

<<定量化学分析>>

图书基本信息

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## 前言

This text brings together the individuals and the desire to develop a text for undergraduate students who have English as a second language. Our initial focus was undergraduate students with chemistry major in the College of Chemistry and Molecular Engineering, Peking University, Beijing, China, but now we hope and expect that other undergraduate students may be able to learn more easily with this text as they cope with the English language and the essentials of analytical chemistry. Lecture Series Leading to Text: The one semester course in analytical chemistry in English for undergraduate students was initiated by Professor Li Ke'an in February 2005 with Dr. Li Na as the presenter of one 2 hour lecture each week for 15 weeks. The size of the lecture room limited the number of students to 50. Each year the students prepare presentations of their science project reports. The audience of their peers grades the oral presentations of those students who volunteered and were selected to give oral presentations. Competition for being included among the oral presenters has been impressive. Student discussion, grading of the presenters and the presentations bring forth a profound bonding. Each of us in the lecture room feels the shoes worn by another. As we introduced different examples and illustrations to the lecture series, these quickly became ideas for the coming analytical chemistry text. In Chapter 1, "the Human Genome Project was used to show the power and success possible when analytical chemists join forces to bring the minds and resources of the academic community to focus on a goal. The project is indeed a road map of problem solving using new and different technologies plus automation to resolve analytical roadblocks to meet the time constraints of the Genome Project thus opening research opportunities for decades. A global environmental need brought together another group of scientists in the concluding Chapter 10 to address the ever present need to monitor drinking water contamination throughout the world. We selected arsenic as one example of the world-wide need for simple, sensitive, cost effective analytical methods to monitor drinking water.

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### 内容概要

北京大学的分析化学课程2003年被评为国家级精品课，是全国分析化学课程中首门国家级精品课程。编者从2003年以来开始对定量化学分析课进行英文讲授。

本书是其中双语课的教材。

本书可与《分析化学教程》(“十五”规划教材)配合使用。

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## 章节摘录

插图：Gravimetry, based on mass measurement, includes precipitation gravimetry, volatilization gravimetry, and electrogravimetry. In precipitation gravimetric analysis, the mass of the product of the chemical reaction related to the analyte, which is the sparingly soluble and pure precipitate, is measured with an analytical balance. For example, a barium sulfate gravimetric method for determining sulfur content in iron ores is recommended by the International Organization for Standardization (ISO 4689.1986, Iron ores—determination of sulfur content—barium sulfate gravimetric method). After sample preparation, the sulfur in the sample is converted to sulfate, an excess of barium chloride ( $\text{BaCl}_2$ ) is added to an aqueous solution of the sample to cause the precipitation of the sulfate as barium sulfate ( $\text{BaSO}_4$ ). The precipitate ( $\text{BaSO}_4$ ) is then filtered, washed to remove impurities, heated, and weighed to obtain the final mass of  $\text{BaSO}_4$ . Precipitation gravimetry is usually suitable for samples with an analyte greater than 1%. Volumetric analysis (also volumetric titration) is a quantitative chemical analysis that is used to determine the unknown concentration of a known reactant. A standard solution is added from a buret to react with the analyte until the titration is complete, i. e., the endpoint is reached as determined by an indicator. In volumetric analysis, the volume measured is used to calculate the concentration of the analyte. For example, a hydrochloric acid ( $\text{HCl}$ ) standard solution added from a buret can be used to determine the concentration of sodium hydroxide ( $\text{NaOH}$ ) in a solution using methyl orange ( $\text{MO}$ ) as the indicator. After the neutralization reaction reaches a point when all the  $\text{NaOH}$  has just reacted with  $\text{HCl}$ , an additional very small amount (about one half drop) of  $\text{HCl}$  changes the final solution from basic to acidic and the methyl orange indicator changes its color from yellow to orange. Volumetric analysis are classified by the type of reactions occurring, e.g., acid-base titration (neutralization titration), complexometric titration, redox titration and precipitation titration.

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