

Radiation Education for High School Students Using Potassium Radiation Sources

Takao KAWANO (National Institute for Fusion Science)

1. Introduction

Many high school students visit the National Institute for Fusion Science (Japan) every year, and some of them attend radiation courses. Recently, radiation measurement classes have also been initiated using radiation sources fabricated from potassium chloride. The sources contain the naturally occurring radioisotope potassium-40 and called natural radiation sources. In 2011, the radiation course, including radiation measurement lessons using natural radiation sources, was taught four times for four high schools involving 37 students. To investigate the educational effect of the radiation measurement lessons, data and reports from students (obtained by survey) were examined.

2. Radiation measurement lesson and results

Using a GM survey meter and a natural radiation source, three measurements were taken to explain the dependence of radiation intensity on time, distance, and shielding thickness (Principles underlying protection from radiation). All data obtained by the students were aggregated.

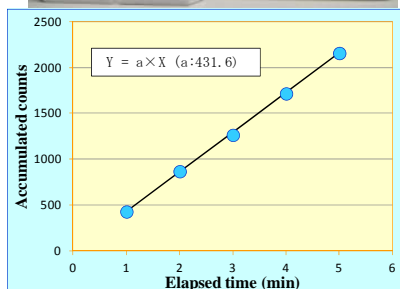


Fig.1 Dependence of radiation count rates on time.

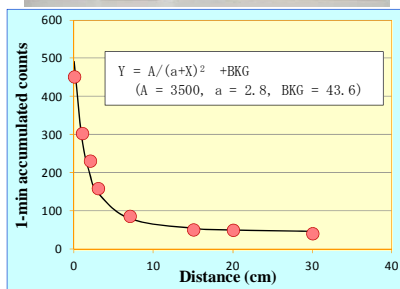


Fig.2 Dependence of radiation count rates on distance.

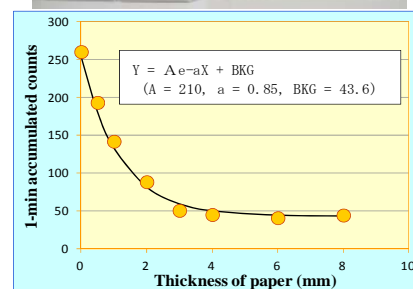


Fig.3 Dependence of radiation count rates on shielding.

Table Typical comments described by students.

- (1) I enjoyed the radiation measurement practice. I was able to obtain results that were exactly the same as those predicted by the lecture.
- (2) I enjoyed handling unique educational tools, including the potassium radiation sources.
- (3) I had a rather negative perception of radiation before. However, my perception about it was changed by the radiation measurement lessons.
- (4) I knew a little about radiation before. However, I thought it was good for me to learn about radiation as much as I could through radiation measurement practice.
- (5) During the radiation measurement lessons, I thought "Oh, really?!" as I learned about the existence of naturally occurring radioactivity around our surroundings.
- (6) I was able to follow the radiation measurement lessons in an approachable way that was easy to understand, even though I felt that the lessons were rather difficult before.
- (7) Although I already knew about the existence of natural radiation around us, I was actually surprised that a GM survey meter responded to natural radiation more sensitively than I thought.

3. Conclusion

Through the radiation measurement lessons, students clearly learned about the dependence of radiation intensity on time, distance, and shielding (radiation protection principles). In addition, the students could safely and easily perform the radiation measurements themselves. Thus, potassium radiation sources are convenient educational tools that can be used to teach radiation principles to high school students without concerns regarding radiation-related regulations. Radiation measurement lessons using potassium radiation sources can be conducted in meeting rooms, school classrooms, or community halls, where stronger radiation sources regulated by law cannot be handled.