

	ATMOSPHERE		OCEANS		ATMOSP. + OCEANS (Total)	
	Earth surface: $5.1 \times 10^{14} \text{ m}^2$		Ocean surface: $3.6 \times 10^{14} \text{ m}^2$			
	Continent surface: $1.5 \times 10^{14} \text{ m}^2$		Ocean volume: $1.37 \times 10^{18} \text{ m}^3$			
			Av. Ocean depth: $3.8 \times 10^3 \text{ m}$			
	O ₂	CO ₂ -C (1965)	O ₂	CO ₂ -C	O ₂	CO ₂ -C
Total mass in mol	3.75×10^{19}	5.3×10^{16}	3.1×10^{17}	2.9×10^{18}	3.781×10^{19}	2.953×10^{18}
Total mass in g	1.2×10^{21}	6.4×10^{17}	9.8×10^{18}	3.5×10^{19}	1.21×10^{21}	3.564×10^{19}
mol/m ²	7.35×10^4	1.04×10^2	8.6×10^2	8.1×10^3		
g/m ²	2.3×10^6	1.25×10^3	2.8×10^4	9.7×10^4		
mol/m ³ (at 1 atm.)	9.35	1.34×10^{-2}	2.3×10^{-1}	2.1		
g/m ³ (at 1 atm.)	299	0.161	7.4	25.0		
Atmosphere: total mol O ₂ /total mol CO ₂			= 700			
Oceans: total mol O ₂ /total mol CO ₂			= 0.10 = 1/10			
Total mol O ₂ atm./total mol O ₂ oceans			= 120			
Total mol CO ₂ atm./total mol CO ₂ oceans			= 1.8×10^{-2} or 1/55			
Average terrestrial prim. prod.: 12 mol Org.-C/m ² /yr			= 12 mol O ₂ /m ² /yr			
Total terrestrial prim. prod.: 1.836×10^{15} mol Org.-C/yr			= 1.836×10^{15} mol O ₂ /yr			
Average oceanic prim. prod.: 6 mol Org.-C/m ² /yr			= 6 or 6.9 mol O ₂ /m ² /yr (*)			
Total oceanic prim. prod.: 2.16×10^{15} mol Org.-C/yr			= 2.16×10^{15} or 2.48×10^{15} mol O ₂ /yr (*)			
Total earth prim. prod.: $(4.0-4.3) \times 10^{15}$ mol Org.-C/yr			= $(4.0-4.3) \times 10^{15}$ mol O ₂ /yr			
This leads to a mean turnover time for (atmospheric plus oceanic) oxygen of 8800-9450 yr (compare 2000 yr: Hall and Rao, 1987; 6000 yr: Holland, 1978),			and a mean turnover time for (atmospheric and oceanic) carbon dioxide of 690-740 yr.			

Table 2

O₂ and CO₂ data for atmosphere and oceans. For the latter, only the mean data are given. O₂ data: from this paper, Broecker (1970) and Budyko et al. (1987); CO₂: using the tables of Buch et al. (1932) and from Bolin et al. (1979). Productivity data from Broecker (1970) and some from Berger et al. (1989) (*). Earth data from Bowden (1965).