

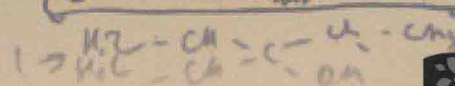
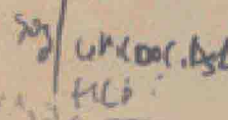
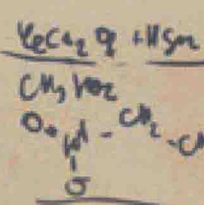
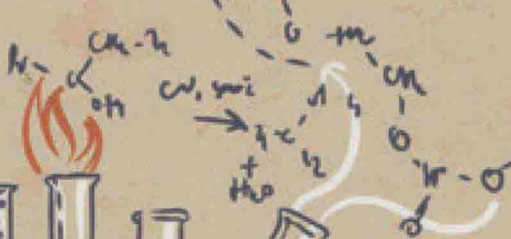
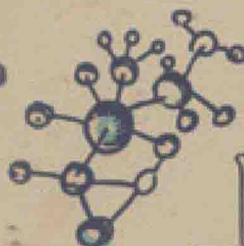
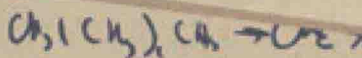
THE LEARNER'S APPROACH

Condensation

CH₃
fume fume

OH
|
HO
|
OH
diol

CH₃



UNDERSTANDING BASIC CHEMISTRY

THE LEARNER'S APPROACH

KIM SENG CHAN
JEANNE TAN



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**UNDERSTANDING
BASIC CHEMISTRY**
THE LEARNER'S APPROACH

PREFACE

The majority of the learning of chemistry in classrooms happens with the help of textbooks and lecture notes. But unfortunately, most textbooks are of the descriptive and non-conversational type, presenting facts rather than explaining them. In addition, the links between concepts are often not made explicit and presupposes that learners would be able to make the necessary integration with the various concepts that they have already come across, forgetting that some learners lack the prior knowledge and metacognitive skills to do it. Hence, learners would at most be able to reproduce the information that is structured and organized by the textbook writer, but not able to construct a meaningful conceptual mental model for oneself.

The pedagogical approach used for this book is similar to our first three books: *Understanding Advanced Physical Inorganic Chemistry*, *Understanding Advanced Organic and Analytical Chemistry*, and *Understanding Advanced Chemistry Through Problem Solving*, retaining the main refutational characteristics of the previous books by strategically planting think-aloud questions to promote conceptual understanding, knowledge construction, and discourse opportunities. We hope that these essential questions would make learners aware of the possible conflict between their prior knowledge, which may be counterintuitive or misleading, with those presented in the text, and hence in the process, make the necessary conceptual changes.

In essence, we are trying to effect metaconceptual awareness — awareness of the theoretical nature of one's thinking — while learners are mastering the chemistry concepts. We hope that by pointing out differences between possible misconceptions and the actual chemistry content, we can promote metaconceptual awareness and thus assist the learner

in constructing a meaningful conceptual model of understanding for chemistry. We want our learners to not only know what they know but at the same time, have a sense of *how they know what they know* and how their new knowledge is interrelated within the discipline.

Lastly, the substance in this book would be both informative and challenging to the practices of chemistry teachers. This book would certainly illuminate their pedagogical method, especially for those who strongly believe in teaching basic chemistry in a significant and integrative approach, from the learner's perspective. The integrated questions at the end of each chapter would certainly prove useful to students in helping them revise fundamental concepts learned from previous chapters, and also appreciate the importance and relevance in the application to their current learning. Collectively, this book offers a vision of understanding basic chemistry meaningfully and fundamentally from the learner's approach. And to fellow chemistry teachers, we hope that it would help you develop a greater insight into what makes you tick, explain, enthuse, and develop in the course of your teaching.

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Special thanks go to all our students who have made our teaching of chemistry fruitful and interesting. We have learnt a lot from them just as they have learnt some good chemistry from us.

Finally, we thank our families for their wholehearted support and understanding throughout the period of writing this book. We would like to share with all the passionate learners of chemistry two important quotes from the *Analects of Confucius*:

學而時習之，不亦悅乎？ (Isn't it a pleasure to learn and practice what is learned time and again?)

學而不思則罔，思而不學則殆 (Learning without thinking leads to confusion, thinking without learning results in wasted effort)

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