

Sub-sector	ODS being replaced	Preferred substitutes
Flexible PUF Slabstock	CFC-11	Methylene chloride
Flexible PUF Moulded	CFC-11	CFC-free systems (water blown) Methylene chloride
Rigid PUF General Insulation (other than refrigeration)	CFC-11	HCFC-141b
Thermoware	CFC-11, CO ₂	Current-HCFC-141b Long term-CFC free systems (water blown)
Integral Skin PUF	CFC-11	HCFC-141b Methylene Chloride
Thermoplastic Foams - EPE/EPPN Foams - EPS Foams	CFC-12 CFC-11	Hydrocarbons Hydrocarbons, HCFC-22, CO ₂
Phenolic foams	CFC-11	Pentane, Butane
Perfumes, shaving foams, insecticides, pharmaceuticals, paints, glues etc.	CFC-11 CFC-12	- HAP - DME (Di-methyl Ethane)
Metered Dose Inhalers	CFC-11	Hydro-fluorocarbon-134a
Fire Extinguishers	H-1211, H-1301	Portable type - ABC powder, CO ₂ , HFC based Fixed type - FM200, HCFC blend, HFC23, inert gases, water mist and Co ₂ system

PHASE OUT SCHEDULE FOR O.D.S.

S. No.	Name of Activities	Phaseout Date
1.	Manufacture of Aerosol products or Pressurised Dispensers (excluding metered dose inhalers for medicinal purpose)	1-1-2003
2.	Manufacture of Polyol for foam Products	1-1-2003
3.	Manufacture of foam products including foam part of Domestic Refrigerator	1-1-2003
4.	Manufacture of Fire Extinguishers or Fire Extinguishing Systems.	1-1-2001
5.	Manufacture of Mobile Air-Conditioners and charging at Automobile industry.	1-1-2003
6.	Manufacture of other Refrigeration and Air-conditioning products (excluding compressors)	1-1-2003
7.	Manufacture of different products	1-1-2010
8.	Servicing of fire extinguishers And fire extinguishing systems.	1-1-2010
9.	Manufacture of Metered Dose inhalers for medicinal purposes.	1-1-2010
10.	Manufacture of different products	1-1-2040
11.	Use of methyl bromide except preshipment & quarantine	1-1-2015

*International day for
Preservation of Ozone layer*



16th September 2000



EMERGENCY RESPONSE CENTRE
M.P. POLLUTION CONTROL BOARD

E-5 SECTOR, PARYAVARAN PARISAR,
ARERA COLONY, BHOPAL-16 (INDIA)
TEL.: 91-755-469 180 FAX: 91-755-463 742
PBX: 91-755-464 428,466 191
e-mail : ercbpl@vsnl.com : erc@mpppcb.org
web : www.mpppcb.org

INTRODUCTION :

As the globalization continues and the Earth's natural processes transform local problems into International issues, a number of environmental problems have started affecting the entire world. These global problems, with far reaching environmental threats, include ozone layer depletion, global warming, acid rain, forest destruction etc. Among these, the issue of ozone layer depletion is well up on the international scene last decade and will continue for couple of decades more.

The region of the stratosphere containing the bulk of atmospheric ozone, i.e. ozone layer, lies approximately 15-40 Kilometers above the Earth's surface. This layer protects life on the Earth from the harmful ultra-violet rays, UV-b. This stratospheric ozone is generated and destroyed through natural cycle but some man-made chemicals used in air conditioners, coolants, foaming, fire extinguishers, solvents etc accelerate the ozone destruction process.

EFFECTS OF OZONE LAYER DEPLETION :

- * Increased UV-b radiation reaching earths surface.
- * Damage to materials, paint, plastics, rubber etc.
- * Damage to biological links in human food chain.
- * Crop and forest damage.
- * Rise in incidence of skin cancer, cataracts and blindness.
- * Human health effects such as respiratory illness and heart Problems.
- * Effect on aquatic life such as lower fish harvests and less ocean plankton.
- * Suppression of body immunity resulting in increase in infectious disease, less effective vaccination.
- * Photochemical formation of tropospheric ozone which contributes to global warming.
- * Accumulation of tropospheric ozone and acid aerosols causing worsening air pollution and acid rain.

GLOBAL DEVELOPMENT AND TREATIES :

Owing to the damaging effects of O.D.S. international action has been initiated. In 1985, Vienna convention was held for the protection of ozone layer followed by Montreal Protocol in 1987 which was signed by 82 countries, now 160 at present, including India. This Protocol has set the limit on the production of ODS and came into force on 1st January 1989. It was followed by further amendments agreed in London in 1991, Copenhagen in 1992, Vienna in 1995, Montreal in 1997 and Beijing 1999 to make terms more stringent to reduce and eventually eliminate the emission of man-made O.D.S.

OZONE DEPLETING SUBSTANCES (O.D.S.)

The substances which are responsible for the depletion/destruction of ozone layer are termed as O.D.S.. These include halons, chlorofluoro carbons (CFCs), hydrochloro fluoro carbons (HCFCs), hydrobromo fluoro carbons (HBFCs), methyl bromide, carbon tetra chloride and methyl chloroform. These compounds are wholly man-made combination of carbon, hydrogen, fluorine and chlorine. The ozone depleting substances are as follows:

CFC - 11	HCFC - 123	HCFC - 231
CFC - 12	HCFC - 123a	HCFC - 232
CFC - 13	HCFC - 124	HCFC - 233
CFC - 111	HCFC - 124a	HCFC - 234
CFC - 112	HCFC - 131	HCFC - 235
CFC - 113	HCFC - 132	HCFC - 241
CFC - 114	HCFC - 133	HCFC - 242
CFC - 115	HCFC - 141	HCFC - 243
CFC - 211	HCFC - 141b	HCFC - 244
CFC - 212	HCFC - 142	HCFC - 251
CFC - 213	HCFC - 142b	HCFC - 252
CFC - 214	HCFC - 151	HCFC - 253
CFC - 215	HCFC - 221	HCFC - 261
CFC - 216	HCFC - 222	HCFC - 262
CFC - 217	HCFC - 223	HCFC - 271
HCFC - 21	HCFC - 224	HBFC -123B2
HCFC - 22	HCFC - 225	Halon - 1211
HCFC - 31	HCFC - 225ca	Halon - 1301
HCFC - 121	HCFC - 225cb	Halon -2402
HCFC-122	HCFC - 226	

Methyl bromide	Tribromotetrafluoropropane
Methyl Chloroform	Dibromopentafluoropropane
Carbon tetrachloride	Bromohexafluoropropane
Bromodifluoromethane	Pentabromofluoropropane
Bromofluoromethane	Tetrabromodifluoropropane
Tetrabromofluoroethane	Tribromotrifluoropropane
Tribromodifluoroethane	Dibromotetrafluoropropane
Bromotetrafluoroethane	Bromopentafluoropropane
Tribromofluoroethane	Tetrabromofluoropropane
Dibromodifluoroethane	Tribromodifluoropropane
Bromotrifluoroethane	Dibromotrifluoropropane
Dibromofluoroethane	Bromotetrafluoropropane
Bromodifluoroethane	Tribromofluoropropane
Bromofluoroethane	Dibromodifluoropropane
Hexabromofluoropropane	Bromotrifluoropropane
Pentabromodifluoropropane	Dibromofluoropropane
Tetrabromofluoropropane	Bromodifluoropropane
	Bromofluoropropane

SUBSTITUTES FOR O.D.S. PHASE OUT :

Sub-sector	ODS being replaced	Preferred substitutes
Domestic refrigerators	Refrigerant CFC-12 HFC-134a Foam Blowing CFC-11	HFC-134a Isobutane Cyclopentane HCFC-141b
Refrigerated Cabinets	Refrigerant CFC-12	HFC-134a Blends of HC-290 and HC-600a
(Deep Freezer, Ice-cream cabinets, bottle coolers, visi coolers)	Foam Blowing CFC-11	HCFC-141b Cyclopentane
Water Coolers	CFC-12 HCFC-22 (for bigger capacity)	HFC-134a Blends of HC - 290 and HC-600a HCFC-22
Mobile (car, bus, van; Refrigerated trucks, train)	CFC-12 HCFC-22 (train)	HFC-134a HCFC-22 (trains only)
Central A.C. plants	CFC-11, CFC-12 HCFC-22 Ammonia	HFC-134a HCFC-123 HCFC - 22
Process chillers	CFC-12	HCFC-22, Ammonia
Ice Candy Machines	CFC-12	HCFC-22, HFC-134a
Walk-in Coolers	HCFC-22, CFC-12	HCFC-22 HFC-134a
Room A.C.	HCFC-22, CFC-12	HCFC-22
Packaged A.C.	HCFC-22	HCFC-22
Shipping	HCFC-22, CFC-12	HCFC-22, HFC-134a

'Be Ozone Friendly'