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APPENDIX A

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APPENDIX B

MAJOR ACRONYMS AND ABBREVIATIONS

A1	baseline (or most likely) halocarbon scenario of the 2006 Ozone Assessment
A1B	scenario of the IPCC Special Report on Emissions Scenarios (SRES)
A5	Article 5 countries of the Montreal Protocol
AAE	Absorption Angstrom Exponent
AASE	Airborne Arctic Stratospheric Expedition (NASA)
Ab	baseline halocarbon scenario of the 2002 Ozone Assessment
ACE-FTS	Atmospheric Chemistry Experiment Fourier Transform Spectrometer
AERONET	AERosol RObotic NETwork
AGAGE	Advanced Global Atmospheric Gases Experiment
AGWP	Absolute Global Warming Potential
AMA	average mean age
AMSU	Advanced Microwave Sounding Unit
AMTRAC	Atmospheric Model with TRansport and Chemistry (Table 3-1)
AO	Arctic Oscillation
AOGCM	atmosphere-ocean general circulation model
AOT	aerosol optical thickness
AR4	IPCC Fourth Assessment Report
ARCTAS	Arctic Research of the Composition of the Troposphere from Aircraft and Satellites
ARCPAC	Aerosol, Radiation, and Cloud Processes affecting Arctic Climate
ATLAS	Atmospheric Laboratory for Applications and Science
ATMOS	Atmospheric Trace Molecule Spectroscopy
AVE	Aura Validation Experiment
B1	a lower-emissions scenario of the IPCC Special Report on Emissions Scenarios (SRES)
B2	scenario of the IPCC Special Report on Emissions Scenarios (SRES)
BC	black carbon
BCE	Before the Common Era
BDC	Brewer-Dobson circulation
BL	boundary layer
BP	British Petroleum
BUV	Backscatter (or Backscattered) Ultraviolet (spectrometer)
C	Celsius (unit of temperature)
CADIC	Centro Austral de Investigaciones Cientificas (Argentina)
CALIOP	Cloud-Aerosol Lidar with Orthogonal Polarization
CALIPSO	Cloud-Aerosol Lidar and Infrared Pathfinder Satellite Observation
CAM	Community Atmosphere Model (Table 3-1)
CATO	Candidoz Assimilated Three-dimensional Ozone
CCM	chemistry-climate model
CCMVal	Chemistry-Climate Model (CCM) Validation Activity
CCSP	Climate Change Science Program (United States)
CCSR-NIES	Center for Climate-Systems Research – National Institute for Environmental Studies CCM (Table 3-1)
CDM	Clean Development Mechanism
CE	Common Era

CFC	chlorofluorocarbon
CHAMP	Challenging Minisatellite Payload
CIE	Commission Internationale de l'Éclairage (France)
CIRES	Cooperative Institute for Research in Environmental Sciences (United States)
cm	centimeters (unit of length)
CMAM	Canadian Middle Atmosphere Model (Table 3-1)
CMF	cloud modification factor
CMIP	Coupled Model Intercomparison Project
CNRM	Centre National de Recherches Météorologiques (France)
CNRM-ACM	CNRM ARPEGE-Climate model (Table 3-1)
CNRS	Centre National de la Recherche Scientifique (France)
CONICET	Consejo de Investigaciones Científicas y Técnicas (Argentina)
CO ₂ -eq	carbon dioxide equivalents
COS	carbonyl sulfide (also OCS)
CPT	cold point tropopause
CR-AVE	Costa Rica-Aura Validation Experiment
CSIRO	Commonwealth Scientific and Industrial Research Organisation (Australia)
CTM	chemistry and transport model
CUE	critical-use exemption
CUSUM	Cumulative Sum of Residuals
DFA	difluoroacetic acid
DIAL	differential absorption lidar
DJF	December-January-February
DLR	Deutschen Zentrum für Luft- und Raumfahrt (Germany)
DMS	dimethyl sulfide
DNA	deoxyribonucleic acid
DOAS	Differential Optical Absorption Spectroscopy
DU	Dobson unit
E39CA	a coupled chemistry-climate model of DLR (Table 3-1)
EC	European Commission
ECl	equivalent chlorine
ECMWF	European Centre for Medium-Range Weather Forecasts (United Kingdom)
EEAP	Environmental Effects Assessment Panel
EECl	equivalent effective chlorine
EESC	equivalent effective stratospheric chlorine
EMAC	ECHAM/MESSy Atmospheric Chemistry model of FUB (Table 3-1)
ENSO	El Niño-Southern Oscillation
Envisat	Environmental Satellite
EP	Eliassen-Palm
EPA	Environmental Protection Agency (United States)
ER-2	Earth Resources-2 (aircraft)
ERA	ECMWF Re-Analysis
ERA-40	ECMWF 40-year reanalysis
ERA1	ECMWF Interim Re-Analysis
ERS	European Remote Sensing Satellite
ESC	equivalent stratospheric chlorine
ESRL	Earth System Research Laboratory (NOAA)
EU	European Union
EUPLEX	European Polar Stratospheric Cloud and Lee Wave Experiment

fGHG	sensitivity simulation with fixed greenhouse gas levels (see Chapter 3 and Table 3-2)
fODS	sensitivity simulation with fixed ozone-depleting substance levels (see Chapter 3 and Table 3-2)
FT	free troposphere
FTIR	Fourier transform infrared
FUB	Freie Universität Berlin (Germany)
GCM	general circulation model
GEOS	Goddard Earth Observing System
GEOSCCM	Goddard Earth Observing System Chemistry-Climate Model (Table 3-1)
GFDL	Geophysical Fluid Dynamics Laboratory (NOAA)
Gg	Gigagrams (10^9 grams) (unit of mass)
GHG	greenhouse gas
GHG-x	a greenhouse gas sensitivity simulation (see Chapter 3 and Table 3-2)
GISS	Goddard Institute for Space Studies (NASA)
GJ	gigajoule (10^9 joules) (unit of energy)
GMD	Global Monitoring Division (NOAA/ESRL)
GOME	Global Ozone Monitoring Experiment
GREET	Greenhouse Gases, Regulated Emissions, and Energy Use in Transportation (model)
GSFC	Goddard Space Flight Center (NASA)
Gt	gigatonnes
GtCO ₂ -eq	gigatonnes of carbon dioxide equivalents
GWP	Global Warming Potential
HadAT	Hadley Centre radiosonde temperature product
HALOE	Halogen Occultation Experiment
HAMMONIA	HAMBURG Model of the Neutral and Ionized Atmosphere
HC	hydrocarbon
HCFC	hydrochlorofluorocarbon
HFC	hydrofluorocarbon
HFE	hydrofluorinated ether or hydrofluoroether
HFO	hydrofluoro-olefin
hPa	hectoPascal (10^2 Pascal) (unit of pressure)
IGRA	Integrated Global Radiosonde Archive (NOAA)
INGEBI	Instituto de Investigaciones en Ingeniería Genética y Biología Molecular (Argentina)
IPA	Institut für Physik der Atmosphäre (DLR) (Germany)
IPCC	Intergovernmental Panel on Climate Change
IPSL	Institut Pierre-Simon Laplace (France)
IR	infrared
IUK	Iterative Universal Kriging
IUP	Institute of Environmental Physics, University of Bremen (Germany)
IUPAC	International Union of Pure and Applied Chemistry
J	joule (unit of energy)
JCET	Joint Center for Earth Systems Technology (United States)
JJA	June-July-August
JMA	Japan Meteorological Agency (Japan)
JPL	Jet Propulsion Laboratory (NASA)
JRA25	Japanese 25-year Reanalysis Project

K	Kelvin (unit of temperature)
kcal	kilocalories (10^3 calories) (unit of energy)
kg	kilogram (10^3 grams) (unit of mass)
km	kilometer (10^3 meters) (unit of length)
Kt	kilotons (10^3 tons) (unit of mass)
LLGHG	long-lived greenhouse gases
LMDZrepro	general circulation model of the Laboratory of Dynamic Meteorology (IPSL) (Table 3-1)
LMS	lowermost stratosphere
LS	lower stratosphere
LZRH	level of zero clear-sky radiative heating
m	meter (unit of length)
MAC	mobile air conditioning
MAM	March-April-May
MATCH	Model for Atmospheric Transport and Chemistry
MBL	marine boundary layer
MetOp	Meteorological Operational satellite
MFA	monofluoroacetic acid
MFRSR	Multi-Filter Rotating Shadowband Radiometer
mg	milligram (10^{-3} grams) (unit of mass)
MILAGRO	Megacity Initiative: Local and Global Research Observations
MIPAS	Michelson Interferometer for Passive Atmospheric Sounding
MIT	Massachusetts Institute of Technology
MLD	mixed layer depth
MJ	megajoule (10^6 joules) (unit of energy)
MLR	multiple linear regression
MLS	Microwave Limb Sounder
mm	millimeters (10^{-3} meters) (unit of length)
μm	micrometer; micron (10^{-6} meters) (unit of length)
MMBtu	million British thermal units (1MMBtu = 1.055 gigajoules)
MOD	merged ozone data set
MODIS	Moderate Resolution Imaging Spectroradiometer
mol	mole (unit, amount of substance)
molec	molecule
MOZAIC	Measurement of Ozone and Water Vapor by Airbus In-Service Aircraft
MOZART	Model for Ozone and Related Chemical Tracers
MRI	Meteorological Research Institute chemistry-climate model (Japan) (Table 3-1)
MSG	Meteosat Second Generation
MSU	Microwave Sounding Unit
MtCFC-11-eq	megatonnes of CFC-11 equivalents
Mt	megatonne
mW	milliWatt (10^{-3} Watts)
NAM	Northern Annular Mode
NAO	North Atlantic Oscillation
NASA	National Aeronautics and Space Administration (United States)
NAT	nitric acid trihydrate
NCAR	National Center for Atmospheric Research (United States)
NCEP	National Centers for Environmental Prediction (United States)
ng	nanogram (10^{-9} grams) (unit of mass)

NH	Northern Hemisphere
NIES	National Institute for Environmental Studies (Japan)
NIWA	National Institute of Water and Atmospheric Research (New Zealand)
nm	nanometers (10^{-9} meters) (unit of length)
NOAA	National Oceanic and Atmospheric Administration (United States)
NPLS	nonparametric least-squares fit
1-D	one-dimensional
OCS	carbonyl sulfide (also COS)
ODP	Ozone Depletion Potential
ODS	ozone-depleting substance
OMI	Ozone Monitoring Instrument
OSIRIS	Optical Spectrograph and InfraRed Imager System
PBL	planetary boundary layer
PEM	Pacific Exploratory Mission
PFC	perfluorocarbon
Pg	petagram (10^{15} grams) (unit of mass)
PG	product gas
PGI	product gas injection
PhotoComp	photolysis intercomparison
POAM	Polar Ozone and Aerosol Measurement
POCP	Photochemical Ozone Creation Potential
ppb	part per billion
ppbv	part per billion by volume
ppm	part per million
ppmv	part per million by volume
ppt	part per trillion
pptv	part per trillion by volume
PSC	polar stratospheric cloud
PSS	photochemical steady state
PTFE	polytetrafluoroethylene
PWLT	piecewise linear trend
QBO	quasi-biennial oscillation
QPS	quarantine and pre-shipment
RAF	radiation amplification factor
RAOB	RAwinsonde OBServation
RAOBCORE	Radiosonde Observation Correction using Reanalyses
RATPAC	Radiosonde Atmospheric Temperature Products for Assessing Climate
RCP	Representative Concentration Pathway
RECON	a near-surface temperature reconstruction
REF-B2	reference “future” simulation of SPARC CCMVal-2 (see Table 3-2)
RF	radiative forcing
RICH	Radiosonde Innovation Composite Homogenization
RO	radio occultation
RSS	Remote Sensing Systems Inc.

s	second
SAD	surface area density
SAGE	Stratospheric Aerosol and Gas Experiment
SAM	Southern Annular Mode
SAM II	Stratospheric Aerosol Measurement II
SAOZ	Système d'Analyse par Observation Zénithale
SAP	Scientific Assessment Panel
SBUV/SBUV2	Solar Backscatter (or Backscattered) Ultraviolet (spectrometer)
SCIAMACHY	Scanning Imaging Absorption Spectrometer for Atmospheric Chartography
SCISAT	a Canadian satellite also known as Atmospheric Chemistry Experiment (ACE)
SE	southeast
SG	source gas
SGI	source gas injection
SH	Southern Hemisphere
SIC	sea ice concentration
SLIMCAT	Single-Layer Isentropic Model of Chemistry and Transport
SOCOL	modeling tool for studies of Solar-Climate-Ozone Links (Table 3-1)
SOGE	System for Observation of Halogenated Greenhouse Gases in Europe
SOLVE	SAGEIII (Stratospheric Aerosol and Gas Experiment III) Ozone Loss and Validation Experiment (NASA)
SON	September-October-November
SPARC	Stratospheric Processes and Their Role in Climate (WCRP)
sr	steradian (unit of solid angle)
SRES	Special Report on Emissions Scenarios (IPCC)
SRM	solid rocket motor
SSA	stratospheric sulfate aerosol
SSA	single scattering albedo
SST	sea surface temperature
SSU	Stratospheric Sounding Unit
SSW	sudden stratospheric warming
STAR	System for Transfer of Atmospheric Radiation
STE	stratosphere-troposphere exchange
STS	supercooled ternary solution
SZA	solar zenith angle
2-D	two-dimensional
3-D	three-dimensional
TC4	Tropical Composition, Cloud and Climate Coupling mission
TCO	tropospheric column ozone
TEAP	Technology and Economic Assessment Panel (UNEP)
TFA	trifluoroacetic acid
Tg	teragrams (10^{12} grams) (unit of mass; equivalent to megatonne)
THESEO	Third European Stratospheric Experiment on Ozone
T-M	tropical-midlatitude
TOMCAT	Toulouse Off-line Model of Chemistry and Transport
TOMS	Total Ozone Mapping Spectrometer
TSAM	time series additive model
TST	troposphere-to-stratosphere transport
TTL	tropical tropopause layer
TUV	Tropospheric Ultraviolet-Visible model

UAH	University of Alabama–Huntsville
UARS	Upper Atmosphere Research Satellite
UBA	Umweltbundesamt (Germany Federal Environment Agency)
UCI	University of California, Irvine
UDMH	unsymmetrical dimethylhydrazine
UEA	University of East Anglia (United Kingdom)
UIUC	University of Illinois at Urbana-Champaign
UK	United Kingdom
UKCA	U.K. Chemistry and Aerosols chemistry-climate model (Table 3-1)
ULAQ	University of L'Aquila chemistry-climate model (Italy) (Table 3-1)
UMSLIMCAT	Unified Model Single-Layer Isentropic Model of Chemistry and Transport CCM (Table 3-1)
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
UPMC	Université Pierre et Marie Curie (France)
US, USA	United States of America
USDA	United States Department of Agriculture
UT	upper troposphere
UTLS	upper troposphere/lower stratosphere
UV	ultraviolet
UV-A	ultraviolet-A (315–400 nm)
UV-B	ultraviolet-B (280–315 nm)
UVSQ	Université Versailles Saint-Quentin (France)
VSL	very short-lived
VSLs	very short-lived substance
W	Watt (unit of energy)
WACCM	Whole-Atmosphere Community Climate Model (Table 3-1)
WCRP	World Climate Research Programme
WFDOAS	Weighting Function Differential Optical Absorption Spectroscopy
WMO	World Meteorological Organization

APPENDIX C

MAJOR CHEMICAL FORMULAE AND NOMENCLATURE FROM THIS ASSESSMENT

HALOGEN-CONTAINING SPECIES

Cl	atomic chlorine	Br	atomic bromine
Cl _y	total inorganic chlorine	Br _y	total inorganic bromine
CCl _y	organic chlorine	CBr _y	organic bromine
Cl ₂	molecular chlorine	Br ₂	molecular bromine
ClO	chlorine monoxide	BrO	bromine monoxide
Cl ₂ O	dichlorine monoxide	Br ₂ O	dibromine monoxide
ClO _x	chlorine radicals ([ClO] + 2×[ClOOCl])	BrO _x	bromine radicals
OCIO	chlorine dioxide		
ClOO	chloroperoxy radical		
Cl ₂ O ₂ , ClOOCl	dichlorine peroxide (ClO dimer)		
ClONO ₂ , ClNO ₃	chlorine nitrate	BrONO ₂ , BrNO ₃	bromine nitrate
HCl	hydrogen chloride (hydrochloric acid)	HBr	hydrogen bromide
HOCl	hypochlorous acid	HOBr	hypobromous acid
F	atomic fluorine	I	atomic iodine
F ₂	molecular fluorine	I ₂	molecular iodine
F _y	total inorganic fluorine	I _y	total inorganic iodine
HF	hydrogen fluoride (hydrofluoric acid)	IO	iodine monoxide
		IO _x	iodine radicals
		OIO	iodine dioxide
		HOI	hypoiodous acid
SF ₆	sulfur hexafluoride		
SO ₂ F ₂	sulfuryl fluoride		
NF ₃	nitrogen trifluoride		
PBr ₃	phosphorus tribromide		

HALOCARBONS**CHLOROFLUOROCARBONS (CFCs)**

CFC-11	CCl_3F
CFC-12	CCl_2F_2
CFC-13	CClF_3
CFC-113	$\text{CCl}_2\text{FCClF}_2$
CFC-113a	CCl_3CF_3
CFC-114	$\text{CClF}_2\text{CClF}_2$
CFC-114a	CCl_2FCF_3
CFC-115	CClF_2CF_3

HALONS

halon-1202	CBr_2F_2
halon-1211	CBrClF_2
halon-1301	CBrF_3
halon-2402	$\text{CBrF}_2\text{CBrF}_2$
halon-2311	CHBrClCF_3
(Halothane)	

HYDROFLUOROCARBONS (HFCs)

HFC-23	CHF_3
HFC-32	CH_2F_2
HFC-41	CH_3F
HFC-125	CHF_2CF_3
HFC-134	CHF_2CHF_2
HFC-134a	CH_2FCF_3
HFC-143	CH_2FCHF_2
HFC-143a	CH_3CF_3
HFC-152	$\text{CH}_2\text{FCH}_2\text{F}$
HFC-152a	CH_3CHF_2
HFC-161	$\text{CH}_3\text{CH}_2\text{F}$
HFC-227ea	$\text{CF}_3\text{CHF}_2\text{CF}_3$
HFC-236cb	$\text{CH}_2\text{FCF}_2\text{CF}_3$
HFC-236ea	$\text{CHF}_2\text{CHF}_2\text{CF}_3$
HFC-236fa	$\text{CF}_3\text{CH}_2\text{CF}_3$

CHLOROCARBONS

CH_3Cl	methyl chloride, chloromethane
CH_2Cl_2	methylene chloride, dichloromethane
CHCl_3	chloroform, trichloromethane
CCl_4	carbon tetrachloride
CHClCCl_2	trichloroethylene, trichloroethene
CCl_2CCl_2	tetrachloroethene, perchloroethene
$\text{CH}_3\text{CH}_2\text{Cl}$, $\text{C}_2\text{H}_5\text{Cl}$	ethyl chloride, chloroethane
$\text{CH}_2\text{ClCH}_2\text{Cl}$	1,2 dichloroethane
CH_3CCl_3	methyl chloroform
$\text{CH}_3\text{CHClCH}_3$	isopropylchloride, 2-chloropropane
$\text{CH}_3\text{CH}_2\text{CH}_2\text{Cl}$	n-propyl chloride, 1-chloropropane
COCl_2 , $\text{Cl}_2\text{C(O)}$	phosgene, carbonyl chloride

HYDROCHLOROFLUOROCARBONS (HCFCs)

HCFC-21	CHCl_2F
HCFC-22	CHClF_2
HCFC-31	CH_2ClF
HCFC-123	CHCl_2CF_3
HCFC-123a	$\text{CHClFCF}_2\text{Cl}$
HCFC-123b	$\text{CHF}_2\text{CCl}_2\text{F}$
HCFC-124	CHClFCF_3
HCFC-124a	$\text{CHF}_2\text{CClF}_2$
HCFC-133a	CH_2ClCF_3
HCFC-141b	$\text{CH}_3\text{CCl}_2\text{F}$
HCFC-142b	CH_3CClF_2
HCFC-225ca	$\text{CHCl}_2\text{CF}_2\text{CF}_3$
HCFC-225cb	$\text{CHClFCF}_2\text{CClF}_2$
HCFC-234fb	$\text{CF}_3\text{CH}_2\text{CCl}_2\text{F}$
HCFC-243cc	$\text{CH}_3\text{CF}_2\text{CCl}_2\text{F}$

HFC-245cb	$\text{CH}_3\text{CF}_2\text{CF}_3$
HFC-245ca	$\text{CH}_2\text{FCF}_2\text{CHF}_2$
HFC-245ea	$\text{CHF}_2\text{CHFCHF}_2$
HFC-245eb	$\text{CH}_2\text{FCHFCF}_3$
HFC-245fa	$\text{CHF}_2\text{CH}_2\text{CF}_3$
HFC-263fb	$\text{CH}_3\text{CH}_2\text{CF}_3$
HFC-272ca	$\text{CH}_3\text{CF}_2\text{CH}_3$
HFC-281ea	$\text{CH}_3\text{CHFCH}_3$
HFC-365mfc	$\text{CH}_3\text{CF}_2\text{CH}_2\text{CF}_3$
HFC-356mcf	$\text{CH}_2\text{FCH}_2\text{CF}_2\text{CF}_3$
HFC-356mff	$\text{CF}_3\text{CH}_2\text{CH}_2\text{CF}_3$
HFC-338pcc	$\text{CHF}_2\text{CF}_2\text{CF}_2\text{CHF}_2$
HFC-43-10mee	$\text{CF}_3\text{CHFCHFCF}_2\text{CF}_3$
HFC-458mfcf	$\text{CF}_3\text{CH}_2\text{CF}_2\text{CH}_2\text{CF}_3$
HFC-55-10mcff	$\text{CF}_3\text{CF}_2\text{CH}_2\text{CH}_2\text{CF}_2\text{CF}_3$

BROMOCARBONS

CH_3Br	methyl bromide, bromomethane
CH_2Br_2	methylene bromide, dibromomethane
CHBr_3	bromoform, tribromomethane
$\text{CH}_3\text{CH}_2\text{Br}$, $\text{C}_2\text{H}_5\text{Br}$	ethyl bromide, bromoethane
$\text{CH}_2\text{BrCH}_2\text{Br}$	1,2 dibromoethane
$\text{CH}_3\text{CH}_2\text{CH}_2\text{Br}$, $\text{n-C}_3\text{H}_7\text{Br}$	n-propyl bromide, n-PB, 1-bromopropane
COBr_2	carbonyl bromide

IODOCARBONS

CH ₃ I	methyl iodide, iodomethane
CH ₂ I ₂	diiodomethane
CH ₃ CH ₂ I, C ₂ H ₅ I	ethyl iodide, iodoethane
CH ₃ CHICH ₃	isopropyl iodide, 2-iodopropane
CH ₃ CH ₂ CH ₂ I, n-C ₃ H ₇ I	n-propyl iodide, 1-iodopropane

OTHERS

CHBr ₂ Cl	dibromochloromethane
CH ₂ BrCl	bromochloromethane
CHBrCl ₂	bromodichloromethane
CH ₂ BrI	bromoiodomethane
CHBrF ₂	bromodifluoromethane
CH ₂ ClI	chloroiodomethane
CF ₃ I	trifluoroiodomethane
CF ₃ CF ₂ CF ₂ I	1-iodo-heptafluoropropane
COClF	chlorofluorocarbonyl
SF ₅ CF ₃	trifluoromethylsulfurpentafluoride

FLUOROCARBONS

CF ₄ (PFC-14)	perfluoromethane, carbon tetrafluoride
C ₂ F ₆ , CF ₃ CF ₃ (PFC-116)	perfluoroethane
C ₃ F ₈ , CF ₃ CF ₂ CF ₃ (PFC-218)	perfluoropropane
c-C ₃ F ₆ (PFC-C216)	perfluorocyclopropane
C ₄ F ₁₀ (PFC-31-10)	perfluorobutane
c-C ₄ F ₈ (PFC-C318)	perfluorocyclobutane
C ₅ F ₁₂ (PFC-41-12)	perfluoropentane
C ₆ F ₁₄ (PFC-51-14)	perfluorohexane
C ₇ H ₁₆ (PFC-61-16)	perfluoroheptane
C ₁₀ F ₁₈	perfluorodecalin
COF ₂	carbonyl fluoride
CH ₂ FC(O)OH	monofluoroacetic acid (MFA)
CHF ₂ C(O)OH	difluoroacetic acid (DFA)
CF ₃ C(O)OH	trifluoroacetic acid (TFA)

OTHER CHEMICAL SPECIES

O	atomic oxygen	H	atomic hydrogen
O(³ P)	atomic oxygen (ground state)	H ₂	molecular hydrogen
O(¹ D)	atomic oxygen (first excited state)	OH	hydroxyl radical
O ₂	molecular oxygen	HO ₂	hydroperoxyl radical
O ₃	ozone	H ₂ O	water
O _x	odd oxygen (O, O(¹ D), O ₃) or oxidant (O ₃ + NO ₂)	HO _x	odd hydrogen (H, OH, HO ₂ , H ₂ O ₂)
N	atomic nitrogen	HNO ₂ , HONO	nitrous acid
N ₂	molecular nitrogen	HOONO	pernitrous acid
N ₂ O	nitrous oxide	HNO ₃	nitric acid
NO	nitric oxide	NH ₃	ammonia
NO ₂	nitrogen dioxide	NH ₄ NO ₃	ammonium nitrate
NO ₃	nitrogen trioxide, nitrate radical		
N ₂ O ₅	dinitrogen pentoxide		
NO _x	nitrogen oxides (NO + NO ₂)		
NO _y	total reactive nitrogen (usually includes NO, NO ₂ , NO ₃ , N ₂ O ₅ , ClONO ₂ , HNO ₄ , HNO ₃)		
S	atomic sulfur	H ₂ S	hydrogen sulfide
SO ₂	sulfur dioxide	CS ₂	carbon disulfide
H ₂ SO ₄	sulfuric acid	COS, OCS	carbonyl sulfide
CH ₃ SCH ₃	DMS, dimethyl sulfide		
C	carbon atom	CO ₂	carbon dioxide
CO	carbon monoxide		
CH ₄	methane	CH ₃ OH	methyl alcohol, methanol
CH ₃ CH ₃	ethane		
CH ₃ CH ₂ CH ₃	propane		