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Study of Mathematics – A Need for Chemists

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ABSTRACT

Mathematics is an essential and integral component of all of the scientific disciplines, and its applications within chemistry are numerous and widespread. Mathematics allows a chemist to understand a range of important concepts, model physical scenarios, and solve problems. Mathematics is used widely in chemistry as well as all other sciences. Mathematical calculations are absolutely necessary to explore important concepts in chemistry. Without some basic mathematics skills, these calculations, and therefore chemistry itself, will be extremely difficult. In this article we are going to discuss that the need of the study of mathematics and reasons for the students feel difficulty in application of mathematics in chemistry.

Keywords : Practical Thinking, Confidence, Interest

I. INTRODUCTION

Mathematics is regarded as a useful tool by chemists, and all undergraduate chemists will need to attend some sort of mathematics course in order to access and make the most of their science. There are various levels of mathematics used in chemistry degrees, ranging from combinatory and proportional reasoning to heavy-weight differential equations and Fourier analysis. However, study of any of the underlying mathematics out of context tends to reduce mathematical activity to a series of clean, dry routines and procedures. Many students then struggle with applying the quantitative knowledge in the complicated chemical contexts they encounter. For example, we have

Mathematics	Chemistry context
Ratios	Mixing solutions with certain molarities, making dilutions
Proportional reasoning	Analysis of molecular structure; moles
Algebra and graphs	Analysis of experimental plots of reaction rates; gas laws
Calculus	Predicting and measuring rates of reaction in measurable experiments
Units of measurements	Making sense of real, complicated measurements
Vectors	Understanding crystal structure
Logarithms	Understanding pH
Probability	Drawing general conclusions from trials

II. REASONS

Why would such students struggle with the mathematical aspects of chemistry? There are several possible reasons for this are:

1) Practical thinking

Mathematics exams can often be passed by learning the content practically. This means that students can answer certain types of question by following a recipe. The problems in chemistry arise because even minor deviations from the precise recipe cause the student to fail to know what to do.

2) lack of ability to translate mathematical meaning to chemical meaning

Students who are very skilled at mathematics might have trouble seeing how to relate the mathematical process to a real-world context; this hampers the use of common sense, so valuable in quantitative science.

3) Incapability to make estimates or approximations

Mathematical contexts in chemistry are rarely simple. In order to apply mathematics predictively, approximations will need to be made. To make approximations requires the student to really understand the meaning and structure of the mathematics.

4) Poor problem solving skills

Mathematical issues in chemistry problems are not usually clearly 'signposted' from a mathematical point of view. The chemist must assess the situation, decide how to represent it mathematically, decide what needs to be solved and then solve the problem. Students who are not well versed in solving 'multi-step' problems in mathematics are very likely to struggle with the application of their mathematical knowledge.

5) Lack of practice

There are two ways in which lack of practice can impact mathematical activity in the sciences. First is a lack of skill at basic numerical manipulation. This leads to errors and hold-ups regardless of whether the student understands what they are trying to do. Second is a lack of practice at thinking mathematically in a chemical context.

6) Lack of confidence

Lack of confidence builds with uncertainty and failure, leading to more problems. Students who freeze at the sight of numbers or equations will most certainly under perform.

7) Not having mathematical interest

Students are hopefully strongly driven by their interest in science. If mathematics is studied in an environment independent of this then mathematics often never finds meaning and remains abstract, dull and difficult.

III. CONCLUSION

The mathematical models and numerical analysis that underlie these methods have an increasingly important and direct role to play in the progress of many areas of chemistry.

Acquiring quantitative knowledge in the complicated chemical contexts and easy way of mathematical approach and applications dilute the negativity and enhance the grasping ability on chemical concepts and real ideas that lie behind the mathematics.

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