

BALL AND STICK FUN MODEL KIT

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ABSTRACT

Chemistry is one of the most important subjects and perceived as a killer subject in Malaysia. Crystal and chemical bonding topics were included in major examinations such as SPM and STPM, as well as in Diploma and Degree levels of studies. In chemistry, class theory is a common teaching method for crystal structure and chemical bonding topics. Thus, this kit introduces a new teaching method where students need to produce the chemical bonding or crystal structure by using the ball and stick model. The colored balls represent the atoms, and the sticks represent the bonds that hold them together. It is a complete set of tinker toys to represent how molecules look. This kit box has been sold at the price of RM19.90 and it contains 200 pieces of molecular model kit, including 70 atoms (ball), 100 bonds (stick) and 30 parts for lone pairs. It comes with an instruction CD, notes and exercises thus serves as a fun learning tool kit for students from secondary school to university level. The parts in the kit can be taken apart and rebuilt or can be used for display or teaching specific crystallographic or structural concepts. The different colored balls represent atoms of different elements. The survey has been conducted and 100% diploma students agree that this kit is fun and help them in understanding the topic.

Keywords: chemistry, chemical bonding, crystal structure, kit box, Interactive learning

1. INTRODUCTION

Education is the process of accepting or giving proper information, which is a crucial process especially for students. Most learners naturally want the best for their process of education, As for chemistry subjects, the two main approaches of teaching are theoretical and practical [1]. The main aim of chemistry subjects is to enhance the understanding of the composition, properties and change of matter. Claims and explanations in chemistry should be supported by observational data [2]. Hofstein and Naaman (2007) reported that practical methods aim at developing students' scientific processing skills, problem solving skills, and draw their attention and develop positive attitudes towards scientific approaches according to the objectives of fundamental science education [3]. This study explores teachers' and student thinking about practical work, especially in regards to the types of practical work they privilege in their teaching of chemistry to support students in their learning [4]. The purpose of this study is to do a survey and reveal to what extent chemistry teachers have utilized the ball and stick model kit and how effective they have been using it. It seeks to investigate the view of practical work, especially the type of practical work for chemical bonding and crystal

structure topics. By this innovation, students will be able to buy the kit at an affordable price and help to improve their understanding of these topics by interactive learning.

2. METHODOLOGY

The kit includes 70 atoms (ball), 100 bonds (stick) and 30 parts for lone pairs. It comes with an instruction CD, notes and exercises thus provides a fun learning tool kit. The survey has been done using Google Form and the 30 respondents are the students who have taken the subject in their studies.

3. RESULT AND DISCUSSION

Table 1. Results from google survey on ball and stick model

Questions	Yes (%)	No (%)
Experience using the ball & stick model kit	60	40
The model can display chemical structure, molecular bond, and bond angle in all directions?	100	0
The model provides a fun learning tool kit for students from secondary to university level?	100	0
The instructions and exercises are easy to understand?	100	0
This model kit attracts Malaysian students to love chemistry subject and science field	100	0
As learning tool to help teacher attract the students' attention	100	0
The price at RM19.90 is affordable for all Malaysian	70	30
It promotes hands-on activity which is fun and helping in better understanding	100	0
It is suitable to be used for teaching tools for two topics which are chemical bonding and crystal by using the same ball and stick	100	0
Theory in class not helping the students to imagine the reaction of chemical bonding and forming crystal	90	10

From the results, 60% participants have the experience of using the UiTM Ball & Stick model kit. the 100% audience agreed that the model can display chemical structure, molecular bond, and bond angle in all directions and provides a fun learning tool kit for students from secondary to university level. They also agreed that the instruction and exercises are easy to understand and this model kit attracts Malaysian students to love the chemistry subject and science field. They agreed that the kit is suitable as a learning tool to help teachers attract the student's attention. However, 30% of students did not agree that the price at RM19.90 is affordable for all Malaysian. This might be due to factors that Malaysian students are always subsidized by the government and they spend less money on education even for their learning tool. All acknowledged that it promotes hands-on activity which is fun and helps in better understanding and it is suitable to be used for teaching tools for two topics which are chemical bonding and crystal by using the

same ball and stick. However, 10% of the audience did not agree that theory in class does not help the students to imagine the reaction of chemical bonding and forming crystals. It can be concluded that students need both practical and theory to help them master the topic.

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2. Pihak Perpustakaan ingin memohon kelulusan YBhg. Profesor untuk membuat imbasan (*digitize*) dan memuat naik semua jenis penerbitan di bawah UiTM Cawangan Perak melalui Repositori Institusi UiTM, PTAR.

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