



The Results Presentation of The Test Plants As A Natural Indicator of The Test Compounds of The Acid-Base Balance In the Teaching Materials of The Atlas to Train Scientific Reasoning Students

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ABSTRACT

The type of research applied in this research is Research and Development. The development model used is Dick and Carrey. The purpose of this research and development is to design an Atlas and apply it to train the students' scientific reasoning abilities. Atlas is a teaching materials developed and applied to high school / vocational / MA level students. The sample chosen for the implementation of the Atlas of teaching materials was grade X of VOCATIONAL Health Yannis Husada Bangkalan students. The application of plants as natural indicators of acid-base tests is the material presented in the developed Atlas. Plants selected as indicators are tested first to be presented in the Atlas. Atlas is a teaching material that can convey information related to the use of natural indicators of the acid-base test to train the students' scientific reasoning skills. The four indicators of scientific reasoning that are trained are Theoretical Reasoning, Proportional Reasoning, Probabilistic Reasoning, and Correlational Reasoning. The data shows the students' scientific reasoning ability on the post-test results, as many as 20% of students are on the high criteria, 60% are moderate criteria, and 20% are still on the low criteria from the post-test results. The post-test result data is quite increased when compared to the pretest results, which 100% of students are in the low criteria.

INTRODUCTION

Acids and bases are one of the studies in the science of chemistry that studies the properties of a substance or material. Compounds that are acids and bases can be detected physically and chemically. The method is chemically more appropriate to be used in the process of testing compounds that are acids and bases. Methods the chemical can test the content of the compound of the acid-alkaline balance in all substances or ingredients, both of which are toxic and non-toxic. Phenolphthalein, Methyl Orange, Brom Thymol Blue, Paper, Universal Indicator and Litmus Paper is an indicator of synthetics used to test the compounds of the acid-base chemical (Jain et al., 2013). Some of the chemical compounds that are used as an indicator of the synthetic because at each pH range can produce different color changes (Vadivel & Chipkar, 2016).

Indicators synthetic widely used can cause pollution of the environment, if the waste is not given special treatment (Mahmud et al., 2018). The use of a natural indicator for test compounds acid-base balance can be a solution to replace the indicator is synthetic, so it can cope with the influx of pollutants to the environment (Senathirajah et al., 2017). Some of the plants that have the pigment of bright and dark colors can be used as a

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