

References

[1] Peter Bamfield, *Research and Development Management in the Chemical Industry*, VCH, Weinheim, 1996.

Anthony D. Barber
*Redwood, 92 Charles Close, Wroxham
 Norwich NR 12 8TT, UK*

E-mail address: adbarber@netcomuk.co.uk (A.D. Barber)
 PII: S 1385-8947(00)00124-8

The physics of foam

Denis Weaire and Stefan Hutzler (Eds.): Oxford University Press, 1999, 246 pp, £47.50 (hardback), ISBN: 0-19-850551-5

What is it about physicists? The former Shell Group Research Co-ordinator, Dr. Harry Beckers (a physicist) once referred to chemical engineers as dung beetles, while he likened physicists to dragonflies. I got something of that same feeling when I started reading this book.

The title is accurate in that the authors have indeed restricted themselves to the physics of the problem and barely touch on the chemistry or engineering which, according to them, deal with different length scales (an interesting concept). They also admit to a “very prejudiced synopsis”, ignoring the ‘voluminous literature of the chemical and chemical engineering communities, often working in industrial laboratories’. Weaire and Hutzler dismiss such work as ‘frankly empirical’. While conceding that the results may be of immediate practical value, they conclude that these results “generally offered little additional insight to that of the blind Belgian of the 1870s”. I should probably declare an interest at this point, but I think that is a rather harsh judgement.

Despite the above irritation, this is a very readable book and a must for anyone interested in either the applications or the problems of foam.

The book starts with a brief review of early work by Plateau (the blind Belgian), Lord Kelvin and others, including a comprehensive bibliography based on that of another early worker, Mysels. It then moves on to a detailed discussion of foam structures and how they may be made. This is followed by a review of various imaging and tomographic methods, though no mention is made of radioactive tracer or transmission techniques. Later chapters discuss modelling, rheology, and electrical conduction through foams.

There is a substantial chapter on foam drainage through the Plateau borders in which the authors present their recent theory. In the development of this theory, Poiseuille flow (immobile surfaces) is assumed. While this is a reasonable

assumption (certainly from an engineering point of view!), it is not at all clear that this is, in fact, the case in practice and is a serious limitation of the otherwise elegant theory presented here. A ‘proper’ treatment would require the inclusion of (surface) chemistry effects, which would be outside the scope of the book. Consideration of such effects will, however, be essential for a complete solution to the problem and will require a multidisciplinary approach.

Film thinning and the consequent foam collapse are treated more superficially than structure and drainage presumably because a detailed description of these areas also cannot adequately be made without due consideration of the surface chemistry. There is, however, sufficient discussion to point the reader in the right direction.

Unfortunately, the chapter on applications of liquid foams restricts itself to a review of aqueous systems whereas many foams of commercial significance occur in non-aqueous systems. Solid foams, such as polymers and metals, and some ‘natural’ foams, such as stormy seas and cuckoo spit, are also briefly discussed and certainly serve to further enhance the attraction of the book.

Most chapters have a short, but useful, bibliography and there are adequate references to the photographs, etc. included in the captions. There are nine appendices with more details of some of the more complicated theories. The book is also peppered with quotations, including Einstein’s particularly apt (in this case) observation that “Things should be made as simple as possible but not any simpler”. Some beautiful (albeit monochrome) photographs of bubbles and foams, both technical and artistic, further complement the text. There are also plenty of appropriate diagrams, graphs and sketches.

Despite its limited coverage, essentially a comprehensive discussion of foam structures and drainage through the borders, this book should be compulsory reading for anyone starting (or already engaged in!) research in this field. I do not believe that industrial practitioners will find anything of direct use, but even such readers are likely to find items of interest. The authors are well aware of the book’s limitations and one of the final illustrations is a map of the field showing the many areas still awaiting thorough treatment. Hopefully, this will inspire interested workers of all disciplines to tackle this industrially important problem.

A.D. Barber
*Redwood, 92 Charles Close, Wroxham
 Norwich NR12 8TT, UK*

E-mail address: adbarber@netcomuk.co.uk (A.D. Barber)
 PII: S 1385-8947(00)00127-3