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**Submission date:** 21-Jul-2018 12:53PM (UTC+0700)

**Submission ID:** 984078017

**File name:** 15\_ICRIEMS\_2016.CE-03\_-\_Proceeding.pdf (376.87K)

**Word count:** 4074

**Character count:** 23553

# Chemistry Teachers' Ability in Measuring Analytical Thinking and Science Process Skills

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**Abstract**—The objectives of the study to investigate chemistry teachers' ability in measuring students' analytical thinking and science process skills. This subject research is chemistry teachers' of XI IPA classes of five senior high schools in Yogyakarta. Data collecting technique used questionnaire and was analyzed in qualitative-descriptive method. The result of the qualitative analyze shows that: 1) some of the subject research teachers do not have the assessment instrument, 2) assessment laboratory activities have not using the assessment instrument, and 3) assessment instrument is not equipped with standard scoring guidelines. On the other hand, the chemistry teachers' ability in measuring analytical thinking and science process skills is low. Therefore, chemistry teachers should be improved their ability in measuring analytical thinking and science process skills.

**Keywords:** analytical thinking, assessment instrument, science process skills

## I. INTRODUCTION

Chemistry learning in 21<sup>st</sup> century requires active participation of teacher to optimize the overall students' abilities on aspects of knowledge, skills, and attitudes. Knowledge related to the cognitive, psychomotor related to the skills, and attitudes related to the affective domain. Knowledge is a process of remembering, associating, assessing, and interpreting a particular phenomenon. Manual skill is the ability possessed by the students to do laboratory activities well. Attitude is a state of mind, feelings, or beliefs about a particular issue embodied in the learning activities [1]. All three of these competencies can be built through a scientific approach by using inquiry-based learning.

Inquiry-based learning is one method of learning centered on students who can improve learning outcomes of students, especially the development of higher skill. In other words, inquiry-based learning can strengthen the relationship between learning in the classroom theory with practical activities in the laboratory [2]. Inquiry-based learning is one of suitable method to apply in learning chemistry because the model facilitates the students to actively carry out an investigation in the lab activities. Inquiry-based activity involving a series of practical dimensions of knowledge students related components conceptual, procedural, and operational [3]. These three components can be obtained through practical activities that are supported by the use of science process skills.

Science process skills are intellectual skills that can be practiced, studied and developed by students through a learning process, so it makes students better prepared to face the challenges of the 21<sup>st</sup> century learning [4]. Science process skills need to be applied to students because it indirectly will involve them in different activities and be able to direct their inquiry to apply basic science process skills and integrated [5]. These results are reinforced by the opinions Yakar [6] who argued that science process skills-based learning can also increase the positive attitude of students towards science. Thus, science process skill is able to accommodate aspects of knowledge, skills, as well as scientific attitude of the students in an integrated manner.

Competence in the science process skills should be seen as an instrument that will help students to acquire knowledge and understanding of how knowledge is acquired [7]. In the context of learning, science process skills are not directly linked to the cognitive dimension [8]. The cognitive dimension includes the students' ability to remembering, understanding, applying, analyzing, evaluating, and creating [9]. In general, the cognitive dimension in Bloom's taxonomy is divided into two levels of thinking, the low order thinking skills and high order thinking skills. Capabilities included in the low order thinking skills include

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