or X-ray diffractometry. The omission of thermal analysis is particularly surprising since in the preface the characterization of polymers is defined as the study of 'the kinetic and thermodynamic interactions of a polymer with its environment'. Nevertheless, the book does give a reasonable overview of those techniques that it covers.

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Protective Groups in Organic Synthesis (2nd Edn)

Theodora W. Greene and Peter G. M. Wuts

John Wiley, New York, 1991, 437 pp.,
ISBN 0-471-62301-6

Protecting groups are used in organic synthesis to temporarily mask a particular reactive group whilst reactions are carried out at other functionalities in the same molecule. A classical example is the protection of a ketone group from attack by nucleophiles by its conversion into a ketal. After nucleophilic reagents have reacted at other sites in the substrate, the ketal group is then converted back into the ketone group (deprotection). Since protecting groups are used when compounds are polyfunctional, success often depends on *selectivity*. Accordingly a wide range of protecting groups is needed to cope with the many different selectivity requirements that can arise. Although very few major organic syntheses can proceed without them, protecting groups are a cinderella area of organic synthesis. Over the years very few books have been published on the subject and Theodora Greene's book published in 1981 rapidly became the bible for the subject. Peter Wuts has now produced a second edition of the book. Two new sections dealing with the protection of various nitrogen-containing functionalities have been added and the second edition contains the following eight chapters plus a subject index:

1. The role of protective groups in organic synthesis
2. Protection for the hydroxyl group, including 1,2- and 1,3-diols
3. Protection of phenols and catechols
4. Protection for the carbonyl group
5. Protection for the carboxyl group
6. Protection for the thiol group
7. Protection for the amino group
8. Reactivities, reagents and reactivity charts

The book does not claim comprehensive coverage of the subject; for example, there is no consideration of the protection of olefins, dienes and benzenoid aromatic compounds, but the topics that are covered are covered very thoroughly with a large number of original references. Chapter 8 is invaluable at finding routes through the mazes that arise from selectivity requirements.

The reader of this review may be wondering about the relevance of this topic to polymer chemistry. As the following examples show, the chemistry described in this book can be exploited in various ways.

First, many protecting groups can be used in monomers to permit and/or to control polymerization. Thus, the use of the acetate group in vinyl acetate permits, via polymerization and deprotection, the synthesis of poly(vinyl alcohol). However, many other groups could be used and recently, for example, the group transfer polymerization of vinyl trimethylsilyl ether and vinyl di-t-butylmethylsilyl ether have been studied as routes to poly(vinyl alcohol). The anionic polymerization of various protected styrene derivatives is also being studied.

Second, derivatives of the protecting group type can be used to modify the solubility of a polymer. An example here is in resist chemistry where various acid-sensitive derivatives of vinylphenol are used to give polymers that can be made alkali-soluble in the presence of compounds that on irradiation release acid catalysts.

Finally, many organic protecting groups can be improved by attachment to an insoluble polymer support. The classical example is the Nobel Prize winning work of Merrifield who carried out peptide synthesis with the carboxyl end of the chain protected as a polymer-supported benzyl ester.

There are undoubtedly many other protecting groups that could be exploited in polymer chemistry. For those who wish to work in this area, the present book is an indispensable gold mine of information and references.

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