

Table 1.1 Composition of the atmosphere.

CONSTITUENT	CHEMICAL FORMULA	MOLECULAR WEIGHT (¹² C=12)	FRACTION BY VOLUME IN DRY AIR	TOTAL MASS (gm)
Total atmosphere		28.97		5.136 x 10 ²¹
Dry air		28.964	100.0 %	5.119 x 10 ²¹
Nitrogen	N ₂	28.013	78.08 %	3.87 x 10 ²¹
Oxygen	O ₂	31.999	20.95 %	1.185 x 10 ²¹
Argon	Ar	39.948	0.934 %	6.59 x 10 ¹⁹
Water vapor	H ₂ O	18.015	variable	1.7 x 10 ¹⁹
Carbon dioxide	CO ₂	44.01	353 ppmv*	~2.76 x 10 ¹⁸
Neon	Ne	20.183	18.18 ppmv	6.48 x 10 ¹⁶
Krypton	Kr	83.80	1.14 ppmv	1.69 x 10 ¹⁶
Helium	He	4.003	5.24 ppmv	3.71 x 10 ¹⁵
Methane	CH ₄	16.043	1.72 ppmv*	~4.9 x 10 ¹⁵
Xenon	Xe	131.30	87 ppbv	2.02 x 10 ¹⁵
Ozone	O ₃	47.998	variable	~3.3 x 10 ¹⁵
Nitrous oxide	N ₂ O	44.013	310 ppbv*	~2.3 x 10 ¹⁵
Carbon monoxide	CO	28.01	120 ppbv	~5.9 x 10 ¹⁴
Hydrogen	H ₂	2.016	500 ppbv	~1.8 x 10 ¹⁴
Ammonia	NH ₃	17.03	100 ppbv	~3.0 x 10 ¹³
Nitrogen dioxide	NO ₂	46.00	1 ppbv	~8.1 x 10 ¹²
Sulfur dioxide	SO ₂	64.06	200 pptv	~2.3 x 10 ¹²
Hydrogen sulfide	H ₂ S	34.08	200 pptv	~1.2 x 10 ¹²
CFC-12	CCl ₂ F ₂	120.91	480 pptv*	~1.0 x 10 ¹³
CFC-11	CCl ₃ F	137.37	280 pptv*	~6.8 x 10 ¹²

(Data excerpted with the permission of the Macmillan Company from *Evolution of the Atmosphere* by J. C. G. Walker, © 1977 by Macmillan Publishing Company; Verniani, 1966 © American Geophysical Union; and Williamson, 1973.) * Values of trace constituents valid in 1990 (ppmv=10⁻⁶, ppbv= 10⁻⁹, pptv=10⁻¹²).

Table 1.2 Water on Earth.

Water Reservoir	Depth if spread over the entire surface of Earth	Percent of Total
Oceans	2650 m	97%
Icecaps and glaciers	60 m	2.2%
Groundwater*	20 m	0.7%
Lakes and streams*	0.35 m	0.013%
Soil moisture*	0.12 m	0.013%
Atmosphere	0.025 m	0.0009%
Total	2730 m	100%

(Data are a composite of various sources: Nace, 1964, used with permission from the American Museum of Natural History; Baumgartner and Reichel, 1975; and Korzun et al., 1978.) * Numbers uncertain.

Table 1.3 Concentrations of the major components of sea water with a salinity of 35‰.

COMPONENT	GRAMS PER KILOGRAM
Chloride	19.353
Sodium	10.76
Sulfate	2.712
Magnesium	1.294
Calcium	0.413
Potassium	0.387
Bicarbonate	0.142
Bromide	0.067
Strontium	0.008
Boron	0.004
Fluoride	0.001

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Table 1.4 Estimated global inventory of land and sea ice.

		Area (km ²)	Volume (km ³)	Percent of total ice mass	
Land ice	Antarctic ice sheet	13.9 x 10 ⁶	30.1 x 10 ⁶	89.3	
	Greenland ice sheet	1.7 x 10 ⁶	2.6 x 10 ⁶	8.6	
	Mountain glaciers	0.5 x 10 ⁶	0.3 x 10 ⁶	0.76	
	Permafrost	continuous	8 x 10 ⁶	(ice content)	0.95
		discontinuous	17 x 10 ⁶	0.2-0.5 x 10 ⁶	
	Seasonal snow (avg. max)	Eurasia	30 x 10 ⁶	2-3 x 10 ³	
		America	17 x 10 ⁶		
Sea ice	Southern Ocean	max	18 x 10 ⁶	2 x 10 ⁴	
		min	3 x 10 ⁶	6 x 10 ³	
	Arctic Ocean	max	15 x 10 ⁶	4 x 10 ⁴	
		min	8 x 10 ⁶	2 x 10 ⁴	

Not included in this table is the volume of water in the ground that annually freezes and thaws at the surface of permafrost ('active layer'), and in regions without permafrost but with subfreezing winter temperatures. (After Untersteiner, 1984. Printed with permission from Cambridge University Press.)