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## **Weakness Analysis of Handbook Guidelines for the Nitrogen Oxidation Number Determination Practice and its Solutions for the use of Media Images**

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**Abstract** Chemical learning that only the theory will difficult for learners, so it can be anticipated by the procurement of practicum activities. Practical activities to train students to solve the problem in its own way of course with manual laboratory manual. The existing practicum book still has many shortcomings, because the contents are all just in the form of writing can lead to different interpretation between learners, practicum that aim to solve problems, with the multi-interpretation of it even add to the problem. The purpose of writing this paper to provide innovation on the contents of practical books that make like comics contains pictures or animations (2D) so it will be more interest for learners to learn it. The approach used in the writing of this paper is descriptive qualitative based on literature review and indirect interviews to some students whose results they are more interested when hearing the book lab will be made like a comic. Therefore, the content of practicum books such as comics is one of the effective innovation to increase students' interest in understanding chemistry.

**Keywords** comic, interest, user manual practicum

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### **Introduction**

Education technology development strongly influenced by the development of the times especially the field of science and technology. This makes sense because technology will make things easier in the world of education that requires us to know things correctly, quickly and accurately. Along with the development of technology, science also continues to evolve from the era of contemporaries including natural science (IPA). One branch of science is the science of chemistry. Chemistry is a science gained and developed on the basis of experiments that seek answers to the question of what, why, and how lame symptoms specifically relate to the composition, structure and properties, transformation, dynamics, and energetics of substances [1].

The chemistry lessons in high school are not the first subjects that the students see. This is because when taking junior high school, students have been getting the material about chemistry, it's just still united with biology and physics while high school chemistry stands alone. So some learners think that chemistry is a difficult lesson because chemistry is abstract. Therefore, chemical learning emphasizes the provision of direct learning experiences through the use and development of process skills and scientific attitudes. In order for the chemistry learning process to be effective, it must be supported by practicum activities.

Practical activities will train students to think because students are directly faced with a problem related to learning materials and given the opportunity to solve the problem so that learners more easily understand the learning



materials provided. Practical activities, of course, have a handbook that is usually called with a practical guide activity.

This manual is the same as other textbooks as visual learning media, only the use of its use is devoted to practical activities. Based on the results of interviews that researchers do to high school students, most argue that the practical manuals tend to be serious, less interesting, boring and often cause inter-interpretation of students [2]. It is, therefore, necessary to innovate the procurement of practical manuals.

Picture books in the form of cartoons or other coloured images will attract more learners to learn. According to Muhammad (2009) cartoons as one form of graphic communication is an interpretative image that uses symbols to convey a message precisely and concisely or something attitudes toward certain people, situations, or events. His ability is great to attract attention, affect attitude and behaviour. Since children, until students are more like reading comics than textbooks. In fact, they are willing to spend time until late at night to read their favourite comics. And learning materials will be more neglected [3].

The discussion of oxidation number is one of the material practicum conducted in class X semester 2. This material is also experienced when in college to take a chemical education program one of them nitrogen oxidation number. In practical work steps of oxidation number sometimes cause different perception this matter because learners less understand step work, and in high school more often teacher work. Although the group has formed but sometimes only rely on one or two people who are considered smart in the group so that all members do not necessarily understand and it certainly has an impact on when he continued his education in college.

Based on the above description, the researcher has the innovation to develop comic media for manual especially at work step. This developed comic is expected to increase the motivation of learners in studying chemicals especially during practicum activity so that the process of practicum runs smoothly and does not give the more multi-interpretation.

### Writing Method

The approach used in this paper is descriptive qualitative based on literature review. Selection of this approach is expected to provide a careful picture of the situation or specific symptoms in the object of study. In this case, the author tries to make innovations to the book references practicum to be more interesting in terms of content so that more facilitate learners do practicum and does not cause multiple interpretations or different interpretations between other students

### Discussion

Oxidation number is a positive or negative number that refers to the charge of a species when electrons are considered to be distributed to the atom according to certain rules. This distribution rule is ionic for heteronuclear species which means the transfer of electrons to more electronegative atoms and covalently pure for homonuclear species. The oxidation-reduction (redox) reaction involves the transfer of electrons causing the change of the oxidation number of the species concerned. To determine the number of electrons involved it is necessary to identify the degree of oxidation or oxidation number involved in the reaction.

One chemical element that has a varied oxidation state is nitrogen. Nitrogen is able to form compounds with other elements are very much. From the compound nitrogen has an oxidation number of +5, +3, +2, +1, 0, -1, -2, -3. To know the change of nitrogen oxidation number can be done by experiment with steps in the form of writing, and it causes more mistakes perception. For example the following working steps:

- 1) Nitrate salt heating
  1. Heat the solid  $\text{KNO}_3$  in the test tube
  2. In different test tubes, heat the  $\text{Cu}(\text{NO}_3)_2$  solid. **Test the resulting gas** and residual solids in the test tube (Team of an organic chemistry lecturer, 2017 [4])

The description of the aforementioned work steps mentioned above is necessary to use litmus paper in the gas test sentence generated in the second work step. However, if students have not read the literature, or do not know before



then the resulting gas is not tested with litmus paper, therefore, it is more effective if the above steps are written as follows by Figure 1.

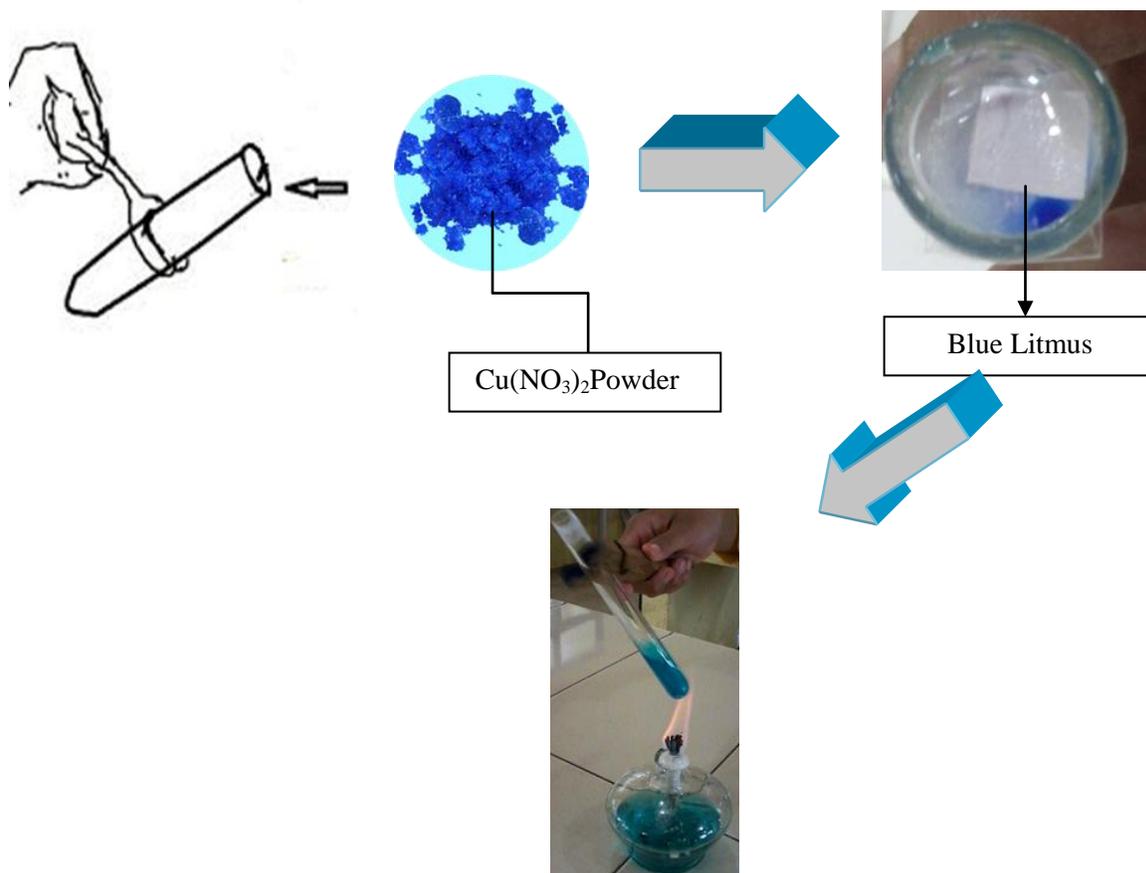


Figure 1: An example of 2D animation in a nitrate salt heating step

### Conclude

1. Mistakes of interpretation often occur in the practice because of the lack of interest in learning students in learning the material in practical manuals that content is considered less attractive
2. The innovation of practicum bookmaking especially in material and work step which accompanied by drawings such as in comic will attract student interest to study harder.

### Suggestion

Better to do further research not only literature study to better know what needs to be improved from the book of practicum that already exist.

### References

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