Equations and Stuff



















(where H is the ‘scale height’)

 or  (integrated over wavelength range)

Derived Values





 = 6.6 x 10-8 m

Useful Bits

STP = 273K, 101,300 Pa (OoC, 1.00 atm)

Planck’s constant; h=6.626 x 10-34 J s

Speed of light in vac; c = 3.00 x 108 m/s

Acceleration due to gravity; g = 9.8 m/s2

Universal gas constant; R = 0.08206 L atm mol-1 K-1 = 8.314 J mol-1 K-1

Stephen Boltzmann constant;  = 5.67 x 10-8 W m-2 K-4

Earth’s Albedo; A = 0.33

Earth’s scale height; H ~ 6.5 km

Solar irradiance on Earth; I = 1.4 x 103 J m-2 s-1

Dimensional analysis

Pa = N m-2 N = kg m s-2 J = N m = kg m2 s-2 W = J s-1 = kg m2 s-3

Terminology

Source, Sink

Reservoir/Compartment

Transformation

Thermodynamics

Kinetics

Residence Time/Lifetime

Primary Pollutant

Secondary Pollutant

Box Model

Troposphere, Stratosphere, Mesosphere, Thermosphere

Radical

Covalent oxide

Mixing ratio

Number density

Dobson unit

Rate constant

Pseudo rate constant

Order of reaction

Differential/integrated rate laws

Mechanism

Elementary reaction

Half-life

Troposphere

Stratosphere

Mesosphere

Thermosphere

Tropopause

Stratopause

Mean free path

Scale height

Lapse rate

Convective mixing

Temperature inversion

Dry/wet deposition

Blackbody radiation

Electromagnetic spectrum (UV/Vis/IR)

Radiative balance

Albedo

‘Greenhouse’ effect

Radiative window

Solar irradiance spectrum

Photochemistry

Ground/excited states

Singlet/triplet states

Fluorescence/phosphorescence

Non-radiative decay

Inter-system crossing

Quantum yield

Absorption cross section

Photon flux

Reactive gas

Boundary layer

Intra-hemispheric mixing

Inter-hemispheric mixing

Global distillation

‘Grass hopper’ effect

Persistent organic pollutant

Semi-volatile organic compound

Cyrosphere

Multi-box model

Singlet atomic/molecular oxygen

Triplet atomic/molecular oxygen

Chapman reactions

Catalytic O3 destruction cycles

Reaction intermediates

‘odd oxygen’

Polar stratospheric clouds

Reservoir species

Chloroflorocarbons (CFCs)

Ozone hole

Hydroxyl radicals

Hydroxyl radical formation reactions

Ground level ozone formation reactions

Nitrogen dioxide formation reactions

Volatile organic compounds

Peroxyacetylnitrate (PAN)

Fine particulates

Smog

Photochemical smog

Steady-state approximation

Secondary organic aerosols

Pseudo first order rate constant

Hydrogen abstraction

Oxygen addition

Photolysis of ketones/aldehydes

Hydroxyl addition to alkenes

Hydroxyl substitution on aromatics (eg PAHs)

Methane oxidation reactions