

**Workshop Title: Risk Assessment of Mildly Flammable Refrigerants**

**Participants:**

	Name	Chair/Speaker	Affiliation
1	Eiji Hihara	Chair	The University of Tokyo
2	Satoru Fujimoto	Co-Chair	The Japan Refrigeration and Air Conditioning Industry Association (JRAIA) (Daikin Industries, Ltd.)
3	Tomohiko Imamura	Speaker	Tokyo University of Science, Suwa
4	Tei Saburi	Speaker	National Institute of Advanced Industrial Science and Technology (AIST)
5	Kenji Takizawa	Speaker	National Institute of Advanced Industrial Science and Technology (AIST)
6	Kenji Takaichi	Speaker	The Japan Refrigeration and Air Conditioning Industry Association (JRAIA) (Panasonic Corporation.)
7	Ryuzaburo Yajima	Speaker	The Japan Refrigeration and Air Conditioning Industry Association (JRAIA) (Daikin Industries, Ltd.)
8	Kenji Ueda	Speaker	The Japan Refrigeration and Air Conditioning Industry Association (JRAIA) (Mitsubishi Heavy Industries, Ltd.)
9	Xudong Wang	Speaker	Air-Conditioning, Heating, and Refrigeration Institute (AHRI)
10	Zhao Yang	Speaker	Tianjin University



**Abstract:**

**- Objective**

The purpose of the session is to share new information on risk assessment of mildly flammable refrigerants being carried out through industry, academia, and government cooperation in Japan.

## **· Background**

The use of chlorofluorocarbons (CFCs) and hydrochlorofluorocarbons (HCFCs) has been widely restricted, and to protect the ozone layer they have been replaced with hydrofluorocarbons (HFCs). However, HFCs used in air conditioners have a high global warming potential (GWP), and increasing use of HFCs has become a serious issue with regard to the prevention of global warming. Therefore, it has been widely recognized that replacing HFCs with low-GWP refrigerants would be an important step in solving this problem.

On the other hand, low-GWP refrigerants may have mild flammability and it is thus essential to collect basic data on their flammability and also conduct research on their safety for practical use. The integration of basic information about refrigerant physical properties, flammability, and risk assessment will simplify their selection for practical use.

Since 2011, the New Energy and Industrial Technology Development Organization (NEDO) has been carrying out the Technology Development of High-Efficiency Non-Fluorinated Air-Conditioning Systems project. The goal of this project is to develop practical application technology for low-GWP refrigerants used in the air-conditioning field.

With the objective of gathering essential data for assessing the risk of mildly flammable refrigerants, safety studies are being conducted in NEDO's project by teams from the Tokyo University of Science at Suwa, Kyushu University, The University of Tokyo, and the National Institute of Advanced Industrial Science and Technology (AIST). Results of the studies conducted to date have been used in industry (Japan Refrigeration and Air Conditioning Industry Association (JRAIA)) for risk assessment of mildly flammable refrigerants. In addition, a research committee has been organized by the Japan Society of Refrigerating and Air Conditioning Engineers (JSRAE) to assess risks associated with mildly flammable refrigerants.

As described above, risk assessment of mildly flammable refrigerants is being carried out through cooperation among industry, academia and government in Japan.

## **· Presentations**

### Session 1

#### ● Opening Remarks (NEDO)

#### ● Introduction

Eiji Hihara (Chair, The University of Tokyo, Project Leader of NEDO)

#### ● Presentations: Research Project on Risk Assessment of Mildly Flammable Refrigerants

##### · Fundamental and Practical Flammability Properties of 2L Refrigerants

Kenji Takizawa (AIST)

##### · Hazard assessment of the combustion of mildly flammable refrigerants

Tei Saburi (AIST)

##### · Experimental evaluation of physical hazard of A2L refrigerant assuming actual handling situation

Tomohiko Imamura (Tokyo University of Science, Suwa)

- Research project on risk assessment of mildly flammable refrigerants in Japan

Eiji Hihara (The University of Tokyo)

●Discussion

Session 2

●Introduction

Satoru Fujimoto (Co-Chair, JRAIA, Sub Project Leader of NEDO)

●Presentations: Risk Assessment of Refrigeration System Using Mildly Flammable Refrigerants

- Overview of the Risk Assessment for Residential Air-Conditioners

Kenji Takaichi (JRAIA)

- Overview of the Risk Assessment for VRF System

Ryuzaburo Yajima (JRAIA)

- Overview of the Risk Assessment for Chiller

Kenji Ueda (JRAIA)

●Presentations: HVAC&R technologies in USA and China

Xudong Wang (Air-Conditioning, Heating, and Refrigeration Institute (AHRI))

Zhao Yang (Tianjin University)

●Discussion

●Conclusion

Eiji Hihara (Chair, The University of Tokyo, Project Leader of NEDO)

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