Chemical Education International, Vol. 1, No. 1, 26-29, Published in August 31, 2000

Message from Nobel Laureates to Young People

Prof. F. Sherwood Rowland
(Nobel Laureate, 1995).

Prof. F. Sherwood Rowland won the Nobel Prize for Chemistry in 1995 together with Mario Molena and Paul Crutzen for their work in atmospheric chemistry, particularly concerning the formation and decomposition of ozone.

Interviewer: Yoshito Takeuchi

Professor Rowland (right), Yoshito Takeuchi (left)

Professor Rowland received his PhD from the University of Chicago in 1952 for work on the chemistry of radioactive atoms with Willard (Bill) F. Libby. After faculty positions at Princeton University and the University of Kansas, he moved to the new Irvine campus of the University of California as Donald Bren Professor of Chemistry and Earth System Science. In 1973, he started his groundbreaking work in atmospheric

chemistry and has brought to light how the destruction of the ozone layer was taking place through the influence of chlorofluorocarbons in aerosol sprays and as solvents, and hence has shown the way to the concrete actions in the Montreal proposal which should enable the ozone layer to recover and thus prevent major environmental damage.

Professor Rowland visited Japan on in June 2000 as the Foreign Secretary of the National Academy of Sciences, USA. On this occasion the interview was arranged for IUPAC CTC.

T. How you became interested in chemistry?

R. I entered a Liberal Arts College. The idea or purpose of such colleges is to encourage young people to study broadly rather than to follow some specific discipline in narrower way. So, I studied chemistry, physics and mathematics side by side to a considerable extent. It is in fact after I entered graduate school when I began to study chemistry in a professional manner.

T. You began to study radiochemistry, that is, chemistry of radioisotopes, from the beginning of your graduate study, but changed your subject of research from this area to the study of the air. What made you into this area?

R. My mentor Prof. Libby (Nobel Laureate in chemistry, 1960, for his development of the new technique of radiocarbon dating) always told us to do something new. This influenced me very much. While I was studying the radiochemical aspect of photoreaction of compounds with chlorine and hydrogen isotopes. When I heard the news that chlorofluorocarbon (CFC) was detected in the atmosphere, I felt that I caught 'something new'. The theme was very new, while the compounds to be studied are familiar to me, and the reactions involved are basically photoreation though these are going in the stratosphere.

T. When you started the study of CFC, and how long did it take before you get some results, some conclusion?

R. I began the study of CFC when Prof. Molina, who received the Nobel Prize jointly with me, joined to my laboratory. It was 1973. An important result was soon obtained. Only after two months and a half. There existed a connection between CFC and ozone. We wrote a preliminary paper, just two pages, and sent it to Nature. We already obtained results enough to write a long, full paper, but we wanted to publish as soon as possible.

T. How was the response to that paper?

R. Well, the more deeply one was involved in this field, the more one was

sympathetic to our view. Naturally, there arose a very strong opposition from the CFC and related industry.

T. When you could feel that your theory finally approved and all oppositions were defeated?

R. I could say it was 1988; 15 years after the initial propose of our theory. In this year NASA organized a panel meeting to discuss ozone issue, and there the ozone hole and disappearance of ozone in northern hemisphere were discussed in relation to the CFC based on our theory.

It was indeed a great turn when the CFC industry finally accepted our theory and decided to stop gradually the production of CFC. Above all, the fact that the largest of CFC industries, aDu Pont, which has a large group of excellent scientists, also made that decision brought a great effect.

T. How do you think about the regulations on CFC? Is it OK?

R. Let us examine what has happened with Montreal Protocol which was established in 1987. This Protocol was modified several times. Initially it was intended to reduce the use of CFC should be 50% reduced by 1999. In 1990, this object was modified so that the use of CFC should be 100% reduced by 1999. According to the 1992 modification, the goal will be 100% reduction by 1996. Thus, the regulation has been more and more strict.

Such is an indication that efforts toward preservation of our environment is stronger and stronger. I can say it is good. The violation of this Protocol is very rare, indicating that the regulation is being practicized under a world-wide agreement.

T. Then can we be a little optimistic to believe that mankind can somehow survive?

R. As far as ozone is concerned, we can say we did a good job. we should not be too optimistic, but we have now some idea. We now know how we can survive.

T. What are you doing now?

R. Still on ozone. What I am interested in is, however, not the ozone in the stratosphere, but ozone in the surface of earth. People tend to believe that ozone in the stratosphere is good ozone while that in the surface of earth is bad ozone. This is not true. Ozone is ozone wherever it exists; the effect of ozone on life is similar. Activity of mankind is always associated with ozone. We are now monitoring ozone in the air of most important cities in the world.

T. Finally please give young people some message.

R. The 21st century is round the corner, but the coming century will be a tough one.

The biggest issue is population. Can we provide sufficient food and water to ever-increasing population? without science and technology, it is very clear that such a difficult goal would never be achieved.

There is some world tendency among citizens to be a bit skeptical to science and technology. It is certain that without science and technology the future of mankind is hopeless. I hope many able young people would choose science and technology as their profession.

T. Thank you very much.

(Note) Unfortunately, the skill of interviewer is very limited, and the recording has a lot of noise. Hence, the sentences reproduced are not necessarily the same with conversation.