

Preface

For several decades Japan has been one of the most important countries for innovative research and development activities. In particular, in the fields of chemistry, chemical engineering and life sciences, Japanese universities, such as Kyoto University, University of Tokyo, Osaka University, Tokyo Institute of Technology, Tohoku University and Nagoya University, are recognized as sources of reliable scientific knowledge. This contribution has been acknowledged by four recent Nobel prizes for chemistry, namely to Professor Kenichi Fukui (Kyoto University; for theories concerning the course of chemical reactions, 1981), Professor Hideki Shirakawa (Tsukuba University; for the discovery and development of conductive polymers, 2000), Professor Ryoji Noyori (Nagoya University; for his work on chirally catalyzed hydrogenation reactions, 2001) and Koichi Tanaka (Shimazu Corporation; for ionization methods for mass spectrometric analysis of bio-macromolecules, 2002). A huge number of researchers, in universities, private companies and research institutes, is steadily creating scientific knowledge and making it available by publishing in scientific journals as well as in patents. Especially, the number of patent applications filed in Japan increased dramatically in the last part of the last century. Unfortunately, many publications are still written in Japanese, in particular most patents. Although Japanese scientists today also publish their results in international journals, and patents are translated before filing in further countries, there is still a great need to understand and consider documents written in Japanese.

In contrast to the importance of sources of scientific information from Japan are the hurdles in their reading and understanding, if they are written in Japanese. Although there is a permanent exchange of scientists with Japan and contact with Japanese Universities is steadily increasing, there are still few scientists with thorough Japanese language capabilities. In addition, there are still only a few tools available that facilitate Japanese text analysis.

A basis for the understanding of scientific literature from Japan is an elementary knowledge of the Japanese language and a thorough knowledge of the technical field of the documents involved. In the case of patent literature, experience with patent documents and legal phraseology is also necessary. However, linguistic problems are widely considered as the main challenge to understanding Japanese patents. While many researchers may have a basic knowledge of Japanese and understand literary texts, the linguistic features of Japanese – such as missing subjects and plural forms, continuously written text without clear word borders, complicated nesting of attributive and subordinate clauses – lead to hurdles in interpretation. For instance, patents often consist of paragraph-long sentences and it is difficult to identify the relationship between sentence elements. Even the relationship between

sentences is sometimes hard to discover. The same problem appears with Japanese characters: a basic knowledge of important *kanji* used in everyday life is easy to obtain, but it is the many rarely used characters that exacerbate the interpretation of scientific texts, together with *kanji* combinations that are unique in their use in a scientific environment. Even simple *katkana* expressions may cause trouble because of the non-standardized transcription of scientific English terms.

For these reasons, this book aims to facilitate analysis of the chemical literature written in Japanese. The main intended audiences are the researcher who has some need for information from Japanese sources, patent attorneys dealing with Japanese patent applications and translators active in the field of chemistry. While scientists from universities and research institutes may focus on journals, most of the other target groups rely on patent information. Because patents contain relevant knowledge, in particular necessary for industrial research, a specific focus is on scientists in industry with some basic knowledge of the Japanese language.

To meet their need for a comprehensive tool for understanding Japanese patents, this book consists of two parts. The main part is the dictionary of scientific terms, covering major aspects of chemistry, such as organic and inorganic chemistry, biochemistry, polymer chemistry and chemical engineering. The focus is on basic organic, inorganic and macromolecular chemistry, in particular words from general chemistry, names of minerals, polymers and organic compounds, expressions for general chemical transformations and reaction types, terms describing physical properties of substances and physicochemical methods. The dictionary is based on a compilation of scientific terms that includes, currently, over 60 000 entries. For this compilation, various sources have been utilized, in particular patents and publications in scientific journals, but also textbooks, scientific dictionaries, internet publications and online dictionaries. The compilation has been established and verified over the last nine years. From this, over 15 000 terms have been selected for inclusion in this book. As criteria, frequency of use, relevance for text understanding, importance for chemistry and diversity were applied. Words are arranged within the dictionary in a way that facilitates their retrieval and translation for non-native Japanese speaking readers. Chapter 6 explains the structure and organizing principles. The dictionary is divided into three parts: Chapter 7 covers terms beginning with *kana*. Words starting with *kanji* are included in Chapters 8 and 9, subdivided into characters with specific importance for chemistry (Chapter 8) and further characters (Chapter 9).

To support people with only a limited understanding of the Japanese language and no professional practice in translation, the book also contains a general part. The goal of the first three chapters is to support text analysis in general. Chapter 1 clarifies basic principles of the Japanese language, such as characteristics of the language, differences to English, basic grammar topics, and overviews two characteristic features of Japanese, namely particles and morphological endings. Owing to the importance of text analysis, this chapter also describes in detail the Japanese way of writing, by explaining *kana*, *kanji* and their phonology (Section 1.2). Chapter 2 discusses the characteristics of scientific documents. By providing detailed lists of frequently used *kanji* and *kanji* combinations, a basic understanding of key terms can be obtained, thereby facilitating navigation within Japanese documents. Readers with little experience may also use this list to build up a basic knowledge of scientific terms. Methods for text analysis are given in Section 2.4, followed by some example translations of different parts

of Japanese patents in Section 2.5. The methodical approach that is described facilitates sentence analysis by providing a step-by-step procedure. This is useful in particular for complicated sentences in Japanese patents, which are difficult to understand because of nested subordinate clauses, long listings and complex attributes and attribute clauses. Further tools that might be applied are provided at the end of Chapter 2. While most printed dictionaries are mainly intended for use by native Japanese speaking scientists and, therefore, in general not very useful for foreigners, the internet has recently become an important source for tools that are helpful for text analysis. Some tools, which are recognized as useful, are described; however, further valuable tools may arise soon. Because the names of chemical compounds are considered as key information in chemical texts, Chapter 3 gives detailed descriptions for naming inorganic and organic compounds.

Probably the most important information source from Japan is patents, especially for industrial research. This is because, whereas many Japanese researchers from universities publish their results in international journals in English, most knowledge obtained from company research is only initially available after publication in Japanese patent documents. Because of this need, important aspects of Japanese patents are described in two additional chapters. The Japanese patent system is the topic of Chapter 4, including its historical development and the role of the Japanese patent office. For proper patent document searches, patents numbers, document types and FI- and F-term classification are discussed. The section also contains Japanese terms used for INID codes and as headlines in patents, which helps in navigating within patent documents. Chapter 4 was written largely by Irene Schellner, an expert on Japanese patent documentation within the European patent office in Vienna. Additional information is available in her further publications. Her contribution has been supplemented by Sections 4.2.2 and 4.3. Various facets of Japanese patent law are specified in Chapter 5, such as basic terminology, patentability criteria, rights of patent owners and licensing opportunities. The complete patenting process is described, beginning with filing the patent application and the examination steps up to patent right enforcement. Chapter 5 is written by patent attorney Dr. Klaus Hinkelmann, who has extensive experience of Japanese patent law. More detailed comments can be found in his publications.

Various people have accompanied the development of the chemical dictionary and this book over the last few years and have made valuable contributions, either by discussions of terms and their arrangement within the dictionary, by reviewing the best procedure to analyze Japanese documents, by arguments on general Japanese language issues, by support in analysis of patents or articles from Japan or by encouragement in finalizing the project. I express my gratitude to Yoko Kono, Dr. Alexandra Schichtel, Dr. William K. Moberg, Kuniko Owada, Keiko Wiskamp, Konrad Vester, Dr. Kuniaki Shimbo, Tomoko Oshiro, Dr. Sandra Löhr and Dr. Anke Eberhardt. Special thanks go to my Japanese friends and colleagues who reviewed Japanese terms in the dictionary and language topics in the general part, in particular to Dr. Hiroyuki Sawada (BASF Japan), Dr. Tsuyoshi Kono (Kyoto University) and Professor Fumitake Yoshida (emeritus, Kyoto University).

