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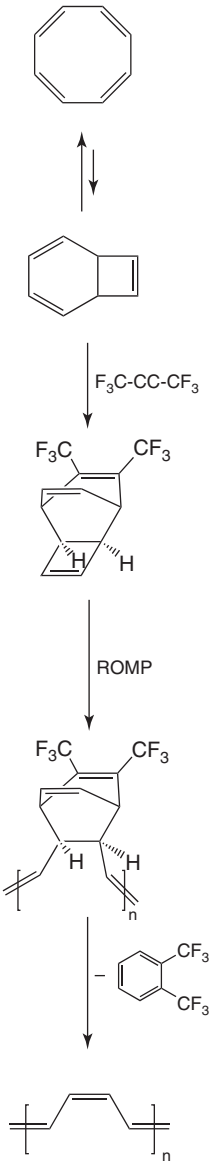
Foreword



Thinking about the structure of a Foreword to this book on the synthesis of polymers it seems that there are several questions that should be addressed for the sake of the potential readership and purchasers. These questions include:

- Does the world need another book on this topic?
- What is the intention of the Editors and Authors?
- Have these intentions been realized?

There are other subsidiary questions and a few comments which will emerge as we proceed.

Well, does the world need another book on this topic? For the sake of argument, it might be assumed that, although historically compilations and encyclopedias had useful roles in providing access to accumulated data for a beginner studying any and all fields of interest, in the modern world such compilations have become redundant. A young researcher brought up in the age of electronic data recovery might say ''The internet makes this sort of publication unnecessary because these days if you have access to the internet you can find everything you need to know in a few seconds.'' We have to ask is such a dismissive approach valid; is it, indeed, true? This set of questions boils down to asking if there are any advantages in having these collections of focused review articles readily accessible. As you might have guessed, my feeling is that such books are welcome and will always be required; I will write about this particular compilation here but I believe that it will not be the last such book and that such books serve a very useful purpose provided that the Editors and Authors have done their jobs properly and that the standard of the enterprise is high.

The Durham-route to polyacetylene: An intelligent combination of organic and polymer chemistry leading to an interesting material. In the Editors' view a most creative piece of modern polymer synthesis. Ref: J. H. Edwards, W. J. Feast, *Polymer* **1980**, *21*, 595–596. For an improved procedure, see: W. J. Feast, J. N. Winter, *J. Chem. Soc., Chem. Commun.* **1985**, 202–203.

Synthesis of Polymers: New Structures and Methods, First Edition. Edited by A. Dieter Schlüter, Craig J. Hawker, and Junji Sakamoto.

First let's briefly consider the immediacy of electronic data searches and recall of information. Everybody who reads this will have access to a search engine that allows us to type a topic title into the search box and press the appropriate key to recover reams and reams of starting points for the recovery of data. I tried this experiment with a few of the chapter titles and received, as expected, ''hits'' varying between a few thousand and several million in a process lasting only a fraction of a second. So far so good, but that's not the end of the story because sifting this amount of data to find what you really want and removing the inevitable redundancies and duplications is time consuming and sometimes ineffectual. Indeed, as the present readership will understand, the procedure I have described is a very unsophisticated way of attempting to recover data but, even using more sophisticated procedures, such searches will provide many many more ''hits'' and ''duplications'' than is useful for a tyro trying to get to grips with a particular field. I know that computer searching can often provide very useful data rapidly, in my own case I find it particularly useful when specific well specified nuggets of data are sought; however, well considered reviews by experts active in the area under review can be invaluable for anybody trying to get to grips with an unfamiliar area and, since the rate of generation of data and understanding continues to expand, there will be an on-going need for such reviews. This last comment carries with it the implication that such compilations have a limited shelf life and I think this is true; indeed, I suspect the useful shelf life of encyclopedia of this kind is of the order of a decade or so, after that all is not lost as the publication then becomes an item in the history of ideas.

When I set out on a career in research over 50 years ago one of the jokes in common circulation was ''six months work in the laboratory can sometimes save you a whole morning in the library,'' the joke, although feeble, is probably still current and still valid. But understanding the importance of proper literature awareness is of long standing; thus, if we go back to 1675 we find Isaac Newton, writing in a letter to Robert Hooke, ''If I have seen further it is by standing on the shoulders of giants'' and thus the great man succinctly acknowledged the debt to earlier workers and the necessity of knowing what had been established by them. Everybody active in science to this day shares this debt.

Now let's address the question: ''What is the intention of the Editors and Authors?''

The Editors say ''We do not aim to create a dictionary of polymer synthesis but to provide a set of appetizers mirroring the fascination felt by editors and authors alike.'' Their target readership is young researchers; thus, Masters students, Post graduates working for their Ph.D., postdoctoral researchers, and anybody coming new to the specific topic under discussion in that particular chapter. The aim is not that the erudition of the writer is set out for admiration but that the topic is examined critically, ''Warts and All,'' as Oliver Cromwell said.[1] Thus,

1) When Cromwell was having his portrait painted he is reputed to have said: ''Mr. Lely, I desire you would use all your skill to paint my picture truly like me,

for this compilation the Editors have pulled together a group of authors who are experts in their fields, they are well known for their achievements and the Editors have done well to get them on board. They were asked to produce chapters on their specialties that will enable new comers to get a good understanding of the field, that is of its strengths and weaknesses, of what works and why and of remaining obscurities and difficulties yet to be sorted out and overcome. This implies that the area is not ''cut and dried'' but active and developing; I believe that this is true. The Editors have not aimed to provide comprehensive cover of the whole of polymer synthesis. They have aimed to have chapters appropriate in length to the content, so the chapters are of differing length because some areas of polymer synthesis are long established and pretty well understood and there is a great deal of knowledge to impart, whereas some are in their infancy. The authors were asked to aim at stimulating the interest of beginners in the particular topic and providing a good starting point for those wishing to delve deeper by giving key references which would provide starting points for those wishing to specialize. This is a difficult objective to meet because one style of presentation will appeal to one reader and be less effective in raising interest with another; so the reader will be the best judge of how well the authors have succeeded in meeting the Editors' objectives. Creating a guide of this complexity and size is, of course, a human activity and therefore inevitably imperfect; I know quite a lot of the authors well and have collaborated with several of them so, in the interests of diplomacy, I'm not going to specify specific examples of good and indifferent, sufficient to say my judgment chimes with my expectation; namely, some chapters meet the Editors objectives very well, some satisfactorily and all provide a compilation of useful data and references; so in my view non is bad but some, as would be expected, are better than others. So this is a compilation which I would expect to be useful and to find a place in the libraries of those with interests in synthesis, polymer science, materials science, and cognate disciplines.

Finally let me comment on the continuing importance of polymer synthesis; this is something on which I feel quite strongly, partly because I've had a career mainly in this area and had a hard time in the early years in getting support from funding agencies. I became interested in the field of polymer synthesis quite by accident. I had proceeded along the educational conveyor belt of the UK educational system of my time. Thus, I was born in 1938 and spent my early years in the West Midlands of the UK. I was extremely lucky in several ways; although my school years were in a period of great austerity in the UK the schools were full of teachers who, having endured the deprivations of war, were determined to give the students under their care as good an introduction to the value and use of knowledge and

and not to flatter at all; but remark all these roughnesses, pimples, warts, and everything as you see me; otherwise I will never pay a farthing for it.'' Walpole Anecdotes of Painting. Chapter 12 quoted in The Oxford Dictionary of Quotations, Third Edition, 1985, Guild Publishing by arrangement with UOP. This dates from sometime in the middle of the seventeenth century; a farthing is no longer part of English currency, it was 1/960 of a pound.

understanding as lay in their power. I proceeded via school to university, B.Sc., Ph.D. as though it were a conveyor belt and without much thought as to the why and wherefore because I found what was presented to me by my various teachers fascinating for its own sake. My research training was in the ''heroic'' days of organic fluorine chemistry; ''heroic'' because as a beginning researcher I was using quite large 100 amp KF/HF electrolytic cells to generate fluorine; stirred bed reactors with 8–10 kg of Cobalt trifluoride to fluorinate cyclic hydrocarbons; very large fractionating columns and preparative gas chromatography set ups to separate the products. The participants had to adapt available things to their use and most of the kit required was home built; for example, the detectors at the ends of large chromatography columns were the elements from tungsten filament light bulbs arranged as part of a Wheatstone Bridge. It was an exciting activity to be a part of and one needed competence to survive without damage; it was the sort of thing Health and Safety Legislation would make prohibitively expensive if not impossible today. However, some of the things that came out of the area are now part of the mainstream of chemical synthesis servicing the consumer products, pharmaceutical, materials, electronics and other high tech industries. My first post doctoral work was a spin out from the research group I trained in; it involved making fluorinated cyclic dienes with internal and external double bonds which were then dispatched to another remote research center for evaluation as potential monomers to make interesting materials. Sadly, from my point of view, there was no feed back and, being of a curious bent, I wanted to know what happened to the materials I had made and dispatched, so decided that the best thing to do was some free lance polymerization studies of my own; this was in about 1963/1964. It was pretty simple free radical initiated bulk and solution phase polymerization, but I was hooked. The process of going from a volatile mobile liquid to a tough glass was an eye opener for me; I wanted to know more so taught myself about measuring molecular weight and its distribution, rudimentary thermal and mechanical properties. Shortly thereafter I got a job in Durham University and was able to continue to develop my curiosity. One of the very good places in Europe to learn about polymer synthesis in its broadest sense was, in those days, in the laboratories of George Smets in Leuven in Belgium and I spent a year there enhancing my knowledge and understanding of the area in which I wanted to develop my research activities. Unfortunately, senior figures in industry and academe in the UK at that time decided that there was no further need for new polymers, new polymer synthesis or any research in these areas for the foreseeable future. I listened to these pronouncements from influential people with increasing disbelief and, on reflection, decided that they had to be wrong (on the basis that anybody who claims to know the future in that kind of detail has got to be wrong) and so continued to do what interested me. In the UK it was difficult for anybody interested in polymer synthesis at that time, funding was limited because funding bodies with limited resources welcomed statements from the ''Great and the Good'' in a particular area that the subject was ''mature'' and no further research was required which gave them all the excuse they needed to close their wallets.

So there, perhaps, is a thought for young academics; namely, do what is interesting to you and do it as well as you can. Even if the major funding agencies don't support the area there are always ways of finding support for things that you think merit your attention, getting the where with all to do the things of interest to you is just another challenge to your ingenuity. It took the major funding agencies in the UK about 20 years to realize the folly of their stance vis à vis polymer synthesis; in the meantime the activity continued to be interesting, challenging and important scientifically and to make lots of money for its users in industry; indeed polymers have even become the currency in reality in many places.[2)]

Today new polymers find application is many areas which were unknown and unimagined 20–30 years ago. Some of the areas where they make impact include: plastic electronics; light emitting diodes; drug delivery; consumer goods (tooth brushes, via cooking utensils, to clothes; pharmaceuticals; spare parts in surgery; and so on), the list is endless and always expanding. All these socially useful achievements start with making a material. The topic also provides intellectual stimuli generating lots of ''What if?'' questions.

Finally, supposing you are coming from training and education in an area outside polymer chemistry and you decide that a new polymer might provide the solution to a research or technology problem, or supposing you just think making a particular structure would be an interesting idea, how do you go about it? First and foremost you need a general feel for and understanding of the area you wish to enter, this can be provided by any general undergraduate textbook and there are lots of those, just pick one you enjoy reading. Then you need to know if your idea is feasible and that is where the various chapters in this publication will help provide a more detailed understanding of the possibilities and the limitations. Finally a highly focused search using a well designed profile and a good search engine should enable you to assess the likelihood of success, or indeed, if your idea has already been investigated. If, after that, you want to do the proposed research, go for it, and don't let anybody discourage you from the vantage point of authority; you should, of course, always listen to logical arguments but ''because I say so'' is not a logical argument. I realize that advice of this kind has always been a hazardous thing[3)] for people of my age to propose, but I think that young people do their best work when they think for themselves and it is a waste of talent to inhibit this tendency; also I am convinced that the area of polymer science is enormously important, is an enormous field of activity and requires to

2) Plastic banknotes were introduced by Australia following research and development by CSIRO and are now wide spread. The material is biaxially oriented polypropylene and is not really a new polymer. Articles about this technology are occasionally recycled by newspapers and there are many relevant and easily found web sites.

3) I was brought up to believe that Socrates was sentenced to death in 399BC for encouraging the young to think for themselves; however, my reading since formal retirement cast some doubt on that widely believed view: see, for example, 1.

attract all the talent it can and, of course, every project requires a first step of synthesis.

Good luck.

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References

1. Lane Fox, R. (2005) *The Classical World,* Allen Lane, Penguin Group.