. in American literature; but the variants K. cal. per m.² per h. °C. and Watts Cm.⁻¹ (deg. Cent.)⁻¹ also occur in the book.

The statement that slop stone at 26 oz. per pint contains 18.33 lb. stone per peck is an obvious arithmetical slip, but the Brongniart formula looks strange with the plus and multiplication signs interposed. As the whole basis of body compounding by the wet method depends on an accurate knowledge of specific gravity (pint weight) one surmises that the slip maker whose pint measure held *approximately* 20 oz. would soon be parting with his can or his job. The mineralogist will be surprised to read that calcium carbonate occurs in Nature as whiting. Flint as a general term for silica is American rather than British practice. Photomicrographs are mostly called microphotographs in the book—a common error.

All too frequent blemishes of the type indicated above should not blind the reader to the merits of the book; it contains too much of value to be lightly dismissed. The author's wide experience both as investigator and manufacturer invests what he has to say with authority, and the persistent reader will be well rewarded for his pains. Chemical and physical formulæ have been reduced to a minimum. The engineer with even a smattering of chemistry will find no insurmountable barriers, while at least 75 per cent of the book will be comprehensible to 95 per cent of potters. Every pottery manufacturer interested in vitreous bodies or tunnel oven firing, to mention only two 'actualities', would be well advised to read it. There are few ready-made recipes for bodies or glazes, and no specification of the ideal tunnel oven, but much thought-provoking discussion of principles and practice.

Each material has its own characteristic limitations and possibilities which, in turn, influence design. The engineer who thinks that ceramic products might provide the answer to some of his problems should consult the ceramist at an early stage in development. In this connexion the sections dealing with shaping methods and tolerances will be of interest. Though not stated explicitly, the book is primarily addressed to electrical engineers. It can, however, be heartily recommended to engineers in general (the chemical engineer is apparently to be catered for in a subsequent volume), many of whom would probably be surprised to see the numerous photographs of ceramic products in the book—some small and complicated, others large and evidently extremely robust.

In the preface to his book Dr. Rosenthal expresses the view that ceramics could further advance industrial progress if their excellent technical characteristics were more generally known. Is it too much to hope that this view will be shared by those responsible for rebuilding and rehousing schemes?

MARCUS FRANCIS.