

Elements of the Solar System

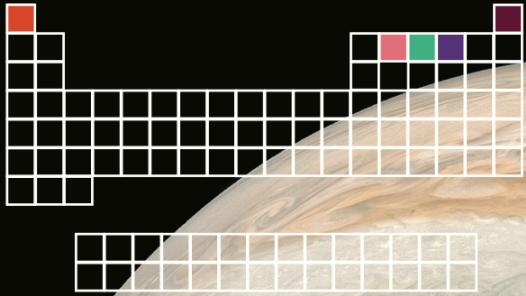
Physics 090

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?

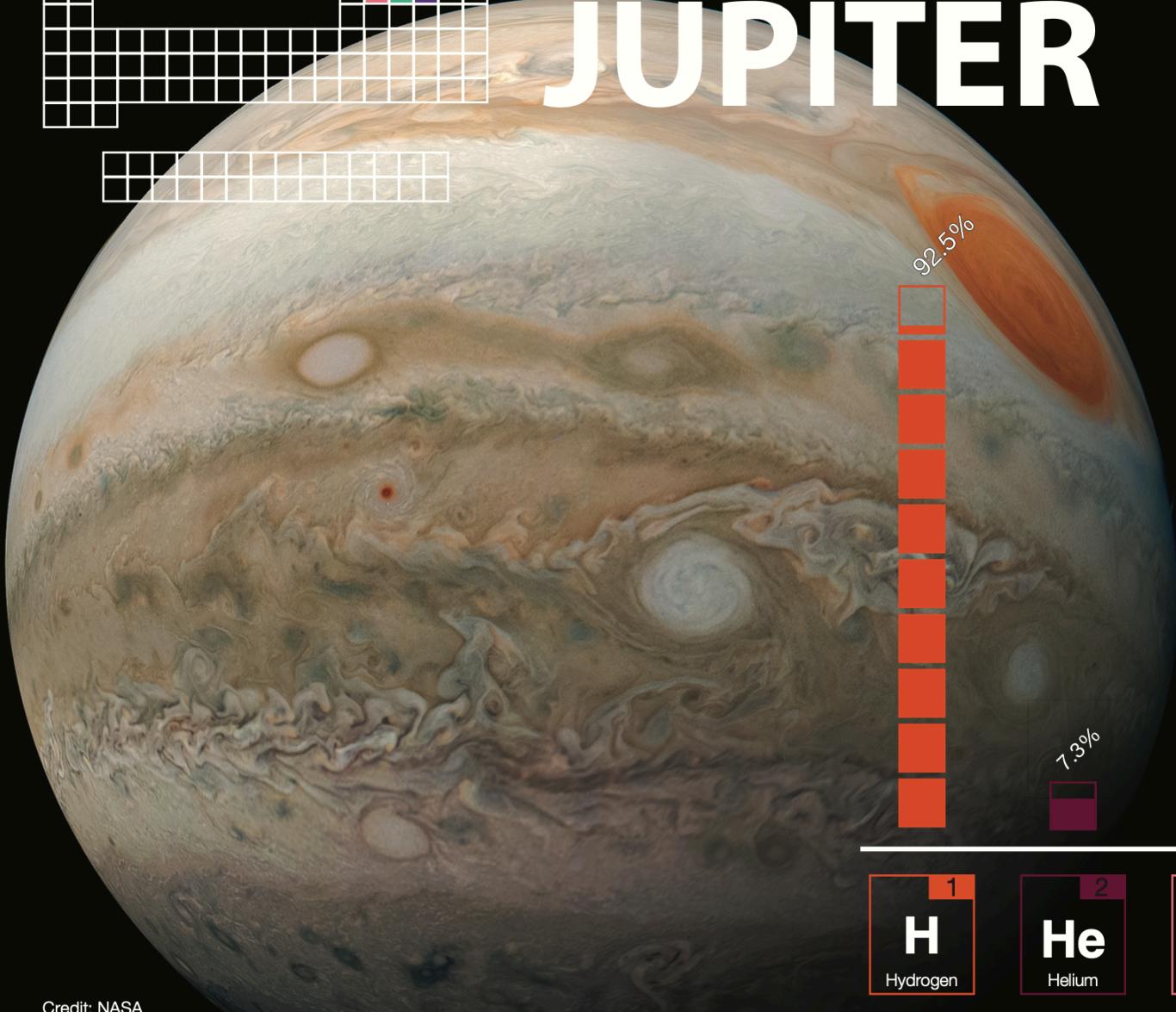


TOP 5 ELEMENTS IN THE ATMOSPHERE OF **JUPITER**

LUNAR AND
PLANETARY
INSTITUTE



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

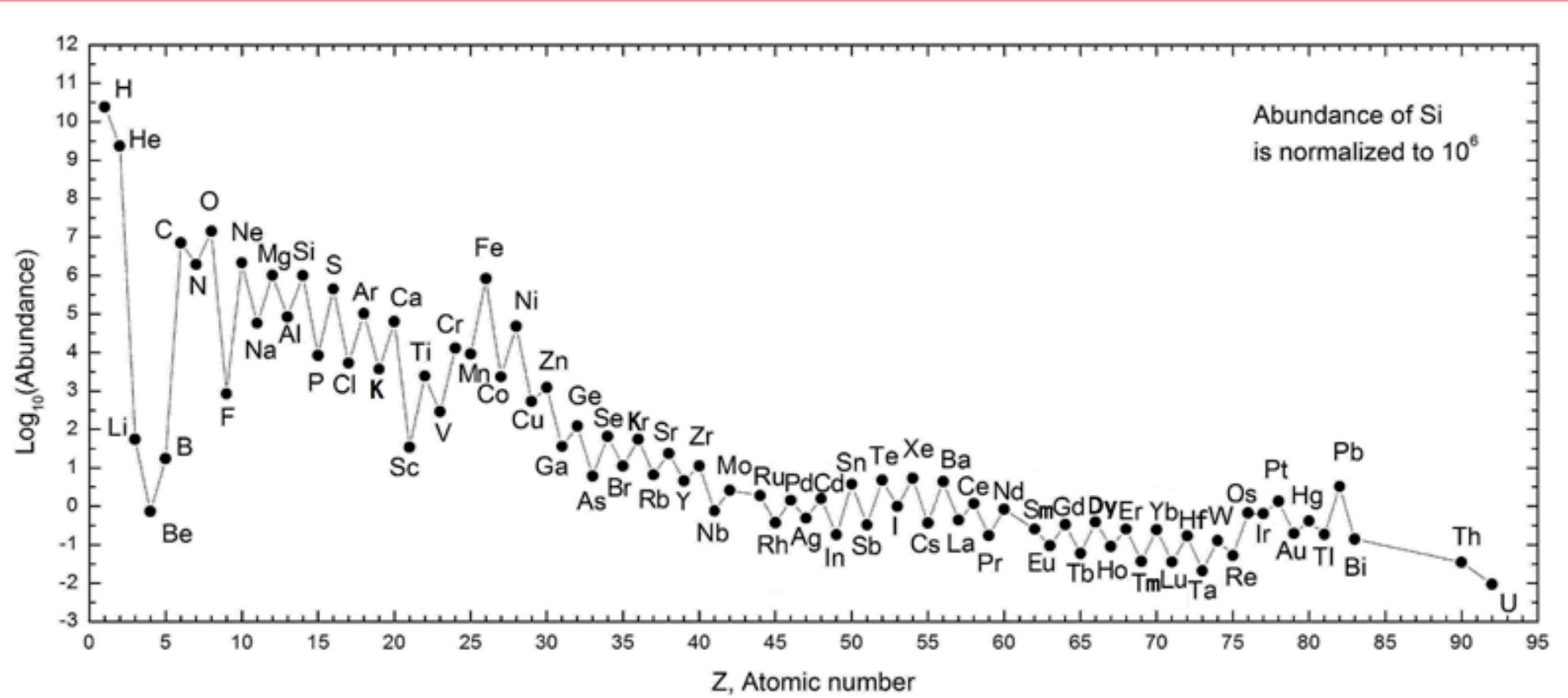
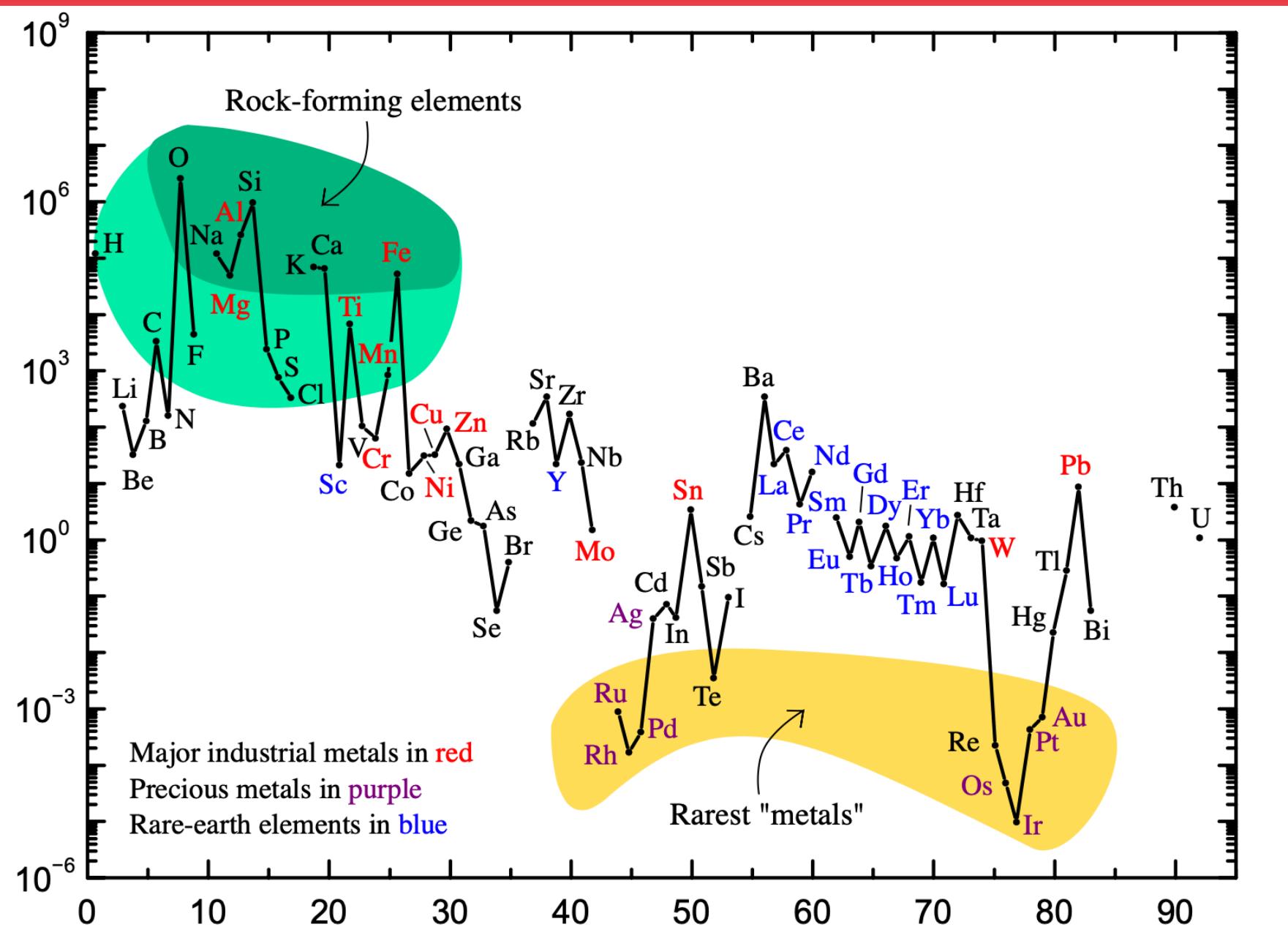
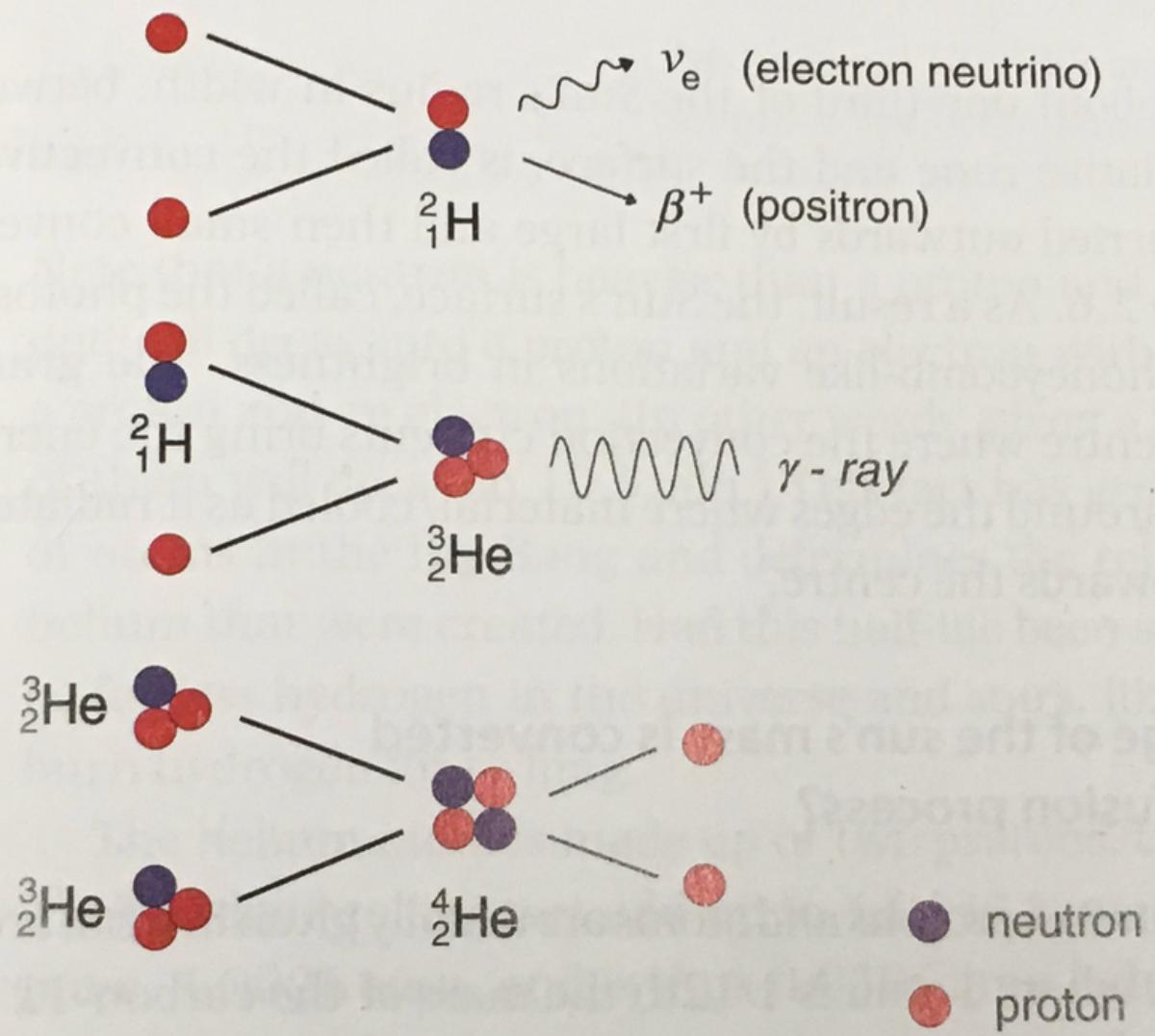


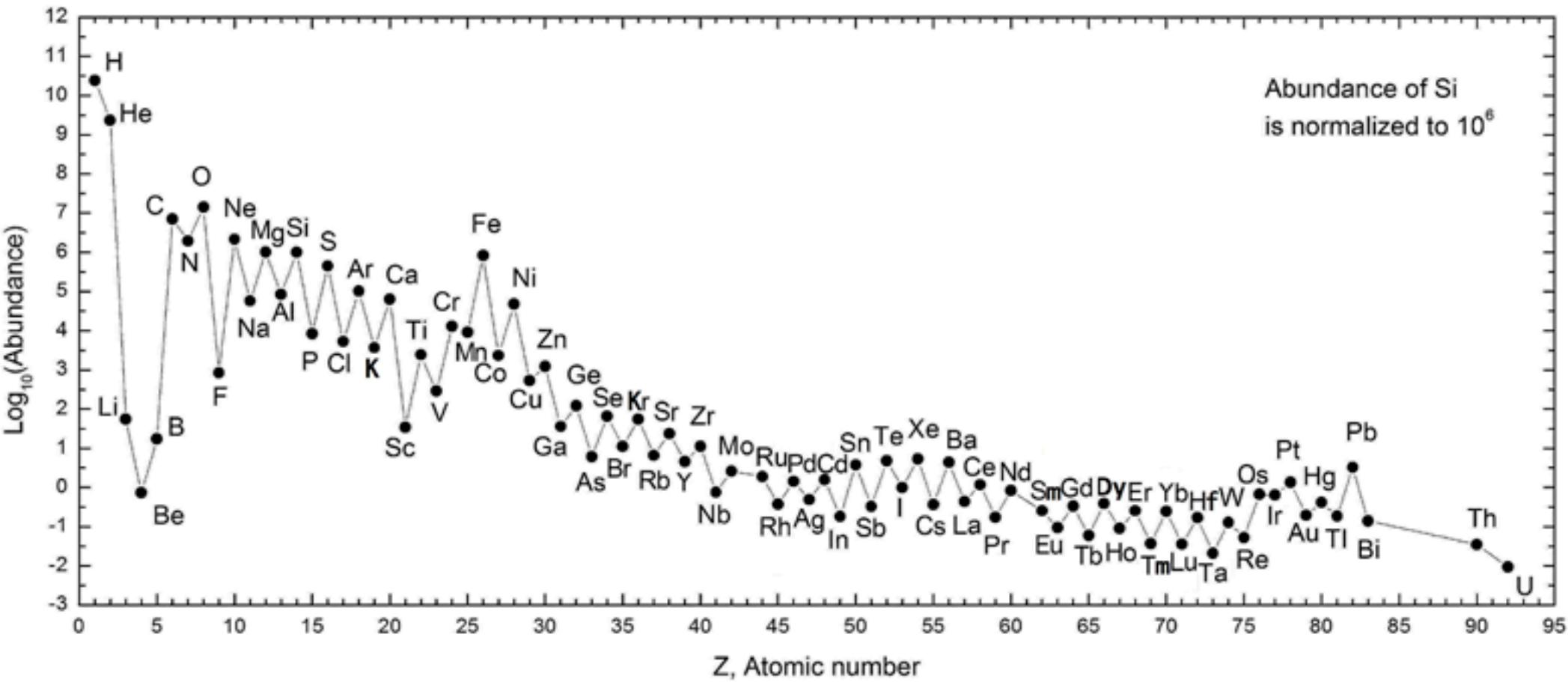
Table: Element Abundances



Element Abundances on Earth



Actual Steps of Fusion in the Sun



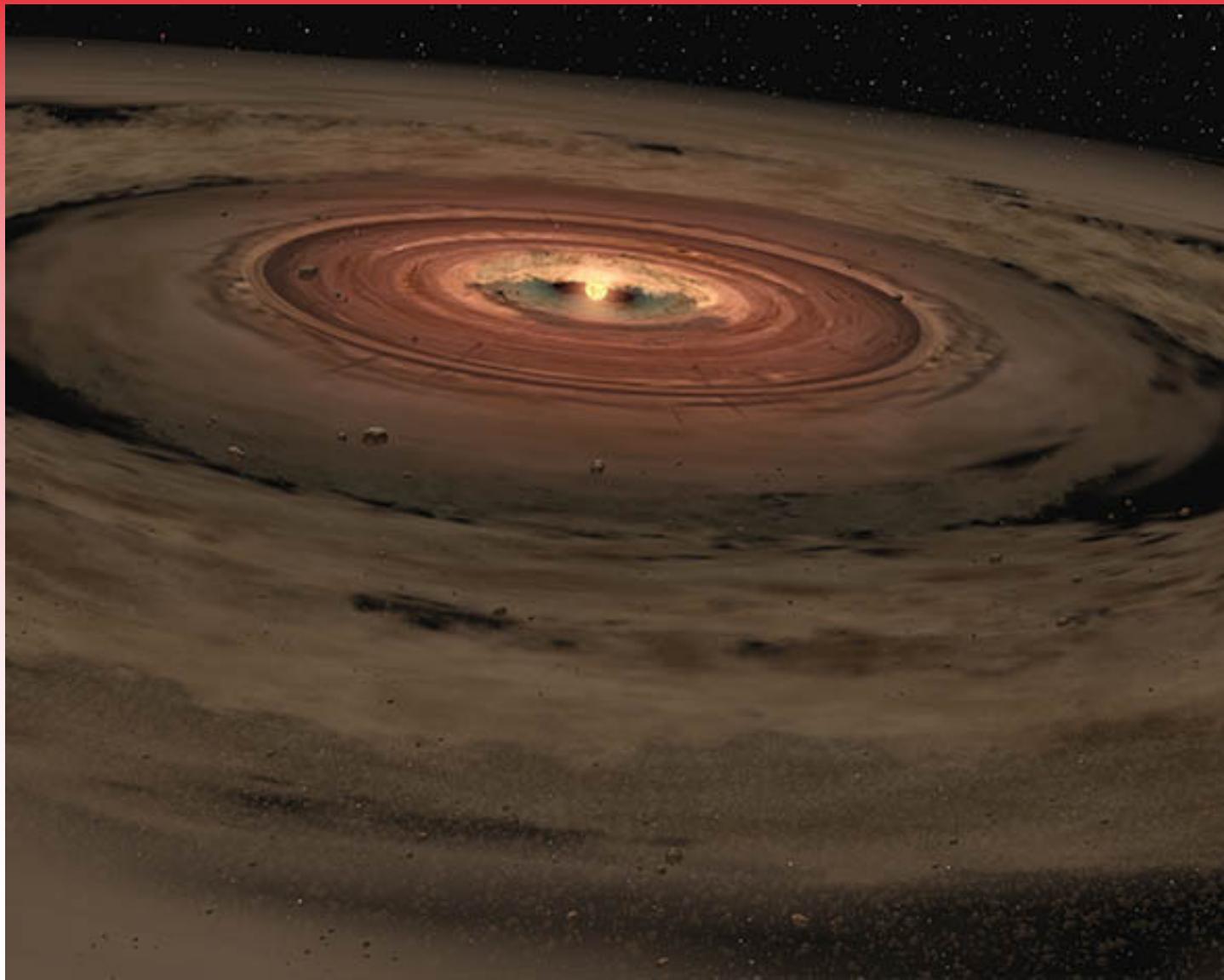
Note Regularity of Upticks

Carbon: 6 protons, 12 nucleons

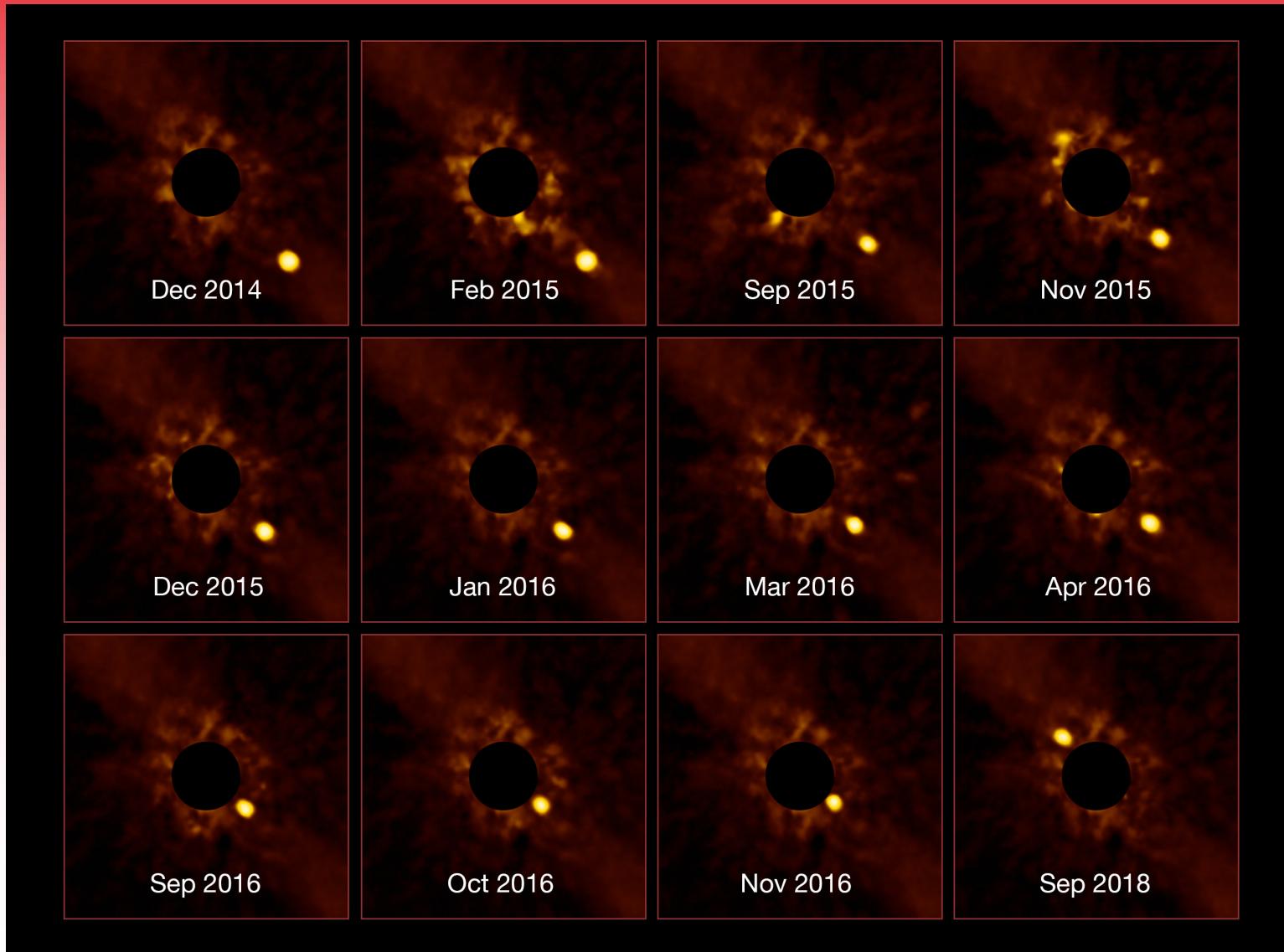
Oxygen: 8 protons, 16 nucleons

Neon, 10 protons, 20 nucleons

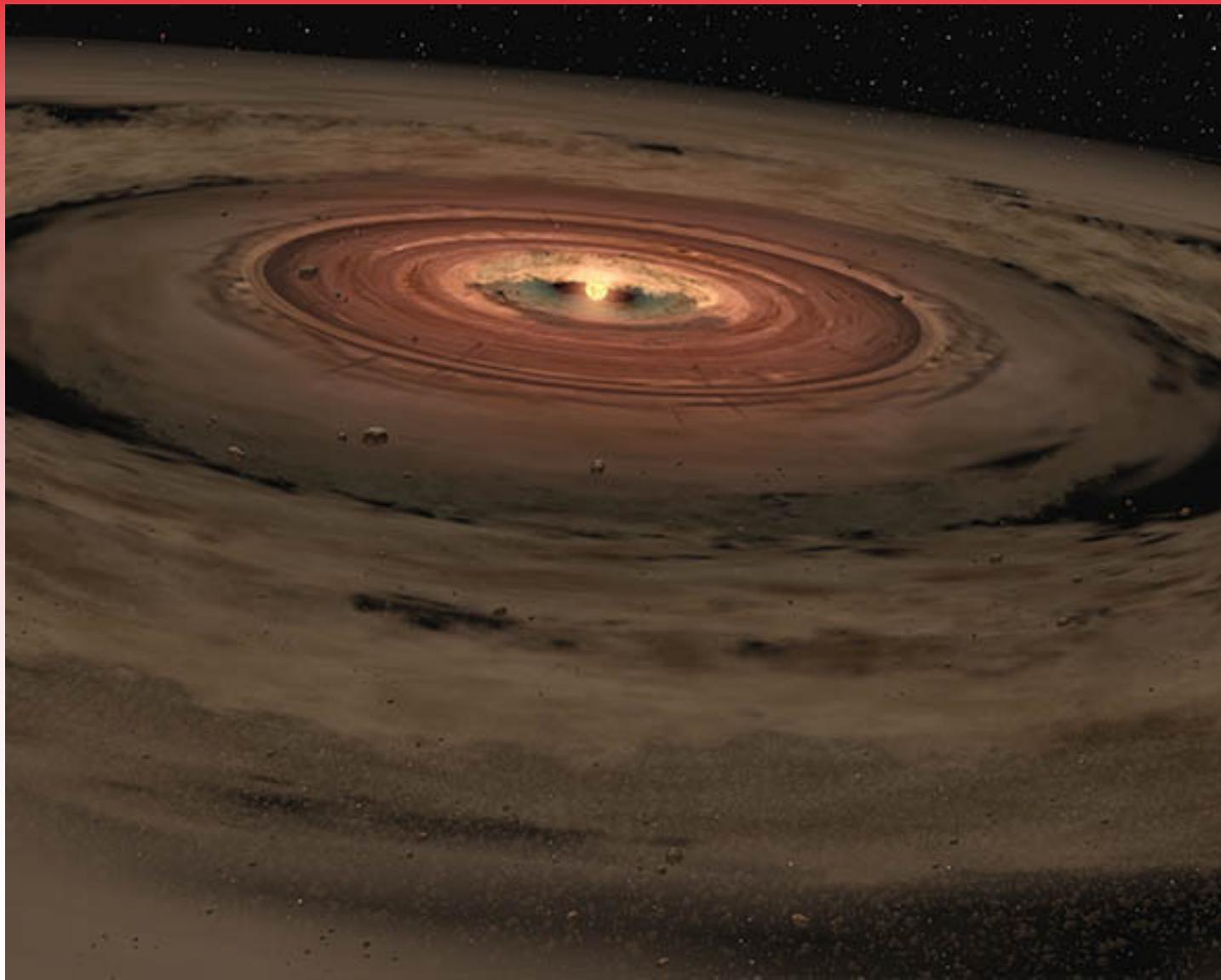
Magnesium, 12 protons, Silicon, 14 protons



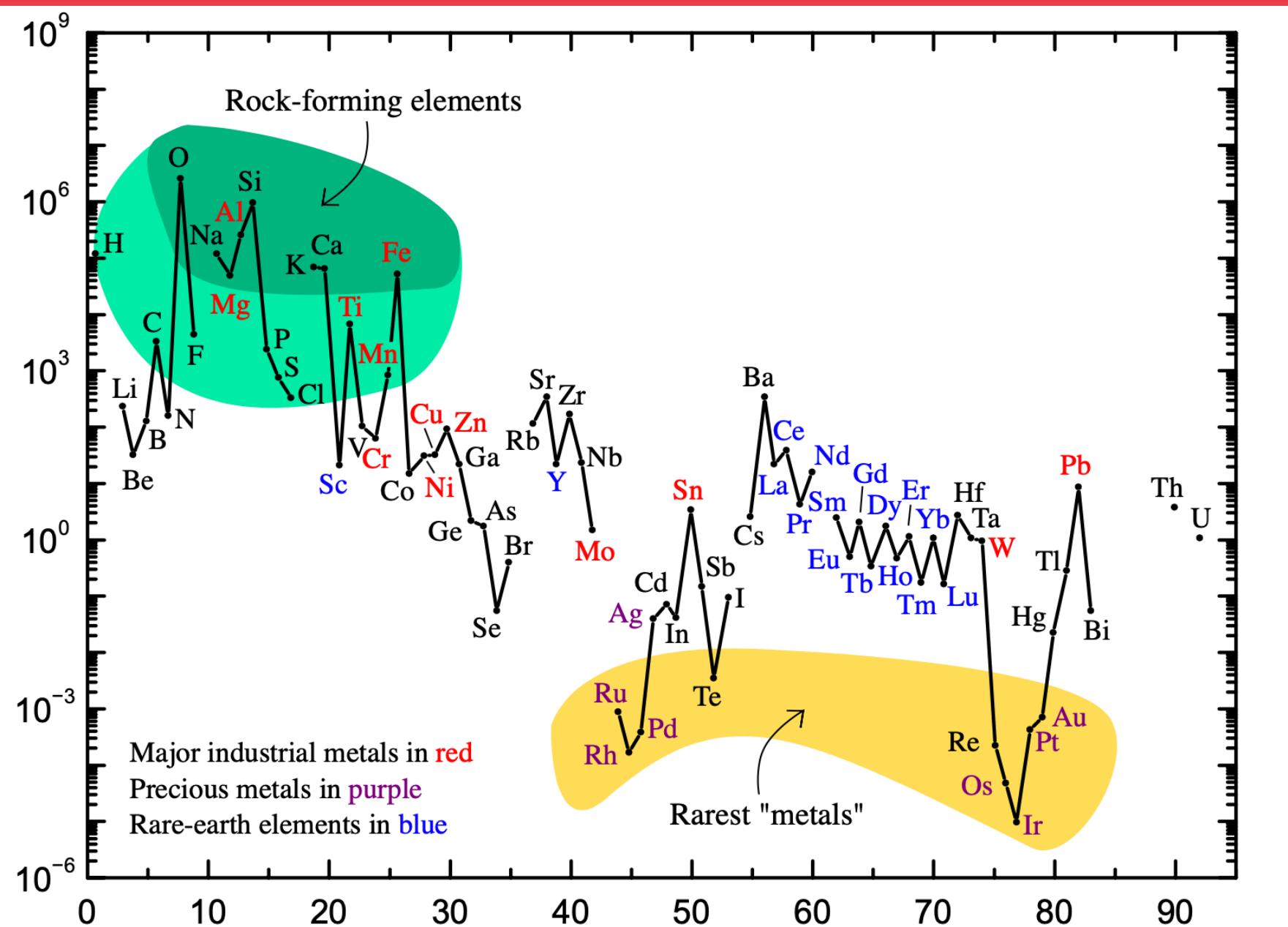
Artist's Concept: Disk Formation



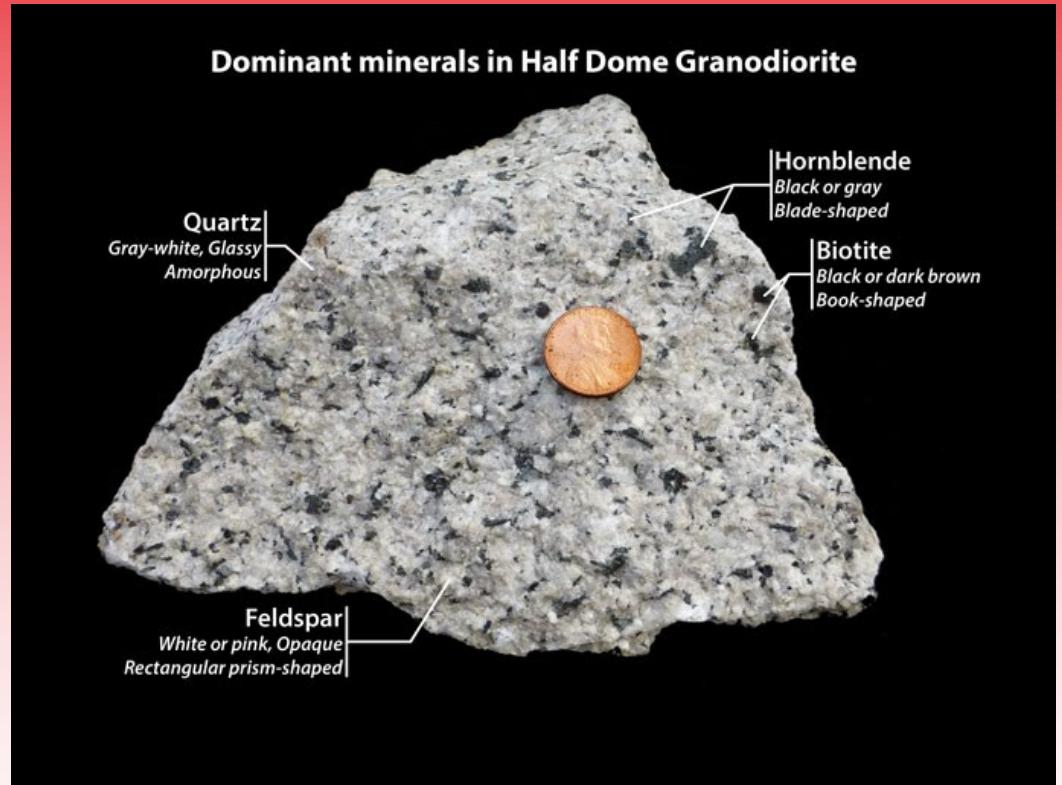
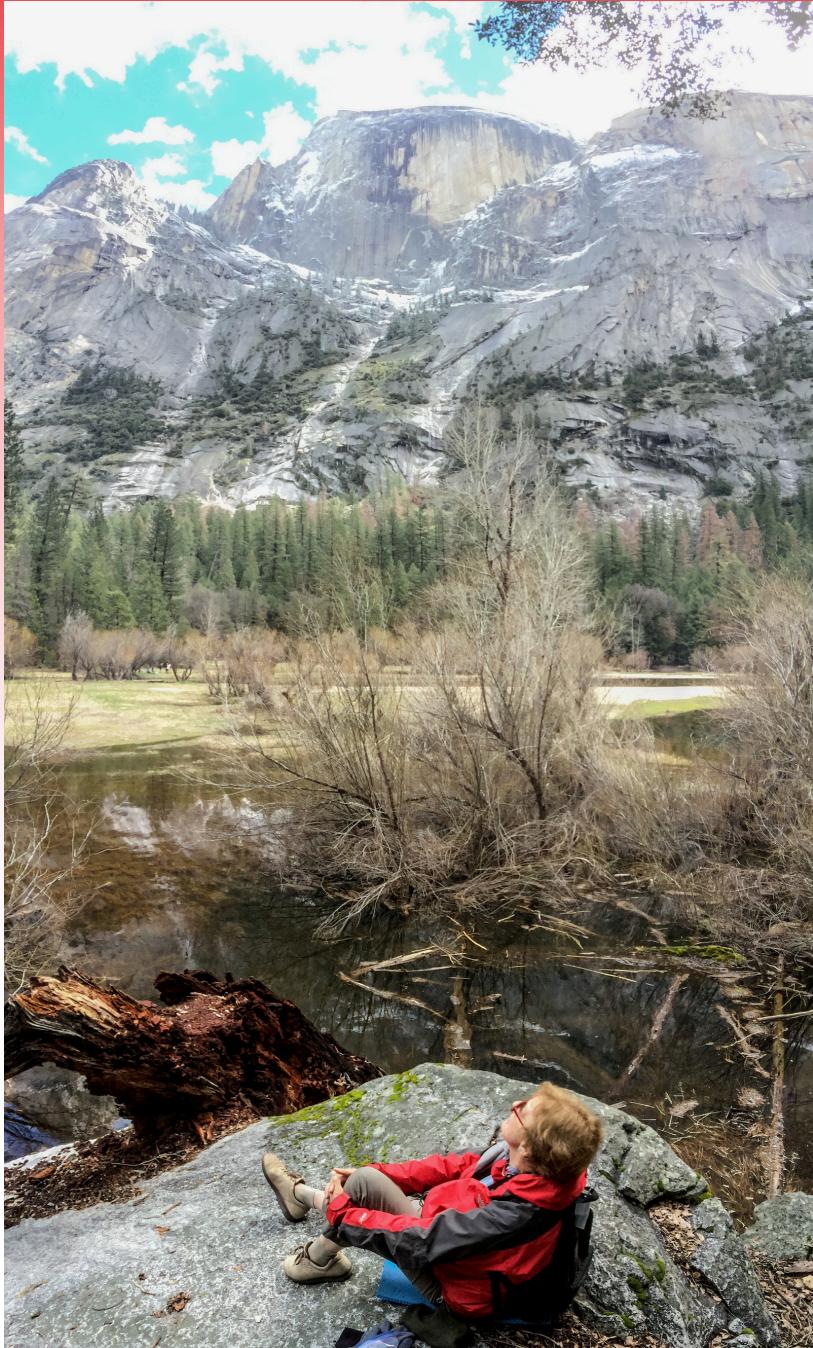
Exoplanet at Saturn Distance from its Star



Rotating Disk Flattens, Star Ignites



Element Abundances on Earth



What is Half-Dome?

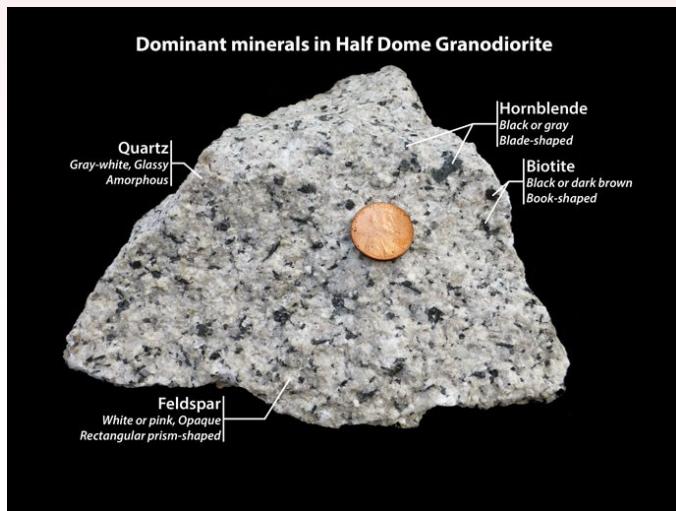
Granite (Granodiorite):
Quartz, Hornblende, Biotite,
Feldspar, etc., etc.



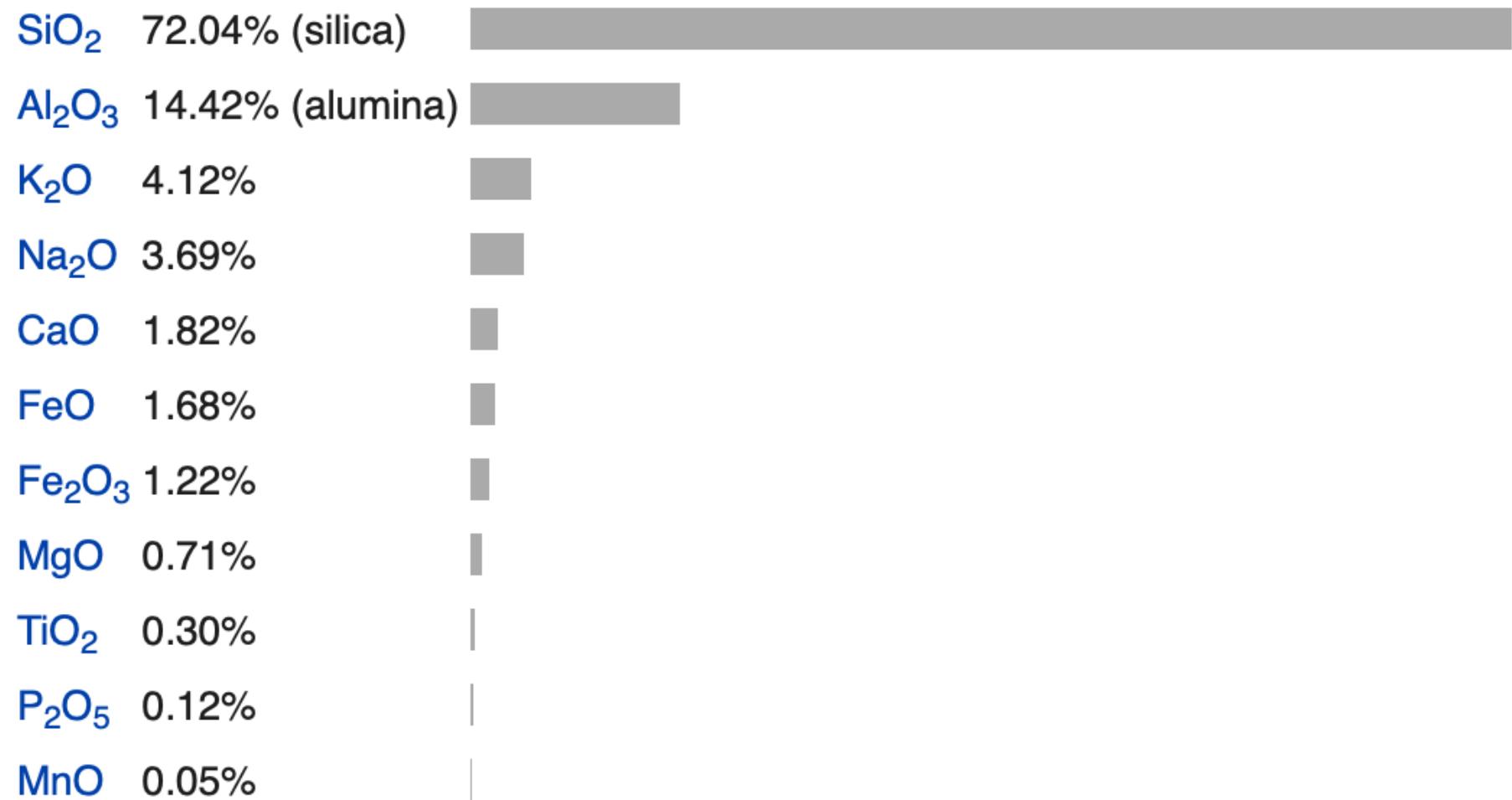
What is Quartz?



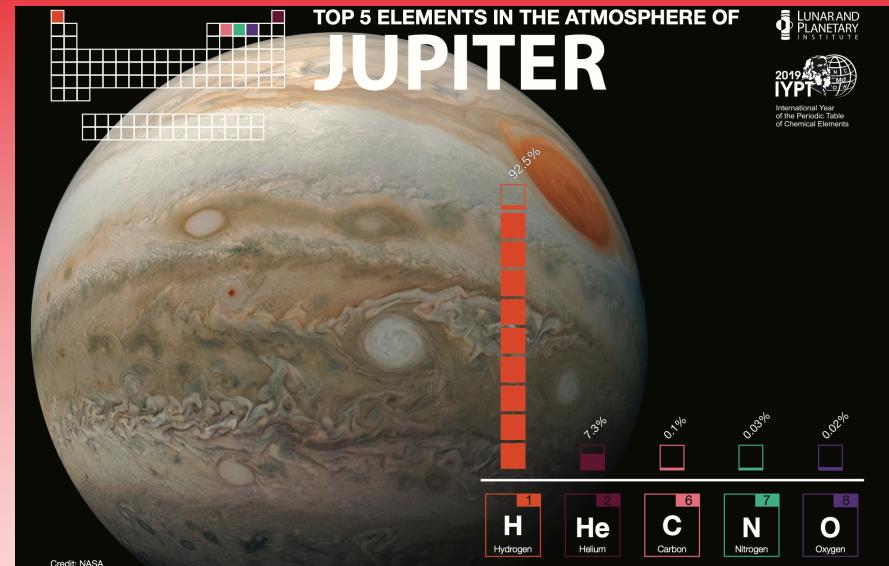
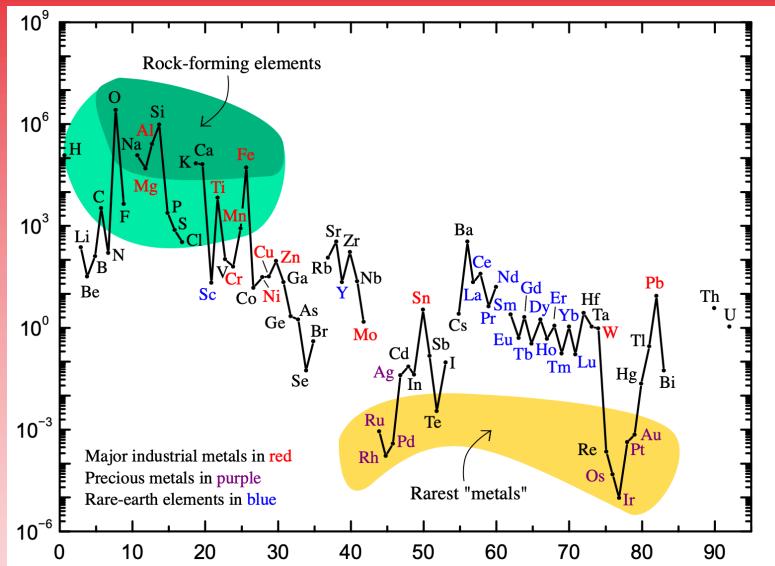
A chemical compound
of Silicon and Oxygen



What is Granite, Chemically?



Average Chemical Composition
(Thousands of Granite Samples)



Summary, Takeaway

4 Rocky Planets (Mercury, Venus, Earth, Mars)

Dominated by Rock-Forming Elements

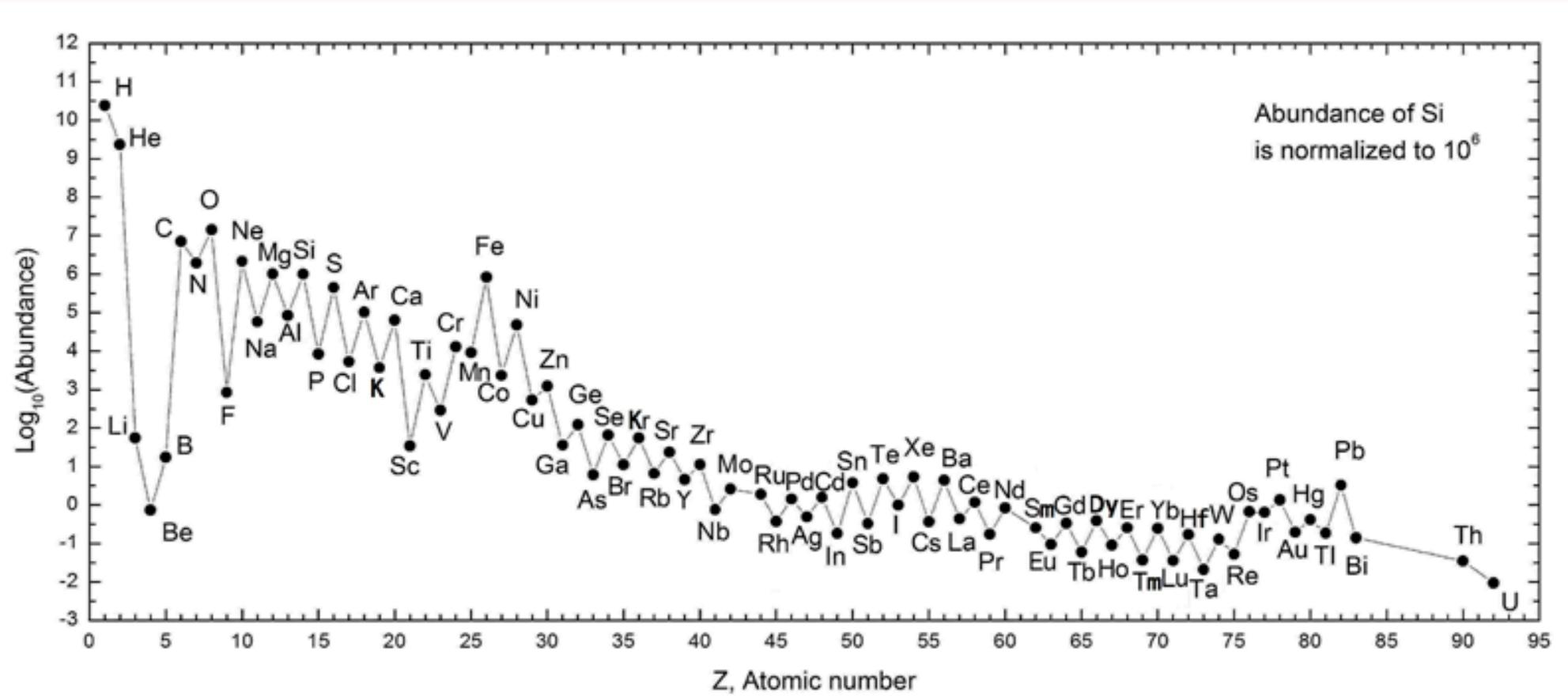
4 Gaseous Planets (Jupiter, Saturn, Uranus, Neptune)

Dominated by Same Gases as Sun (Hydrogen, Helium)

Reason for Difference?

Light Gases Stripped from Rocky Planets, "Boiled Away"

Not Yet Explained!



How did we get these abundances?