



Ozone Depleting Potential (ODP) of Refrigerants: Which Particular Values are Used?



INTRODUCTION

Under the Montreal Protocol on Substances that Deplete the Ozone Layer, Article 7 of the Protocol requires all Parties, both developing countries (also called Article 5 countries) and developed countries, to provide statistical data on an annual basis, on various issues related to trade and production of ozone-depleting substances (ODS), covering CFCs, halons, carbon tetrachloride, methyl chloroform, HCFCs, HBFCs, bromochloromethane and methyl bromide to the Ozone Secretariat. This data is then used to calculate each Party's official ODS consumption and production levels. The data reported includes information on: production; imports from and exports to Parties and non-Parties; imports and exports of ODS that have been recycled; amounts used for feedstock; amounts destroyed by technologies approved by the Parties; amount of methyl bromide used for quarantine and pre-shipment (QPS) applications.

It is important to note that Parties submit the data (Article 7 data) for each calendar year in **metric tonnes**. The Ozone Secretariat then converts this data to ODP-tonnes (ODP weighted tonnes) and calculates each Party's official ODS production and consumption figures.

Parties may have additional reporting requirements,



such as developing countries that have an obligation to provide annual Country Programme (CP) data to the Multilateral Fund Secretariat. It is again important to note that all ODS quantities in CP data are reported in **metric tonnes** and the Multilateral Fund Secretariat converts the data to ODP-tonnes where necessary.

However it is important to have a good understanding of which ODP values are used in the Montreal Protocol context since, for example, the maximum allowable total consumption values for HCFCs included in funding agreements for compliance with Protocol reduction schedules in HCFC Phase-Out Management Plans (HPMPs) are recorded in **ODP tonnes**.

WHAT IS ODP?

Ozone depletion potentials (ODPs) were a very important measure in the formulation of the Montreal Protocol and its Amendments.

ODP values are used to provide a simple way to compare the relative ability of various ODS to destroy stratospheric ozone. ODP is defined as "*the integrated change in total ozone per unit mass emission of a specific ozone-depleting substance relative to the integrated change in total ozone per*

unit mass emission of CFC-11" (WMO, 1995), i.e the ratio of global loss of ozone due to a given substance and global loss of ozone due to CFC-11 of the same mass.

CFC-11 or trichlorofluoromethane is taken as the reference substance and is assigned an ODP value of 1. It is against this standard that all other ODPs are calculated.

WHY ARE THERE DIFFERENT SETS OF ODP VALUES?

Calculation of ODP is a complex issue. For each refrigerant there are a number of different sets of values of ODP which could potentially lead to confusion and inaccuracies in reporting.

This is primarily due to the fact that there is a variety of sources from which the ODP values can be obtained; there are different methods used to calculate ODP; and as research progresses ODP values are periodically updated, based on the most recent research and scientific understanding.

It is also important to note that the ODP value quoted in a variety of sources can include a range to reflect the uncertainty of the value or can indicate different values depending if it was derived from a model or a semi-empirical approach.

However, the Montreal Protocol has incorporated agreed ODP 'reporting values' into the text of the Protocol which provides standardisation.

TABLE 1 - EXAMPLE ODP VALUES

Substance	Montreal Protocol 'reporting values'	WMO* (1998)	WMO (2002)	WMO (2006)	WMO (2010)	WMO (2014)
CFC-11	1	1	1	1	1	1
CFC-12	1	0.9	1.0	1	0.82	0.73
CFC-113	0.8	0.9	1.0	1	0.85	0.81
HCFC-22	0.055	0.05	0.05	0.05	0.04	0.034
HCFC-123	0.02	0.04	0.02	0.02	0.01	-
HCFC-141b ^a	0.11	0.1	0.12	0.12	0.12	0.102
Methyl Bromide	0.6	0.37 ^b	0.38	0.51	0.66	-
Halon 1301	10	13	12	16	15.9	15.2
Carbon Tetrachloride	1.1	1.20	0.73	0.73	0.82	0.72

* Scientific Assessment of Ozone Depletion, World Meteorological Organization

a = used as foam blowing agent or solvent b = value was erroneously reported as 0.57 in WMO 1998.

ODP VALUES USED IN THE MONTREAL PROTOCOL

The ODP values illustrated in the Table 1 above are based on international scientific assessments and reflect the latest scientific consensus on potential impacts of ODS at the time of publication of the particular report/assessment.

These values are provided to illustrate the progressive calculations over time in updating the ODP values and also to highlight some examples of the different sources from which the values are available.

However it is essential to recognise that **the Montreal Protocol has adopted standard 'reporting values' for ODPs in the Annexes of the Protocol.**

The relevant Montreal Protocol 'reporting values' are highlighted in red in Table 1 and some examples are provided below in Table 2. The full list of 'reporting values' adopted by the Protocol can be found in the treaty text (see reference below).

TABLE 2 – ODP VALUES OF SELECTED SUBSTANCES

Substance	ODP value ('reporting' value)
CFC-11	1
CFC-12	1
CFC-113	0.8
CFC-115	0.6
HCFC-22	0.055
HCFC-123	0.02
HCFC-124	0.022
HCFC-142b	0.065
HCFC-225ca	0.025
Methyl Bromide	0.6
Halon 1301	10
Carbon Tetrachloride	1.1

The values in Table 2 are based the Montreal Protocol treaty text, available in the *Handbook for the Montreal Protocol on Substances that Deplete the Ozone Layer* (Annexes A, B, C and E). This includes more information and tables of ODP values to be used for the Montreal Protocol:

<http://ozone.unep.org/en/handbook-montreal-protocol-substances-deplete-ozone-layer/5>

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