

physical understanding of the concepts of fluid flow (for example, streamlines, vortices, turbulence, viscosity, static and total pressure) such that he can use them fruitfully to invent new systems and design modified systems which will in fact obey the physical laws. In this case it is essential to explain in words all the assumptions and significance of the basic equations and laws, and when the final answer is obtained again to explain in detail the meaning of each term and what positive or negative affects all the variables. The algebra, on the other hand, leading from the initial assumptions to the final result can be put in small print so long as it is done correctly.

In my opinion *Fluid Flow: a First Course in Fluid Mechanics* is good from this point of view since it presents clearly drawn, simple diagrams and explains in words the assumptions and the meanings of the equations which are essential to the development of this subject and gives the student a feeling for the concepts. The engineer has long ago abandoned the idea that he could get by with empirical equations without understanding the physics of the process, and this book can therefore be recommended to engineers.

The mathematical methods involve both straightforward vector notation and the clear derivation of the Navier Stokes equation and the Eulerian equations from Newton's laws of motion, but the treatment is carried right through to the practical problems of lubrication, turbine engines, flow in pipes and boundary layer flow. There is a brief appendix for the student who has never heard of vectors and another explaining the pound-force and slug mass units used.

There are very few books in this field which start with Newton's laws of motion and lead clearly on to a physical explanation of such parts of turbo-machine design as can be explained physically. It is therefore very suitable as a text-book for an engineering science course.

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## WHOLE-BODY RADIOACTIVITY MONITORS

*Directory of Whole-Body Radioactivity Monitors (Low Activity Levels.)* Pp. 704. (Vienna: International Atomic Energy Agency; London: H.M.S.O., 1964.) 294 schillings; 84s.; 14 dollars.

THE compiler of any directory faces a Herculean task; he must produce a volume which is both comprehensive and up-to-date. There can be little doubt that Dr. Mehl has collected together a high proportion of the available data; information is given on 111 whole-body monitors located in 22 countries. However, keeping these data up to date is the major problem in such a rapidly expanding field and, therefore, it is inevitable that the *Directory of Whole-Body Radioactivity Monitors (Low Activity Levels)* is already out-of-date, and refers to the situation as it was some two years ago. There can never be a right time to publish a directory, and so it is unfortunate that on referring to the section covering United Kingdom monitors, it is evident that valuable additions could be made to at least half the data sheets. I can think of two new laboratories which have been constructed in the past two or three years, and five counters (which are listed as under construction) which have now been commissioned, not to mention new schemes under consideration. It is to be hoped that Dr. Mehl is already considering publishing supplementary data sheets for what is basically a useful first edition.

The value of any directory is partly concerned with the ease with which it can be used. This volume is easy to use, the information being arranged in three sections. Part I contains some 30 pages of general information, including the addresses of the institutions operating or

developing whole-body monitors and an explanation of the layout of the data sheets. The salient features of the data sheets are reproduced on a pull-out section at the back of the book, which can be studied in conjunction with the individual pages. Part 2, comprising the main bulk of the *Directory*, consists of about 570 pages of data sheets, including more than 450 illustrations. This section is provided with a thick blue card index which makes it easy to find and should prove durable in use. The arrangement of the data sheets is consistent, which enables the user to compare data on different sheets, and the illustrations are well drawn and clearly labelled. Part 3 has some 100 pages mainly devoted to an intercomparison of most of the aspects of the whole-body monitors listed in the data sheets. This is a comprehensive analysis, much of which is in tabular form, which brings out clearly the main features of whole-body monitors. A comprehensive bibliography of about 400 references is followed by a list of the experts referred to in the *Directory*.

Another factor affecting the usefulness of this *Directory* is the accuracy of the information. The data sheets were compiled from enquiries sent to the experts at each establishment concerned, and apart from one case (*US 3-1*), where a collimated detector is described as an uncollimated detector in an 'open-type' monitoring room, most systems seem to have been fitted to the rigid format of the data sheet without much difficulty. I found less than twenty inconsistencies and errors in the whole 600 pages of Part 2, and these were mostly obvious typographical errors which were not perpetuated in the subsequent analysis in Part 3. The analysis, apart from minor typographical errors, was clearly related to the information in the data sheets, with the possible exception of Table 13, p. 622, which required some correction to three of the five entries in order to conform to the data sheets.

I found only a few offending features, such as the nominal dimension of a 3 in. diameter *P.M.* tube being quoted as 7.62 cm. The unit of c.p.m./MeV as the ordinate for the graphs of background spectrum, while mathematically correct and providing convenient numbers, would not seem so realistic as the use of c.p.m./keV. A disappointing omission in the book is the cost of each equipment. When intercomparing data, it would have been nice to have known such items as the cost per unit volume of monitoring rooms, the cost per unit volume of detector systems and the cost per unit of background index. Apart from these criticisms, there is much of use and interest to be found in the *Directory*, especially the final section.

As the Director of the International Atomic Energy Agency has commented in the foreword, the International Atomic Energy Agency intends to follow up this survey, and users are invited to inform the Agency of new whole-body monitors and references to the literature not covered by the bibliography. It is to be hoped that those concerned will heed this request, and so ensure that future editions are kept as up to date as possible. B. E. GODFREY

## CHEMICAL TECHNOLOGY

*Encyclopedia of Chemical Technology*  
By Kirk-Othmer. Second completely revised edition. Vol. 4: Calcium Compounds to Chloramphenicol. Pp. xvi+937. (New York and London: Interscience Publishers, a Division of John Wiley and Sons, 1964.) 338s.

THE fourth volume of Kirk-Othmer's *Encyclopedia of Chemical Technology* covers thirty-five articles ranging from "Calcium Compounds" to "Chloramphenicol". Once again the Editorial Board is to be congratulated on the maintenance of the high standard of the reviews.

The subjects reviewed follow, with few exceptions, the sequence chosen for the first edition, and cross-references are given for subjects classified elsewhere in the *Encyclopedia*. For example, "Cereals" or "Carcinogens" are