

Supplementary Information to
Chemical space: limits, evolution and modelling of an object bigger than our universal library
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Table S1. Chemical diversity of the universe. Data retrieved from the Supplementary Information from Melvin M. Vopson, "Estimation of the information contained in the visible matter of the universe", AIP Advances 11, 105317 (2021) <https://doi.org/10.1063/5.0064475> and from p. 4 in N. Greenwood and A. Earnshaw, Chemistry of the Elements, Elsevier Science, 2012.

Element	Weight abundance (%)	Molar mass (g/mol)	Weight in the universe	Atoms in the universe
Hydrogen	75	1.008	1.0875E+053	6.4948E+76
Helium	23	4.0026	3.335E+052	5.0159E+75
Oxygen	1	15.9999	1.45E+051	5.4557E+73
Carbon	0.5	12.011	7.25E+050	3.6338E+73
Neon	0.13	20.1797	1.885E+050	5.6233E+72
Iron	0.11	55.845	1.595E+050	1.7194E+72
Nitrogen	0.1	14.007	1.45E+050	6.2319E+72
Silicon	0.07	28.085	1.015E+050	2.1756E+72
Magnesium	0.059	24.305	8.555E+049	2.1190E+72
Sulphur	0.05	32.06	7.25E+049	1.3614E+72
Argon	0.02	39.948	2.9E+049	4.3702E+71
Calcium	0.007	40.078	1.015E+049	1.5246E+71
Nickel	0.006	58.6934	8.7E+048	8.9233E+70
Aluminium	0.005	26.9815	7.25E+048	1.6176E+71
Sodium	0.002	22.9897	2.9E+048	7.5938E+70
Chromium	0.0015	51.9961	2.175E+048	2.5182E+70
Manganese	0.0008	54.938	1.16E+048	1.2711E+70
Phosphorus	0.0007	30.9738	1.015E+048	1.9727E+70
Cobalt	0.0003	58.9331	4.35E+047	4.4435E+69
Titanium	0.0003	47.867	4.35E+047	5.4708E+69
Potassium	0.0003	39.0983	4.35E+047	6.6977E+69
Vanadium	0.0001	50.9415	1.45E+047	1.7135E+69
Chlorine	0.0001	35.45	1.45E+047	2.4623E+69
Fluorine	4E-05	18.9984	5.8E+046	1.8378E+69
Zinc	3E-05	65.38	4.35E+046	4.0054E+68
Germanium	2E-05	72.63	2.9E+046	2.4037E+68
Copper	6E-06	63.546	8.7E+045	8.2419E+67
Zirconium	5E-06	91.224	7.25E+045	4.7844E+67
Strontium	4E-06	87.62	5.8E+045	3.9849E+67
Krypton	4E-06	83.798	5.8E+045	4.1667E+67
Selenium	3E-06	78.971	4.35E+045	3.3160E+67
Scandium	3E-06	44.9559	4.35E+045	5.8250E+67
Lead	1E-06	207.2	1.45E+045	4.2128E+66
Neodymium	1E-06	144.242	1.45E+045	6.0516E+66
Cerium	1E-06	140.116	1.45E+045	6.2298E+66
Barium	1E-06	137.327	1.45E+045	6.3564E+66
Xenon	1E-06	131.293	1.45E+045	6.6485E+66

Rubidium	1E-06	85.4678	1.45E+045	1.0213E+67
Gallium	1E-06	69.723	1.45E+045	1.2520E+67
Tellurium	9E-07	127.6	1.305E+045	6.1568E+66
Arsenic	8E-07	74.9216	1.16E+045	9.3207E+66
Yttrium	7E-07	88.9058	1.015E+045	6.8728E+66
Bromine	7E-07	79.904	1.015E+045	7.6471E+66
Lithium	6E-07	6.94	8.7E+044	7.5467E+67
Platinum	5E-07	195.084	7.25E+044	2.2372E+66
Samarium	5E-07	150.36	7.25E+044	2.9027E+66
Molybdenum	5E-07	95.95	7.25E+044	4.5487E+66
Tin	4E-07	118.71	5.8E+044	2.9413E+66
Ruthenium	4E-07	101.07	5.8E+044	3.4546E+66
Osmium	3E-07	190.23	4.35E+044	1.3766E+66
Iridium	2E-07	192.217	2.9E+044	9.0824E+65
Ytterbium	2E-07	173.045	2.9E+044	1.0089E+66
Erbium	2E-07	167.259	2.9E+044	1.0438E+66
Dysprosium	2E-07	162.5	2.9E+044	1.0743E+66
Gadolinium	2E-07	157.25	2.9E+044	1.1102E+66
Praseodymium	2E-07	140.9077	2.9E+044	1.2390E+66
Lanthanum	2E-07	138.9055	2.9E+044	1.2568E+66
Cadmium	2E-07	112.414	2.9E+044	1.5530E+66
Palladium	2E-07	106.42	2.9E+044	1.6405E+66
Niobium	2E-07	92.9064	2.9E+044	1.8791E+66
Mercury	1E-07	200.592	1.45E+044	4.3516E+65
Iodine	1E-07	126.9045	1.45E+044	6.8784E+65
Boron	1E-07	10.81	1.45E+044	8.0749E+66
Beryllium	1E-07	9.0122	1.45E+044	9.6858E+66
Caesium	8E-08	132.9055	1.16E+044	5.2543E+65
Bismuth	7E-08	208.9804	1.015E+044	2.9239E+65
Hafnium	7E-08	178.49	1.015E+044	3.4233E+65
Gold	6E-08	196.9666	8.7E+043	2.6590E+65
Silver	6E-08	107.8682	8.7E+043	4.8554E+65
Rhodium	6E-08	102.9055	8.7E+043	5.0895E+65
Thallium	5E-08	204.38	7.25E+043	2.1355E+65
Tungsten	5E-08	183.84	7.25E+043	2.3741E+65
Holmium	5E-08	164.9303	7.25E+043	2.6463E+65
Terbium	5E-08	158.9254	7.25E+043	2.7463E+65
Europium	5E-08	151.964	7.25E+043	2.8721E+65
Thorium	4E-08	232.0377	5.8E+043	1.5048E+65
Antimony	4E-08	121.76	5.8E+043	2.8676E+65
Indium	3E-08	114.818	4.35E+043	2.2807E+65
Uranium	2E-08	238.0289	2.9E+043	7.3344E+64
Rhenium	2E-08	186.207	2.9E+043	9.3756E+64
Lutetium	1E-08	174.9668	1.45E+043	4.9889E+64
Thulium	1E-08	168.9342	1.45E+043	5.1671E+64
Tantalum	8E-09	180.9479	1.16E+043	3.8592E+64