

Elements of the Solar System

Physics 090

2020-04-01

Group→	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	
↓Period																			
1	1 H																		2 He
2	3 Li	4 Be											5 B	6 C	7 N	8 O	9 F		10 Ne
3	11 Na	12 Mg											13 Al	14 Si	15 P	16 S	17 Cl		18 Ar
4	19 K	20 Ca	21 Sc	22 Ti	23 V	24 Cr	25 Mn	26 Fe	27 Co	28 Ni	29 Cu	30 Zn	31 Ga	32 Ge	33 As	34 Se	35 Br		36 Kr
5	37 Rb	38 Sr	39 Y	40 Zr	41 Nb	42 Mo	43 Tc	44 Ru	45 Rh	46 Pd	47 Ag	48 Cd	49 In	50 Sn	51 Sb	52 Te	53 I		54 Xe
6	55 Cs	56 Ba	* 71 Lu	72 Hf	73 Ta	74 W	75 Re	76 Os	77 Ir	78 Pt	79 Au	80 Hg	81 Tl	82 Pb	83 Bi	84 Po	85 At		86 Rn
7	87 Fr	88 Ra	** 103 Lr	104 Rf	105 Db	106 Sg	107 Bh	108 Hs	109 Mt	110 Ds	111 Rg	112 Cn	113 Uut	114 Fl	115 Uup	116 Lv	117 Uus		118 Uuo
			* 57 La	58 Ce	59 Pr	60 Nd	61 Pm	62 Sm	63 Eu	64 Gd	65 Tb	66 Dy	67 Ho	68 Er	69 Tm	70 Yb			
			* 89 Ac	90 Th	91 Pa	92 U	93 Np	94 Pu	95 Am	96 Cm	97 Bk	98 Cf	99 Es	100 Fm	101 Md	102 No			

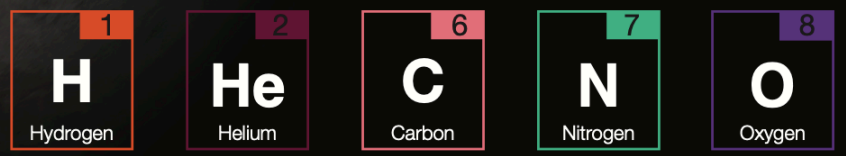
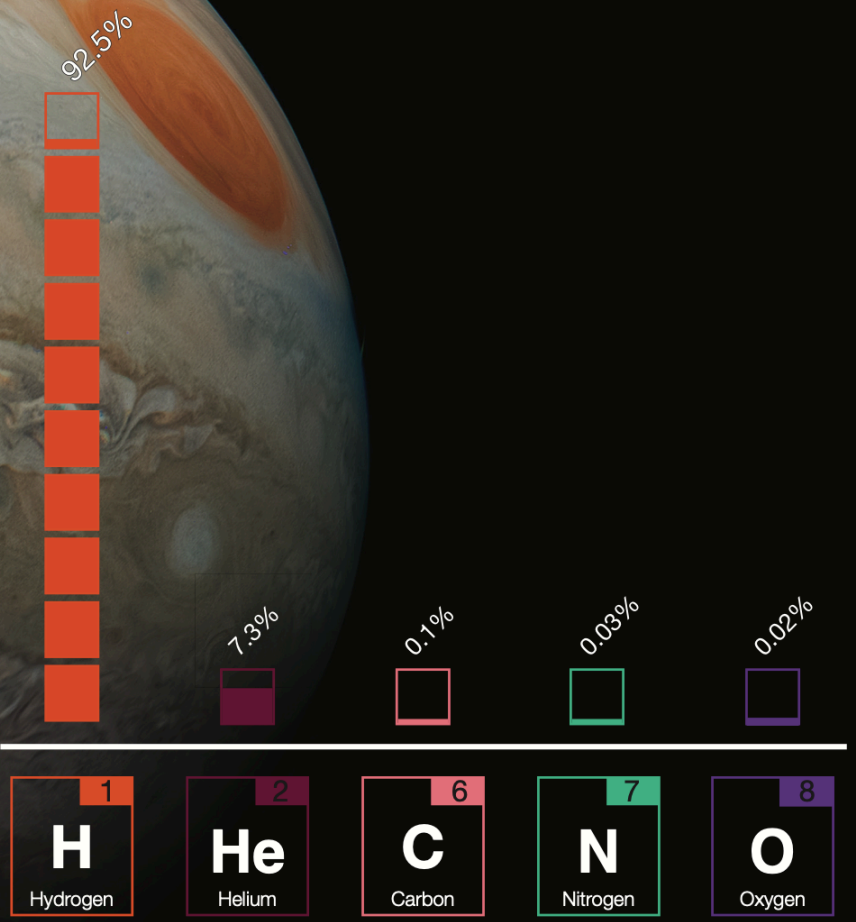
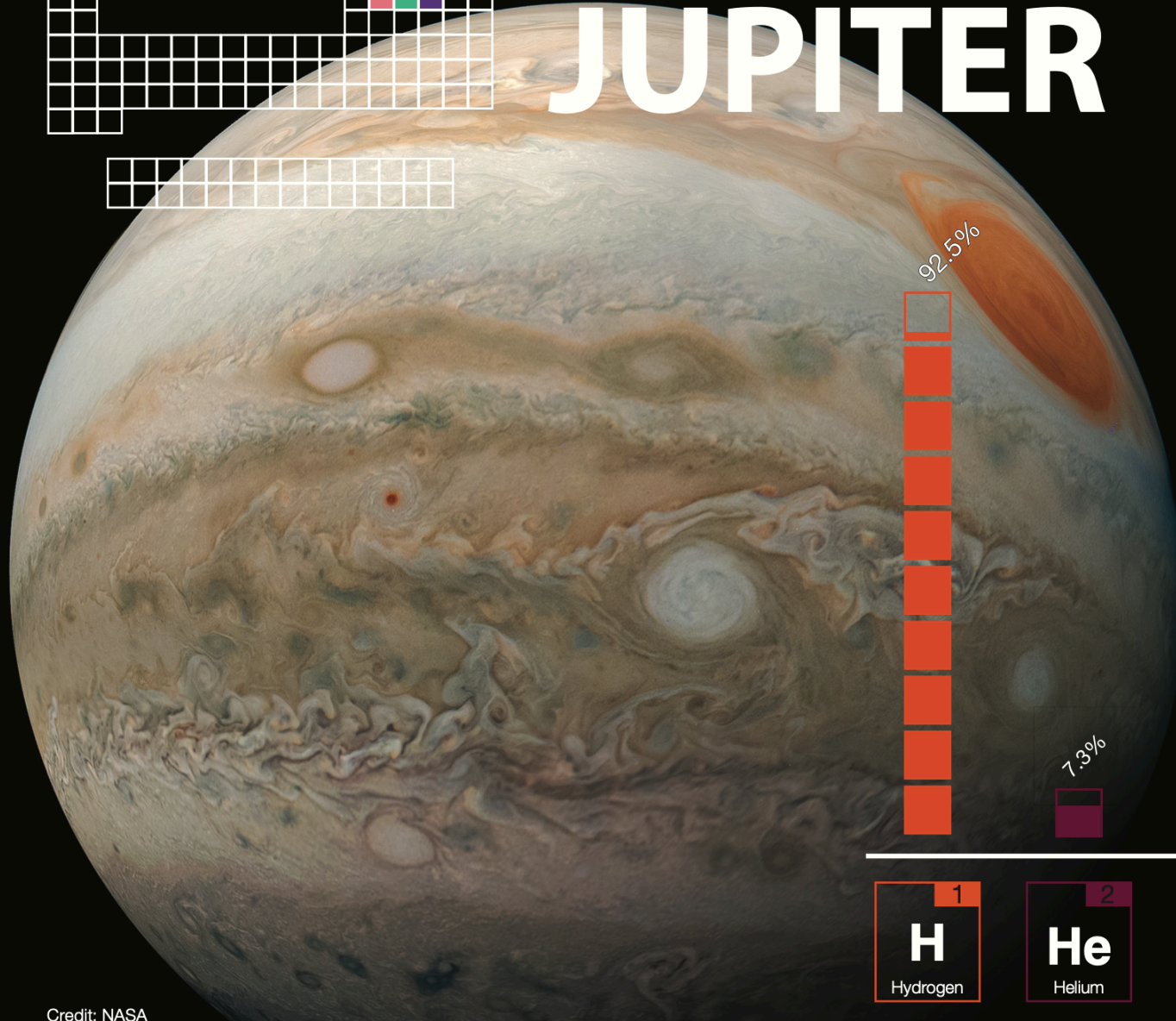
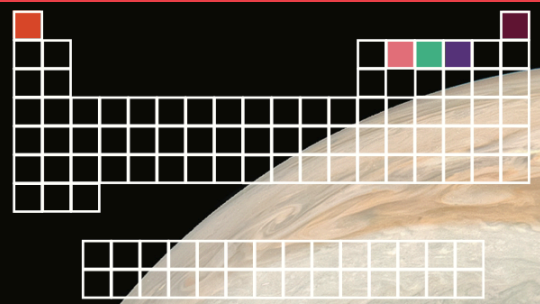
The Periodic Table

What Elements are Most Common? In the Sun? On Earth?

TOP 5 ELEMENTS IN THE ATMOSPHERE OF JUPITER

LUNAR AND PLANETARY INSTITUTE

2019 IYPT
International Year of the Periodic Table of Chemical Elements



Credit: NASA

Most Common Elements in Jupiter's Atmosphere

The Most Common Elements in the Solar System

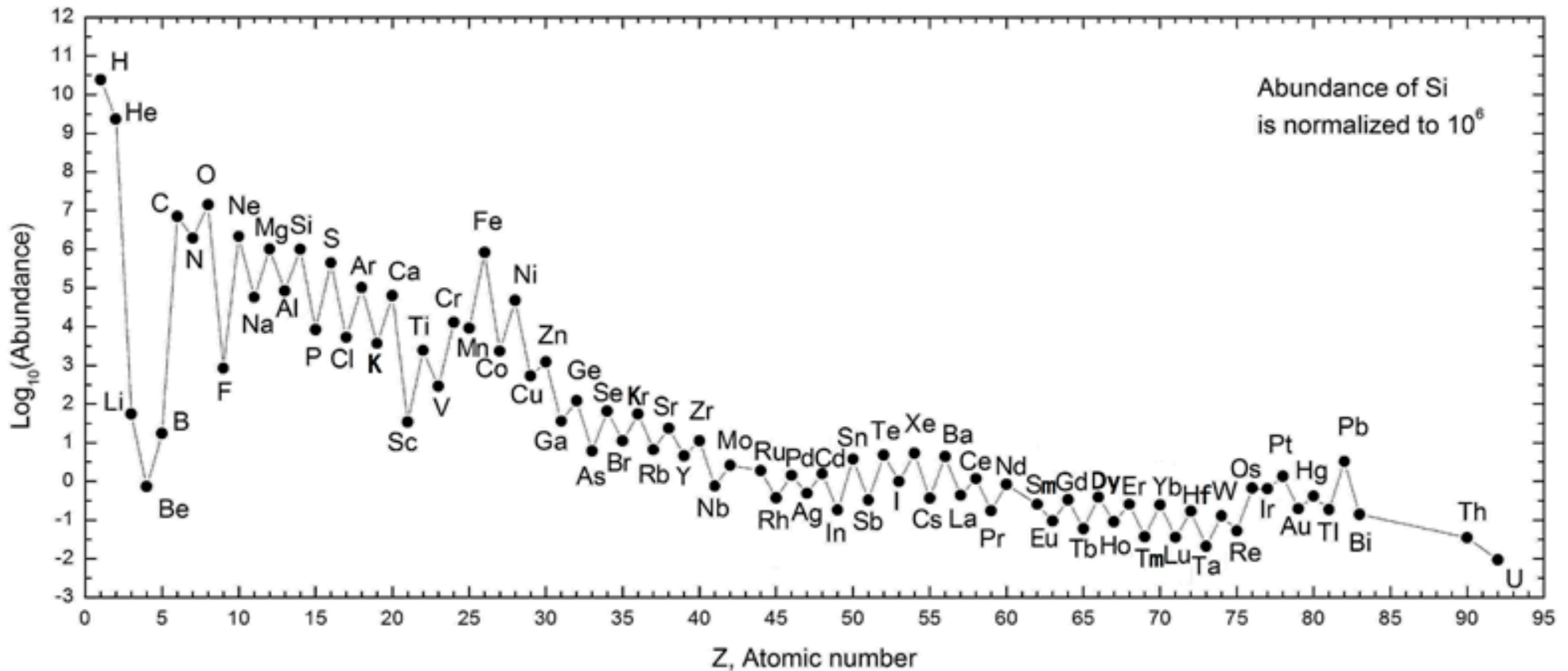
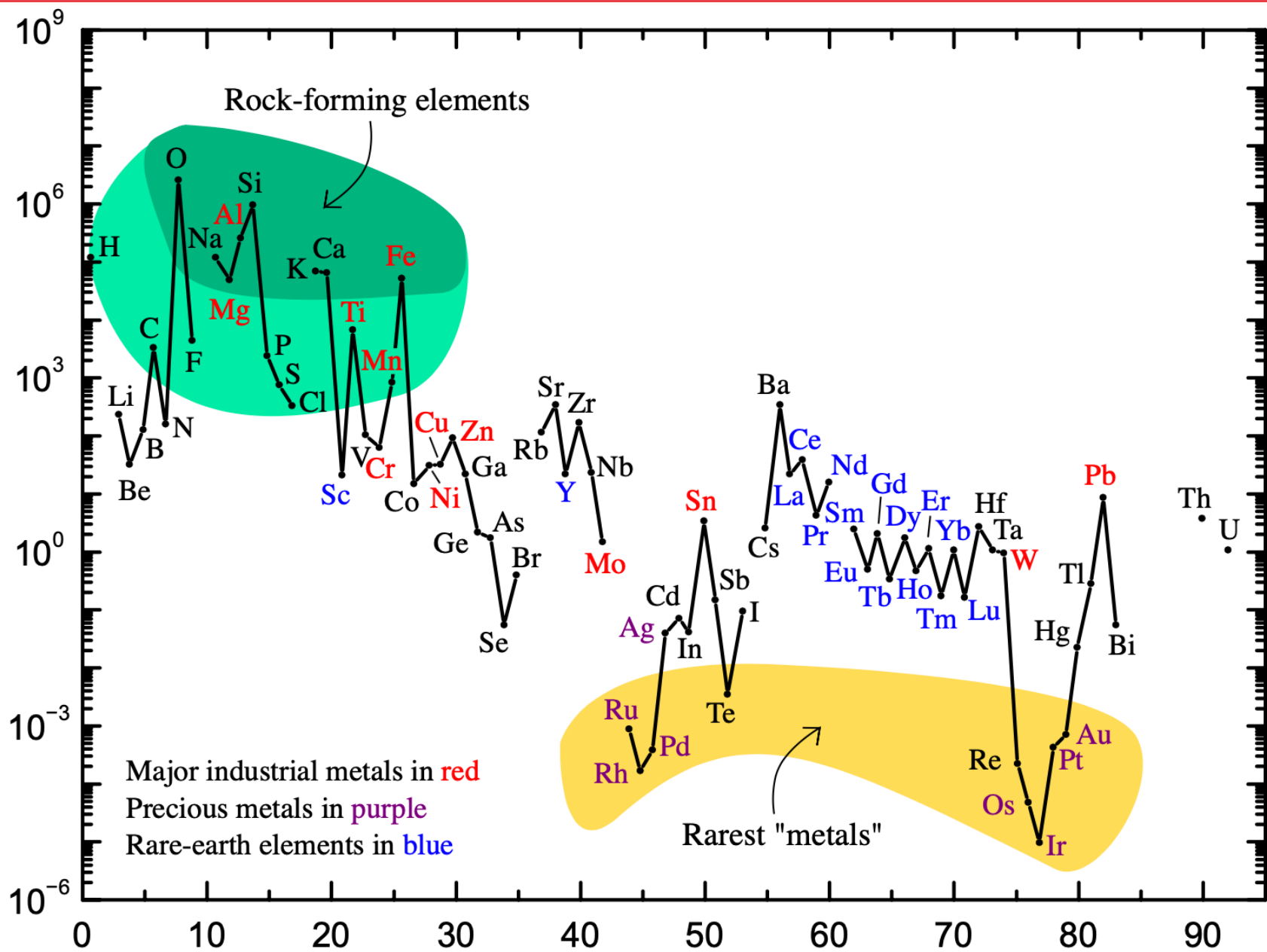
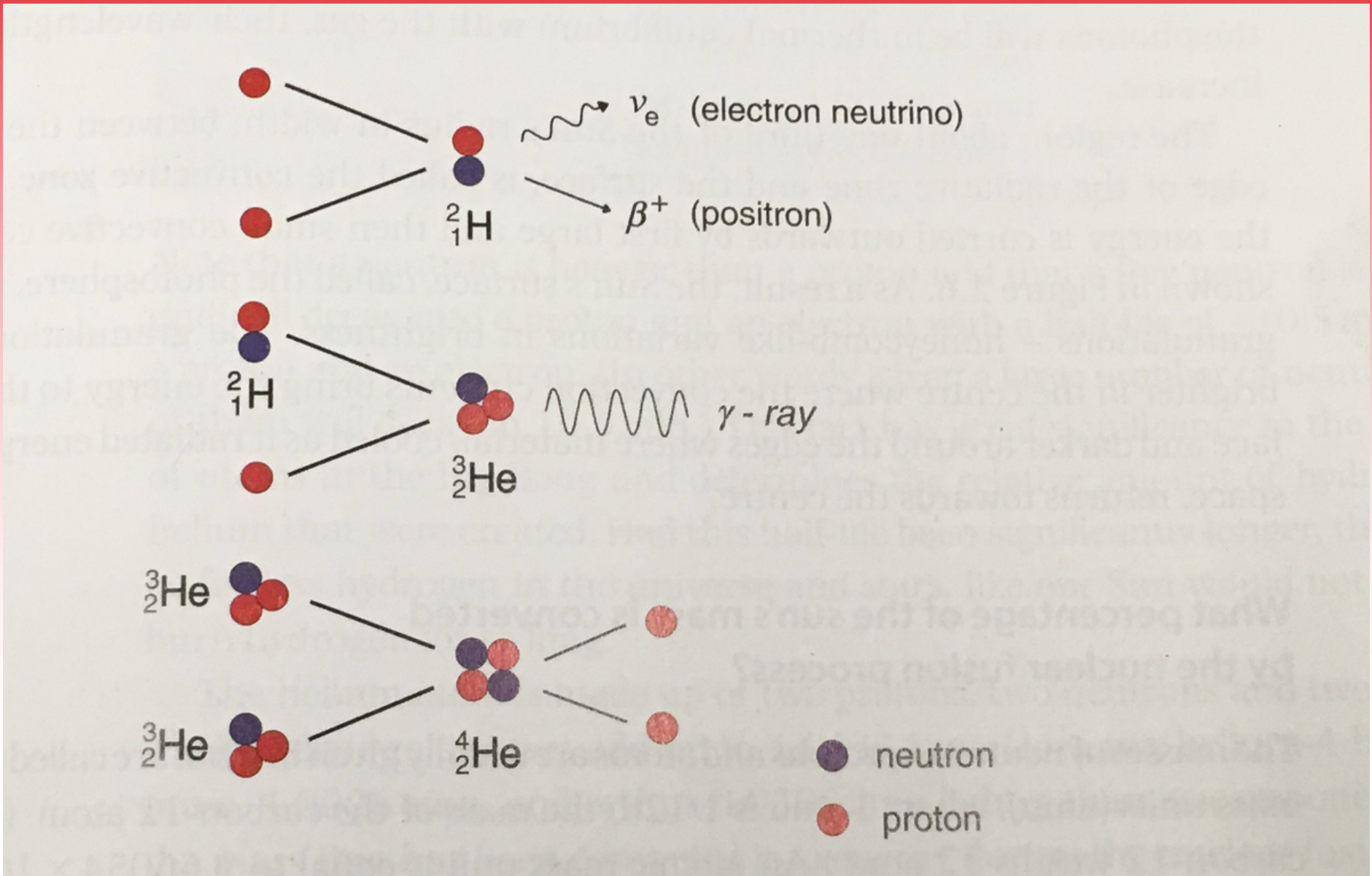


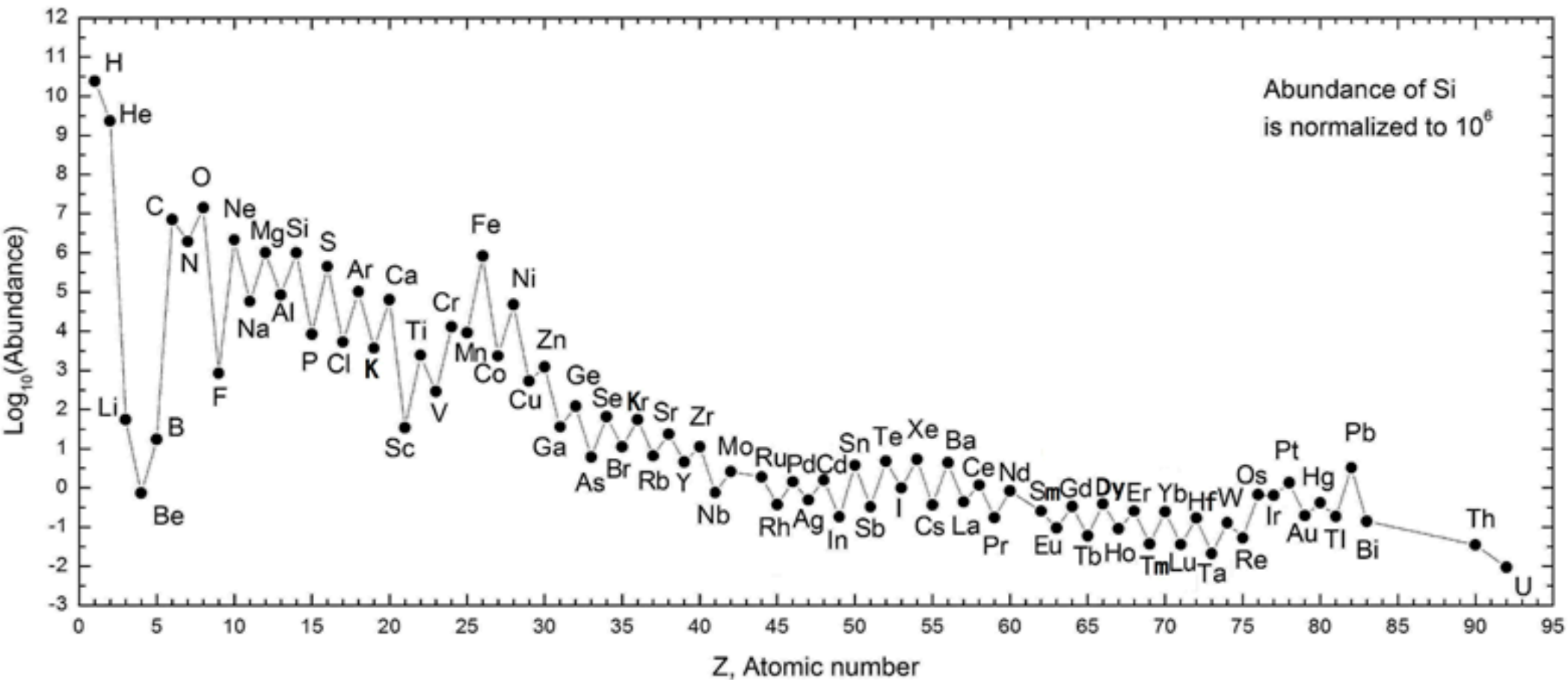
Table: Element Abundances



Element Abundances on Earth



Actual Steps of Fusion in the Sun



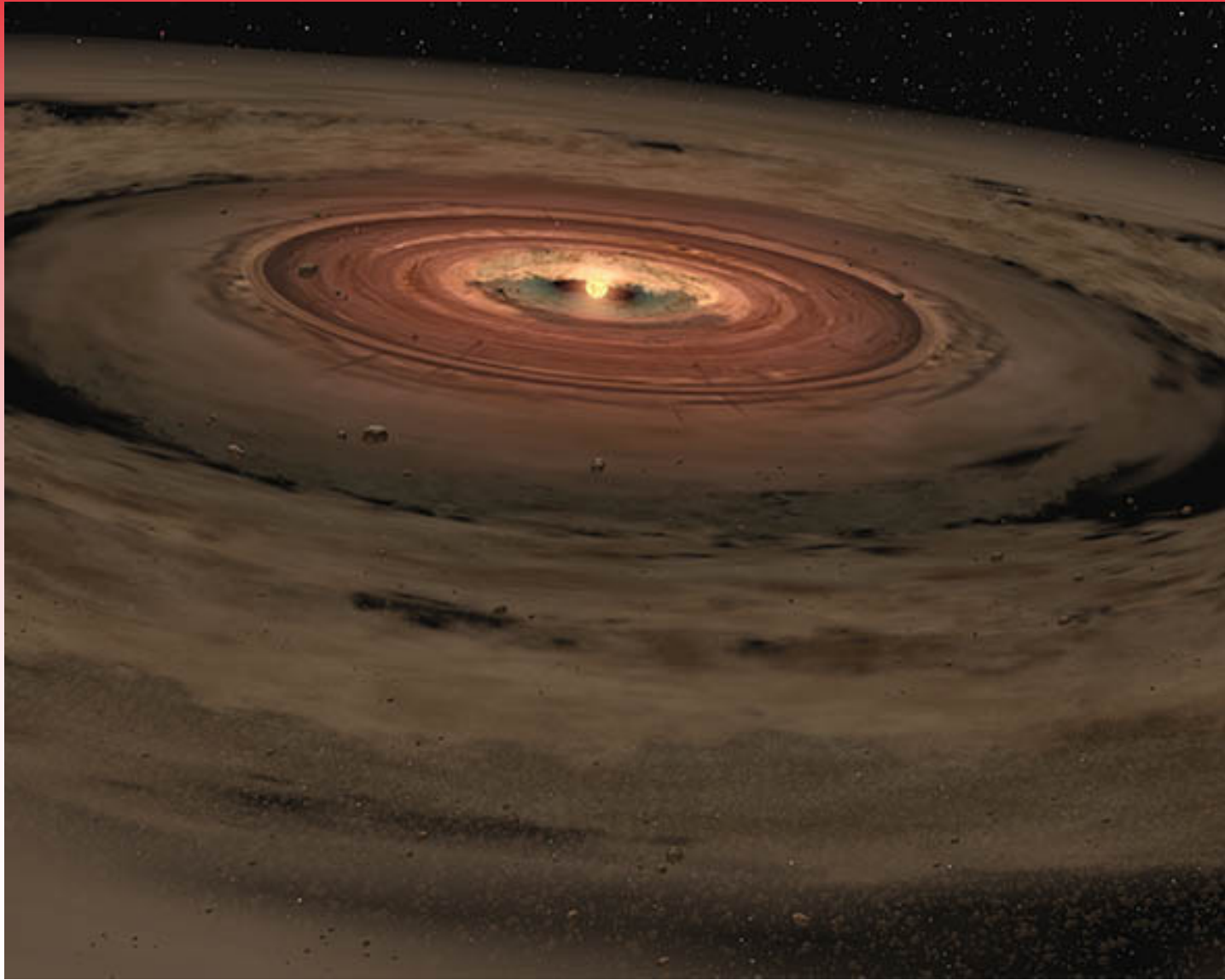
Note Regularity of Upticks

Carbon: 6 protons, 12 nucleons

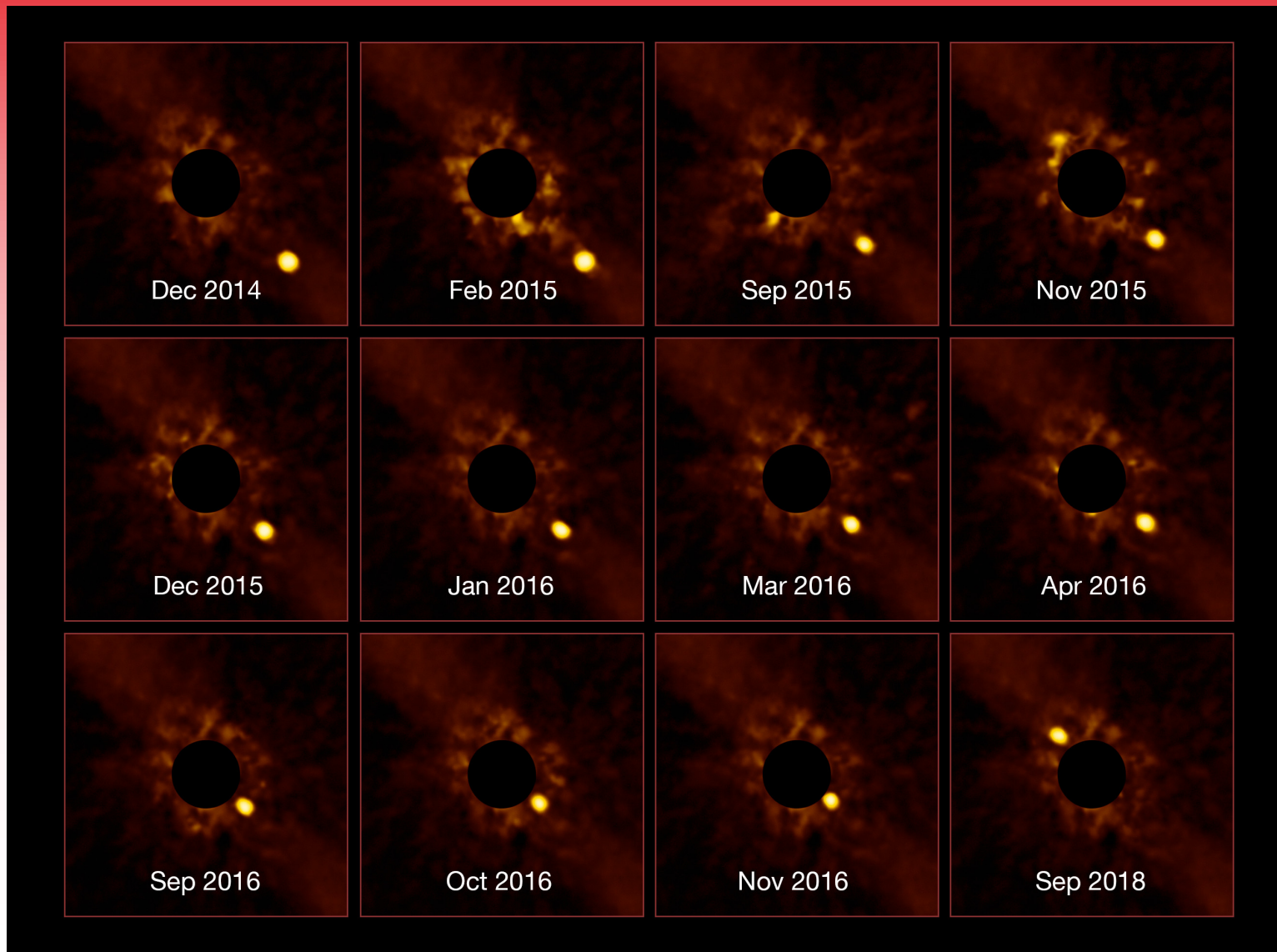
Oxygen: 8 protons, 16 nucleons

Neon, 10 protons, 20 nucleons

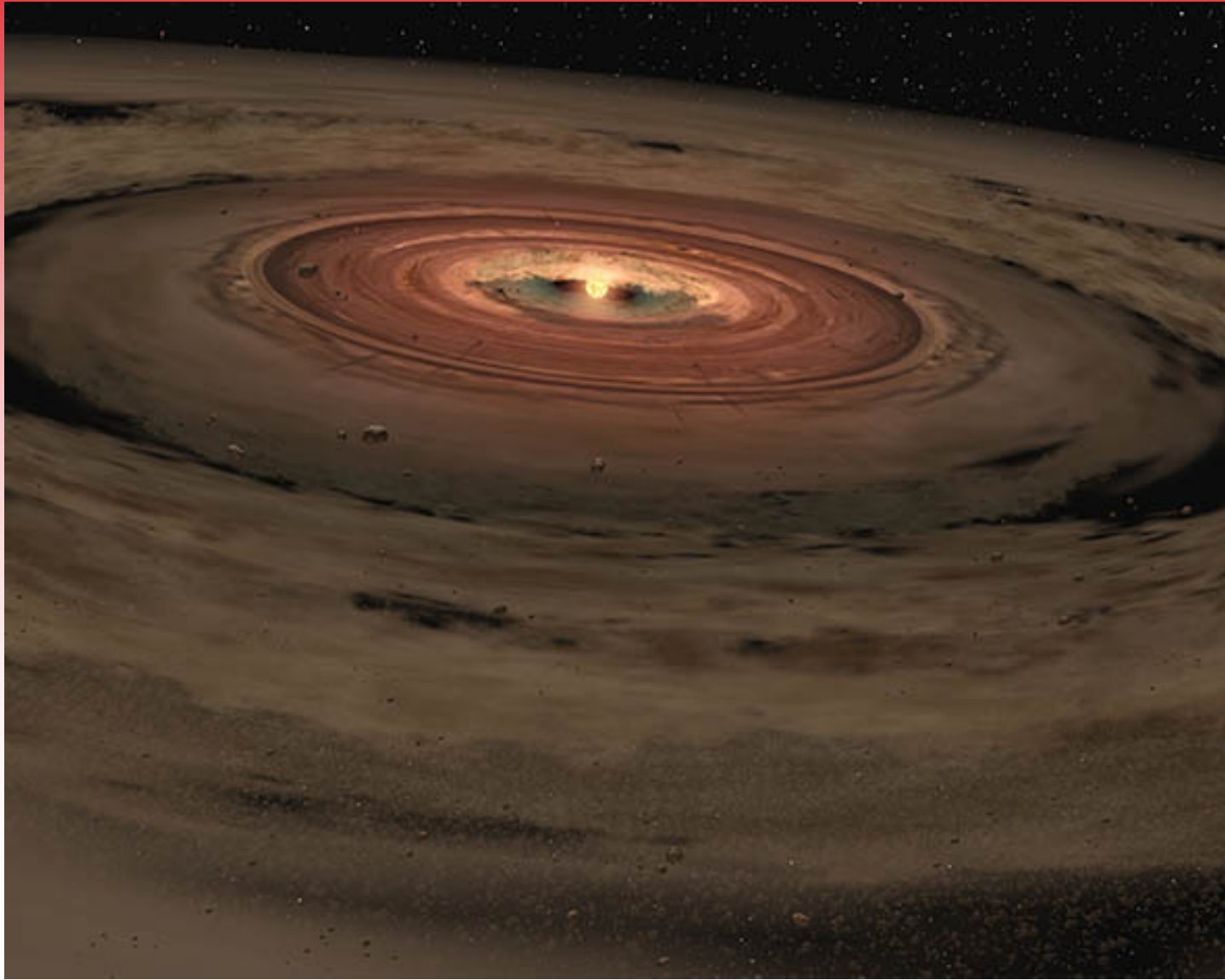
Magnesium, 12 protons, Silicon, 14 protons



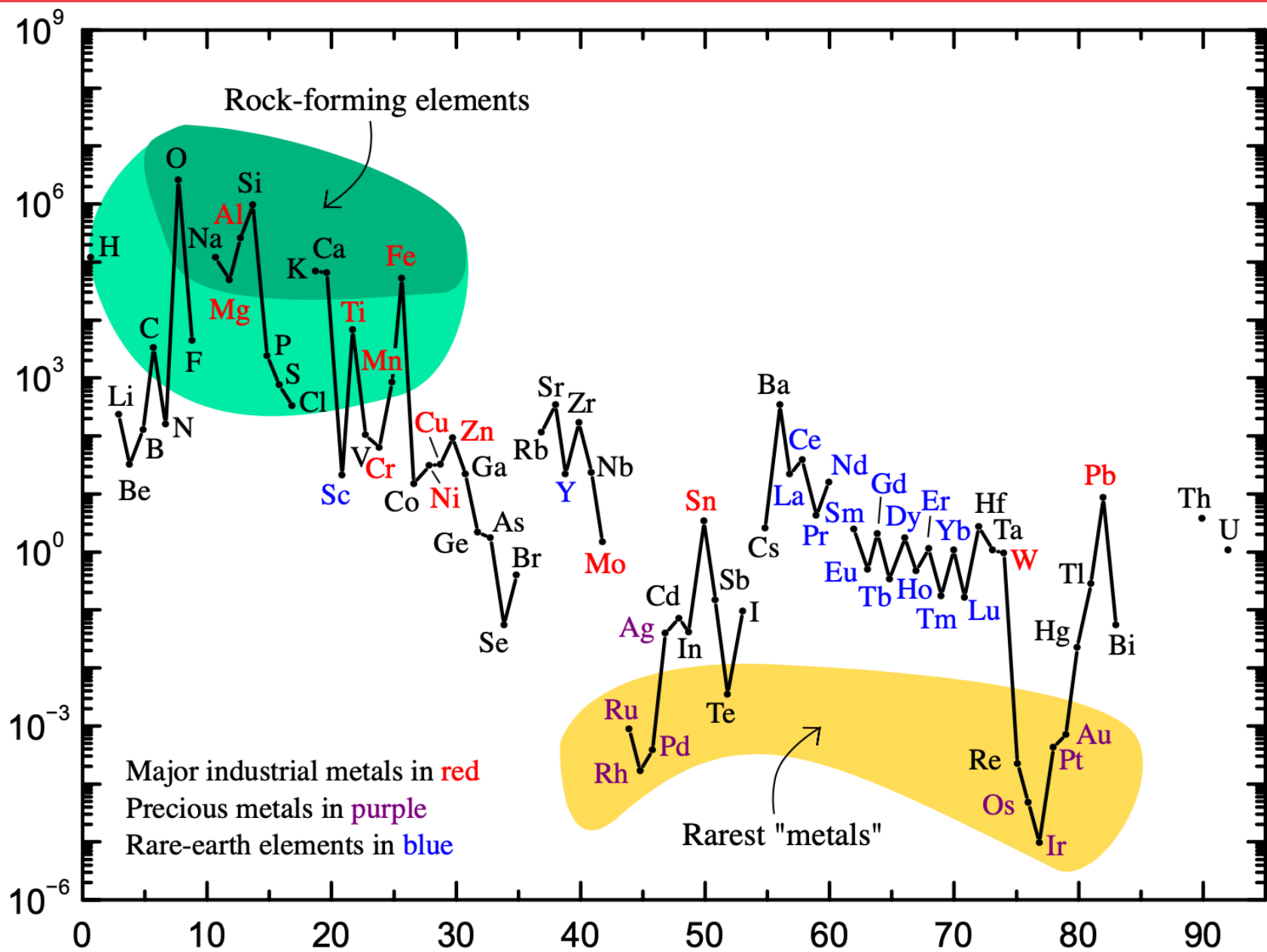
Artist's Concept: Disk Formation



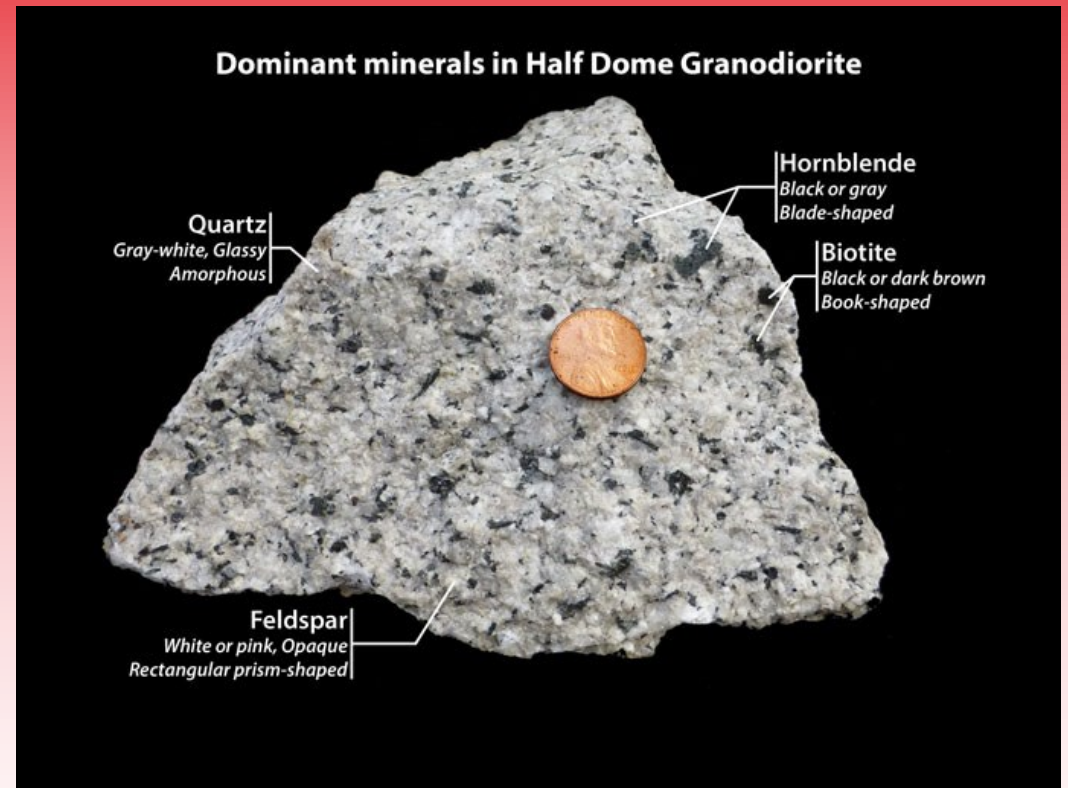
Exoplanet at Saturn Distance from its Star



Rotating Disk Flattens, Star Ignites



Element Abundances on Earth



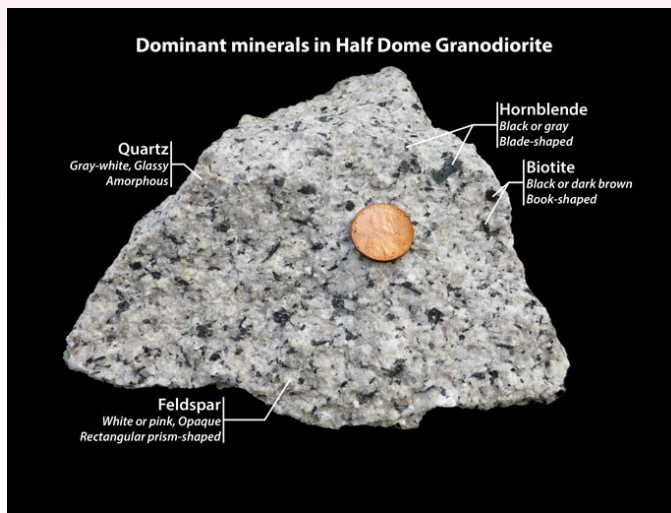
What is Half-Dome?

Granite (Granodiorite):
Quartz, Hornblende, Biotite,
Feldspar, etc., etc.












What is Quartz?



A chemical compound
of Silicon and Oxygen

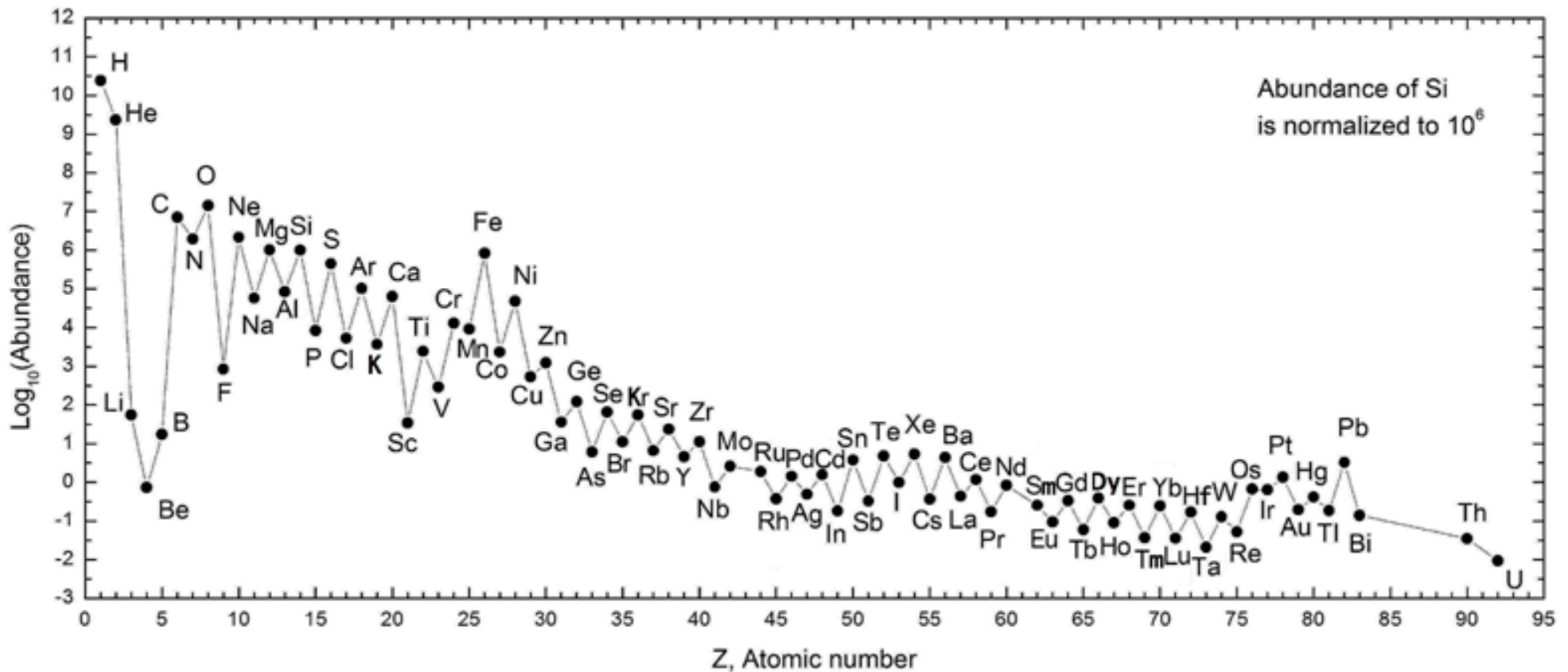


What is Granite, Chemically?

SiO ₂	72.04% (silica)	
Al ₂ O ₃	14.42% (alumina)	
K ₂ O	4.12%	
Na ₂ O	3.69%	
CaO	1.82%	
FeO	1.68%	
Fe ₂ O ₃	1.22%	
MgO	0.71%	
TiO ₂	0.30%	
P ₂ O ₅	0.12%	
MnO	0.05%	

Average Chemical Composition
(Thousands of Granite Samples)

Not Yet Explained!



How did we get these abundances?