

Lesson #	Lesson Title
Lesson 1	Refrigerant Types
Lesson 2	Refrigerants Classification
Lesson 3	Refrigerants Selection
Lesson 4	Refrigerants Management

Halocarbons

- CFC** Chlorofluorocarbon, a non-hydrogenated halocarbon, contains no hydrogen atoms. Harmful to the earth's ozone layer and contributes to global warming.
- HCFC** Hydrochlorofluorocarbon, a hydrogenated halocarbon, contains one or more hydrogen atoms. Less harmful to the earth's ozone layer but contributes to global warming.
- HFC** Hydrofluorocarbon, a halocarbon not containing chlorine. Safe to earth's ozone layer but contributes to global warming.
- HFO** Hydrofluoroolefin, a halocarbon not containing chlorine, with one or more double bonds between carbon atoms. Safe to earth's ozone layer and no or minimal contribution to global warming.

Drag and drop the three atoms that combine with carbon to form Halocarbons.

9 Fluorine (18.9), 17 Chlorine (35.5), 35 Bromine (79.9), 53 Iodine (126.9)

Safe Use of HCFC Alternative Refrigerants

Map of Safety Hazards of Alternative Refrigerants

Flammable, High Pressure, Higher Toxicity

Refrigerants: HC-290, L-40, R-446A, DR-5, R-447A, R-444A, DR-7, HFC-32, R-410A, R-744, R-444B, R-717, HCFC-123

FIRST eLEARNING COURSE ON REFRIGERANTS FOR NON-SPECIALISTS

ASHRAE UN environment United Nations Environment Programme

eLearning

REFRIGERANTS LITERACY

UN Environment, represented by the Economy Division (OzonAction), and ASHRAE have a Memorandum of Understanding to establish technical cooperation and mutual coordination toward providing professional technical services to the refrigeration and air-conditioning stakeholders (governmental, private, and public). The organizations work to ensure that up-to-date related technical information and standards are properly introduced and promoted. ASHRAE is a worldwide technical society of more than 57,000 individual members.

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What is eLearning?

eLearning is a web-based, on-demand learning allowing the learner to study at their own pace and when convenient, from any computer with internet access. It includes audio, video, and interactive exercises that enable the learner to engage with content and retain what they have learned.

What is the Refrigerants Literacy Course?

UN Environment and ASHRAE have partnered on a web-based course entitled "Refrigerants Literacy." This course is 4.5 hours of instruction covering the basics of refrigerants used in air conditioning and refrigeration applications.

Who Should Take the Course?

The course is mainly designed for non-specialist in HVAC&R operation and servicing i.e. Non-Ozone Units (NOUs), policy makers, procurement officers, buildings owners, facility managers, etc. It is also recommended for HVAC&R engineers, consultants and technical people who wish to get an overall and holistic overview about refrigerants and its progression).

How This Course is Useful to National Ozone Units (NOUs).

This course includes important background information and update about refrigerants definitions, use and management which is essential part of bread and butter of daily NOUs work including monitoring import/export of refrigerants/applications, setting national policies for the use of refrigerants and placing into market, controlling emissions of ozone depleting substances (ODSs) and their alternatives, updating/advising other authorities and private sector about technology and designing/implementing national refrigerant management plan.

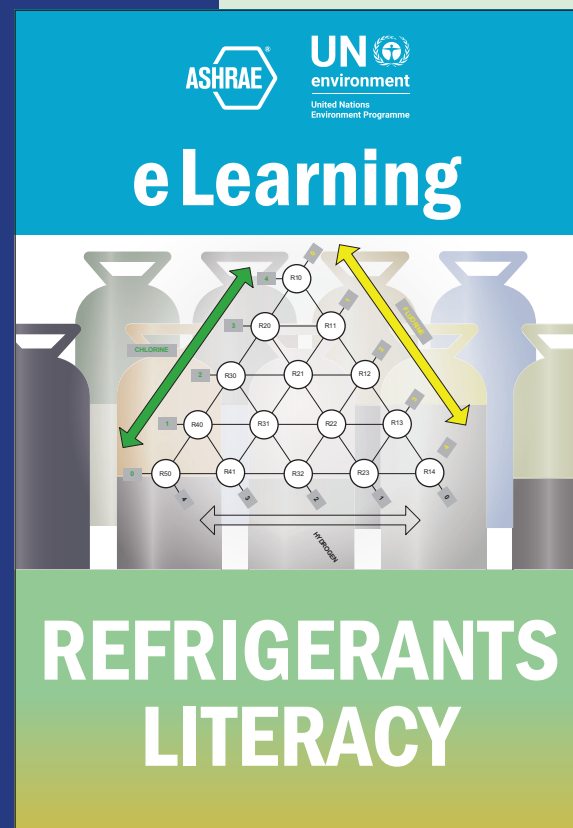
What is the Course Content?

The course consists of 4 lessons.

Lesson 1 covers refrigerants types and addresses environmental considerations. Lesson 2 deals with refrigerant classifications, including ASHRAE Standards 15 and 34. Lesson 3 addresses refrigeration selection, including residential and small commercial applications. Lesson 4 covers refrigerant management, including

the development of a management plan, containers, storage, and recovery, recycling, and reclamation.

In addition, the course includes interactivities in the form of knowledge checks to test the learner's mastery of the content as well as narration to keep the learner engaged. At the end of the course, there is a compulsory examination which, if passed, earns the learner a course completion certificate. The exam consists of 35 questions and allows unlimited attempts.



How Does One Enroll in the Course?

The following are the steps involved in enrolling in the Refrigerants Literacy course:

- 1 Contact Ms. Manal Aabed directly at Manal.Aabed@unep.org and let her know you are interested in enrolling in the course. Copy Mr. Ayman Eltalouny at Ayman.eltalouny@unep.org.
- 2 Ms. Manal Aabed will then send your name to the ASHRAE eLearning administrator.
- 3 ASHRAE will create an account for you.
- 4 ASHRAE will enroll you into the course.
- 5 ASHRAE will send you an email with eLearning portal access credentials, URL, and instructions on how to get started on the course.
- 6 You will need a computer with internet access to complete the course.
- 7 Once enrolled, the subscription lasts for 12 months, so you have 12 months to complete the course.

Technical Support

If a learner has any difficulties with login or course access, they should contact eLearning@ashrae.org. This support email address is indicated in the eLearning portal, <https://elearning.ashrae.org/>.