

# THE ELEMENTS

**PERIODIC TABLE OF THE ELEMENTS**  
Standard Table

1 2 13 14 15 16 17 18

1 H 2 He

3 Li 4 Be 5 B 6 C 7 N 8 O 9 F 10 Ne

11 Na 12 Mg 13 Al 14 Si 15 P 16 S 17 Cl 18 Ar

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

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

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

87 Fr 88 Ra 103 Lr 104 Rf 105 Db 106 Sg 107 Bh 108 Hs 109 Mt 110 Ds 111 Rg 112 Uub 113 Uut 114 Uuq 115 Uup 116 Uuh 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

Alkali Nonmetal Gas  
1(IA), 1, s  
H  
Hydrogen  
1.00794

Show Highlight on Selected Element Underlined Symbols are Synthetic/Decay Elements.

Standard Table Find Element: [input] ?

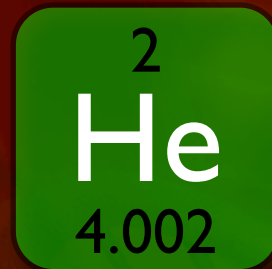
1 1.00794 H Hydrogen 1.00794

Standard Table Find Element: [input] ?

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Honors Physical Science @ SHS



# Chemical Symbols



- A chemical symbol is a short-hand way of writing the name of an element.
- Chemical symbols consists of either one or two letters.
- The first letter is always uppercase (capitalized). If there is a second letter, it is lowercased and half the size of the first letter.
- Correct : Mg, He, Li, Be, Ca, Au, Fe
- Incorrect: HE, he, H<sub>E</sub>, H<sup>E</sup>

# Where did the chemical symbols come from?

- Most symbols came from first one or two letters in the English name of the element.  
Examples: H = hydrogen, He = helium,  
Ne = neon, Al = aluminum, S = sulfur
- Others come from the first one or two letters in the Latin words for the element.  
Examples: Pb = lead (plumbum),  
Sn = tin (stannum), Cu = copper (cuprum)  
Fe = iron (ferrum), Ag = silver (argrum)

# Where did the chemical names come from?

- The elements names came from:
  - Planets: Neptunium, Plutonium, Mercury...
  - People: Einsteinium, Curium, Nobelium...
  - Places: Gallium (France), Europium, Polonium...
  - Color: Chlorine (yellow-green in Latin),  
Indium (Indigo), Iodine (violet in Greek)
  - Myth: Thorium (Norse war god), Titanium (Titan)...
  - Minerals: Calcium (chalk), Boron (borax)...
- The only thing you cannot name an element after is a living human.

# The Chinese Periodic Table

族 周期	I A	元素周期表										0	电子 层	电子 数
1	1 H 氢 1s <sup>1</sup>	II A	原子 序数	92 U 元素符号, 红色 指放射性元素	非金属	金属	III A	IV A	V A	VI A	VII A	2 He 氦 1s <sup>2</sup>	1	2
2	氢													
3	锂 铍									硼 碳 氮 氧 氟 氖				
4	钠 镁									铝 硅 磷 硫 氯 氩				
5	钾 钙 钪 钛 钒 铬 锰 铁 钴 镍 铜 锌 镓 锗 砷 硒 溴 氙													
6	铷 锶 钇 锆 铌 钼 铯 钨 铼 钨 铂 金 汞 铊 铅 铋 钋 砒 氡													
7	铯 钡 镧 铈 铉 钍 钷 钆 铈 镨 钕 钐 铈 铈 铈 铈													
镧系	镧 铈 铈 铈 铈 铈 铈 铈 铈 铈 铈 铈 铈 铈 铈													
锕系	锕 钍 钍 钍 钍 钍 钍 钍 钍 钍 钍 钍 钍 钍 钍													

元素的半衰期最长的同位素的质量数。

中国科学院上海物理研究所  
彭桓武 曹则刚 周同庆  
周同庆 曹则刚 彭桓武  
1955年编成  
1980年修订

# Russian Periodic Table

<b>1</b> <b>Н</b> Водород 1.00794	<b>Периодическая система</b> <i>(Относительные атомные массы Для элементов 104-107 приведен</i>		
<b>3</b> <b>Li</b> Литий 6.941	<b>4</b> <b>Be</b> Бериллий 9.01218	<b>5</b> <b>B</b> Бор 10.811	<b>6</b> <b>C</b> Углерод 12.011
<b>11</b> <b>Na</b> Натрий 22.98977	<b>12</b> <b>Mg</b> Магний 24.305	<b>13</b> <b>Al</b> Алюминий 26.98154	<b>14</b> <b>Si</b> Кремний 28.0855

22.98977  
Натрий

24.305  
Магний

26.98154  
Алюминий

28.0855  
Кремний

# The Element Song

by Tom Lehrer



## **"The Elements"**

**Lyrics by Tom Lehrer**

**Music by Sir Arthur Sullivan**

**Animation by Mike Stanfill**

# Ways to burn these into your brain:

- Copper: Drive by police yelling "C u copper!".
- Gold: In Autumn the leaves turn gold. Or: A person grabs your gold necklace and runs. You yell out: "Au, give me back my gold!"
- Iron: You pay a Fee to have someone iron your clothes. Or the Ferris wheel is made of iron.
- Silver: As you Age your hair turns silver.
- Potassium: The K-9 sniffed out the Pot-assium.
- Mercury: Hg Wells wrote about life on Mercury.
- Lead: Plumbers once used lead pipes.
- Tin: It's a Sin not to recycle your tin cans.



# Chemical Symbols

- Go to Chapter 4 in the Physical Science Series.
- Open Chemical Symbols Practice '01 folder.
- Open Chem. Symbols 71 - Click On It folder.
- Open Even on Desktop, Odd on Laptop.
- Click on Chemical Symbols Quiz.
- After title screen, click on Click here to view symbols.
- Check the symbols you need to memorize.
- Take the quiz for practice - doesn't count.

# Properties of the Elements

Long form of the Periodic Table

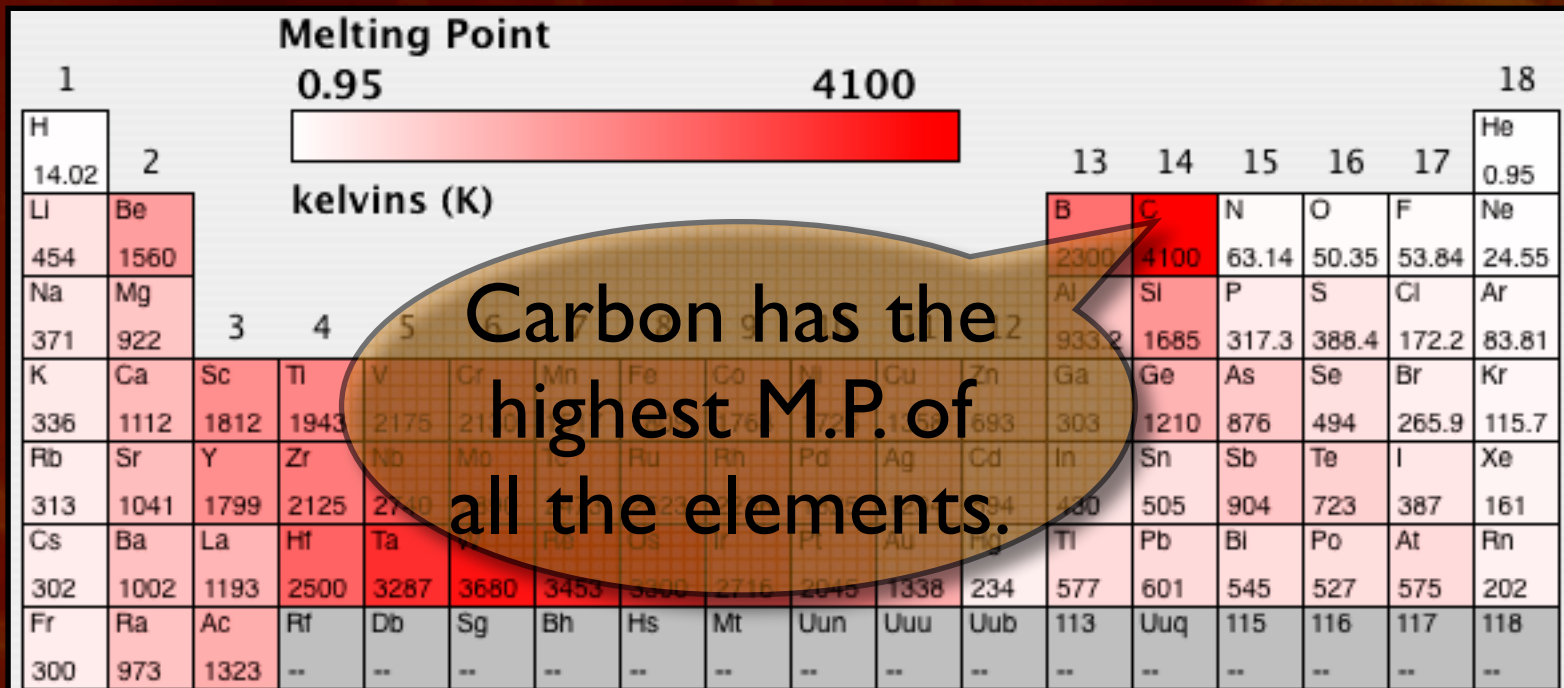
H																	He														
Li	Be											B	C	N	O	F	Ne														
Na	Mg											Al	Si	P	S	Cl	Ar														
K	Ca	Sc											Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr				
Rb	Sr	Y											Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I	Xe				
Cs	Ba	La	Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At	Rn
Fr	Ra	Ac	Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No	Lr	Rf	Db	Sg	Bh	Hs	Mt	110	111	112	113	114	115	116	117	118

Short form of the Periodic Table

H																	He
Li	Be											B	C	N	O	F	Ne
Na	Mg											Al	Si	P	S	Cl	Ar
K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr
Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I	Xe
Cs	Ba	La	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At	Rn
Fr	Ra	Ac	Rf	Db	Sg	Bh	Hs	Mt	110	111	112	113	114	115	116	117	118

Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu
Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No	Lr

# Properties of the Elements: Melting Point



Carbon has the highest M.P. of all the elements.

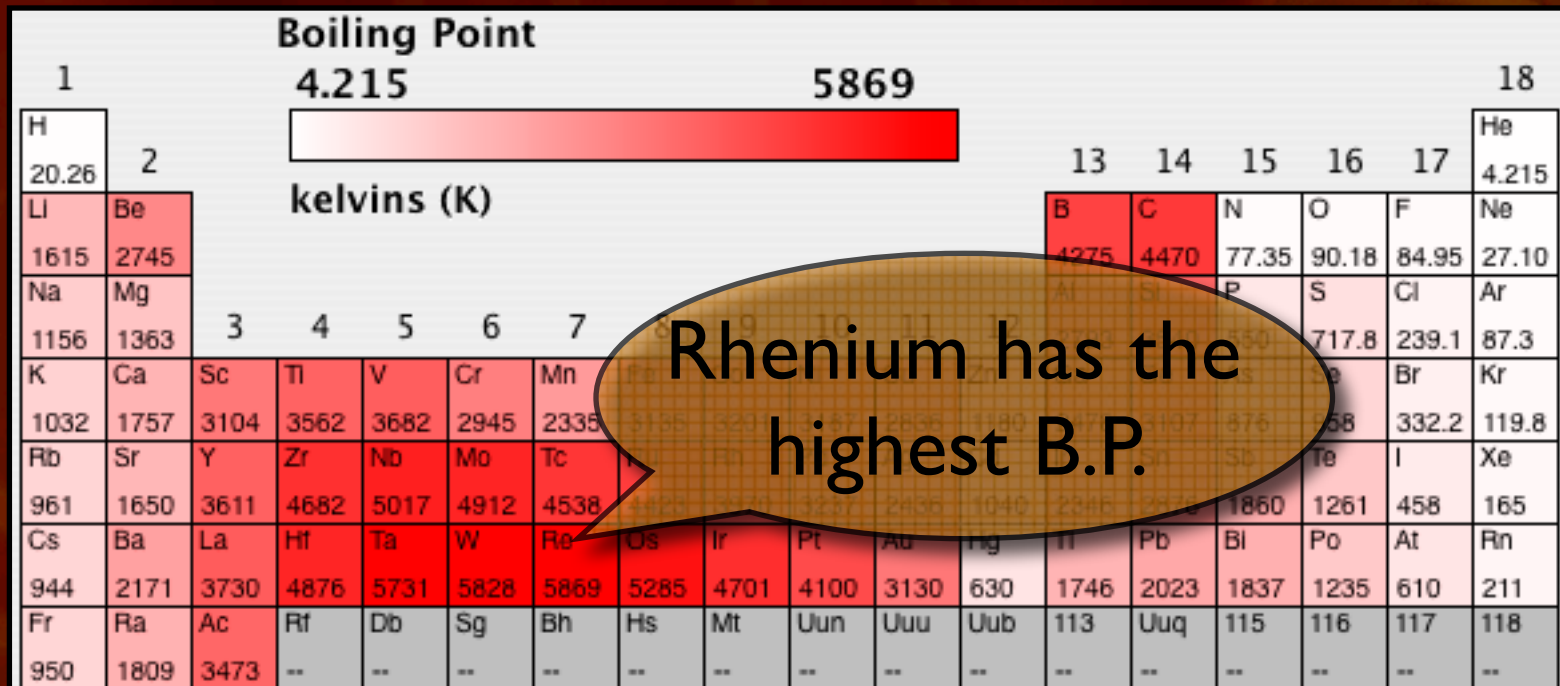
Values  Log scale

Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu
1071	1204	1289	1204	1345	1090	1585	1630	1682	1743	1795	1818	1097	1936
Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No	Lr
2028	--	1405	910	913	1268	1340	--	900	--	--	--	--	--

Log scale  Values

5058	--	1402	810	813	1588	1340	--	800	--	--	--	--	--
1011	1504	1588	1504	1342	1080	1282	1230	1285	1143	1182	1818	1097	1936
Ce	Pr	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No	Lr

# Properties of the Elements: Boiling Point



Rhenium has the highest B.P.

Values  
 Log scale

Ce 3699	Pr 3785	Nd 3341	Pm 3785	Sm 2064	Eu 1870	Gd 3539	Tb 3496	Dy 2835	Ho 2968	Er 3136	Tm 2220	Yb 1467	Lu 3668
Th 5061	Pa --	U 4407	Np --	Pu 3503	Am 2880	Cm --	Bk --	Cf --	Es --	Fm --	Md --	No --	Lr --

Log scale  
 Values

2021	--	4407	--	3203	5880	--	--	--	--	--	--	--	--
10	69	11	10	61	11	10	61	11	10	61	11	10	61
3668	3136	3341	3136	5061	1870	3539	3496	2835	2968	3136	2220	1467	3668
Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu

# Properties of the Elements: Phases @ Room Temperature

**State**

@ 298K  
24.85°C, 76.73°F  
19.88°R, 536.40Rk  
& 1 atm

1																	18
H gas	2											13	14	15	16	17	He gas
Li solid	Be solid											B solid	C solid	N gas	O gas	F gas	Ne gas
Na solid	Mg solid	3	4	5	6	7	8	9	10	11	12	Al solid	Si solid	P solid	S solid	Cl gas	Ar gas
K solid	Ca solid	Sc solid	Ti solid	V solid	Cr solid	Mn solid	Fe solid	Co solid	Ni solid	Cu solid	Zn solid	Ga solid	Ge solid	As solid	Se solid	Br liquid	Kr gas
Rb solid	Sr solid	Y solid	Zr solid	Nb solid	Mo solid	Tc solid	Ru solid	Rh solid	Pd solid	Ag solid	Cd solid	In solid	Sn solid	Sb solid	Te solid	I solid	Xe gas
Cs solid	Ba solid	La solid	Hf solid	Ta solid	W solid	Re solid	Os solid	Ir solid	Pt solid	Au solid	Hg liquid	Tl solid	Pb solid	Bi solid	Po solid	At solid	Rn gas
Fr solid	Ra solid	Ac solid	Rf --	Db --	Sg --	Bh --	Hs --	Mt --	Uun --	Uuu --	Uub --	113 --	Uuq --	115 --	116 --	117 --	118 --

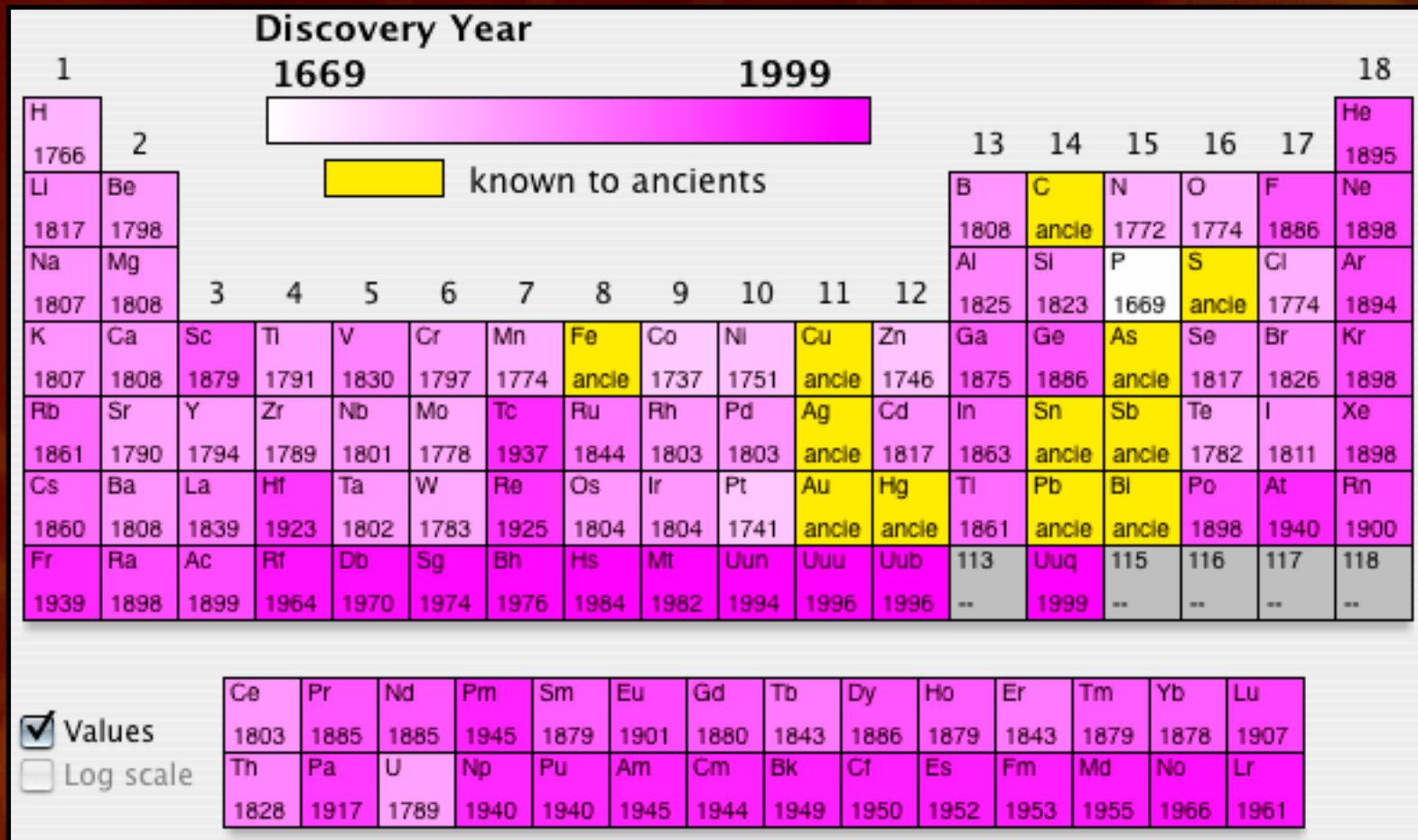
  

<input checked="" type="checkbox"/> Values	Ce solid	Pr solid	Nd solid	Pm solid	Sm solid	Eu solid	Gd solid	Tb solid	Dy solid	Ho solid	Er solid	Tm solid	Yb solid	Lu solid
<input type="checkbox"/> Log scale	Th solid	Pa --	U solid	Np --	Pu solid	Am solid	Cm --	Bk --	Cf --	Es --	Fm --	Md --	No --	Lr --

2 Liquids, 11 gases, 96 solids @ r.t.

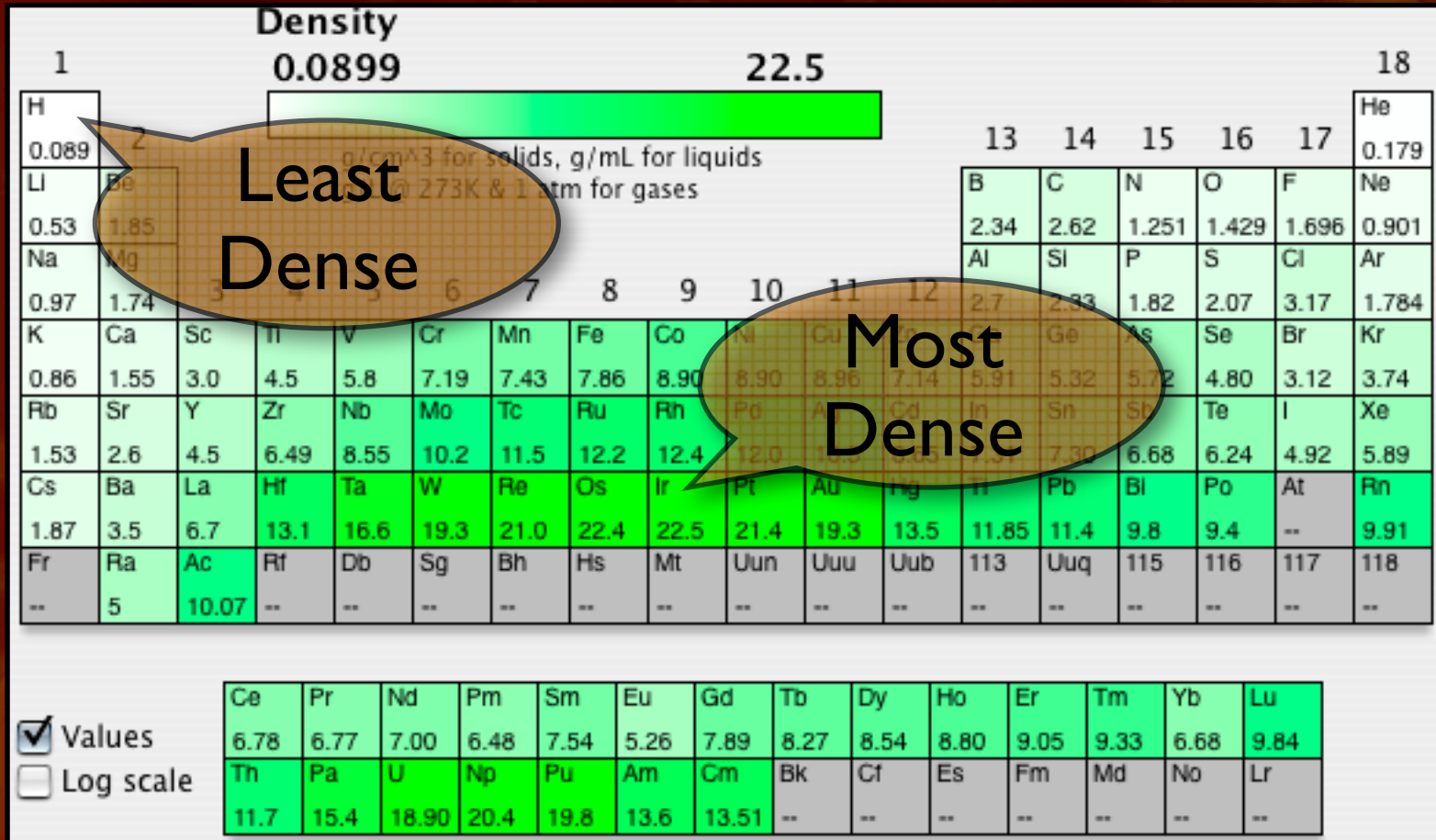


# Properties of the Elements: Year of Discovery



In 1850, only half of the elements had been discovered.

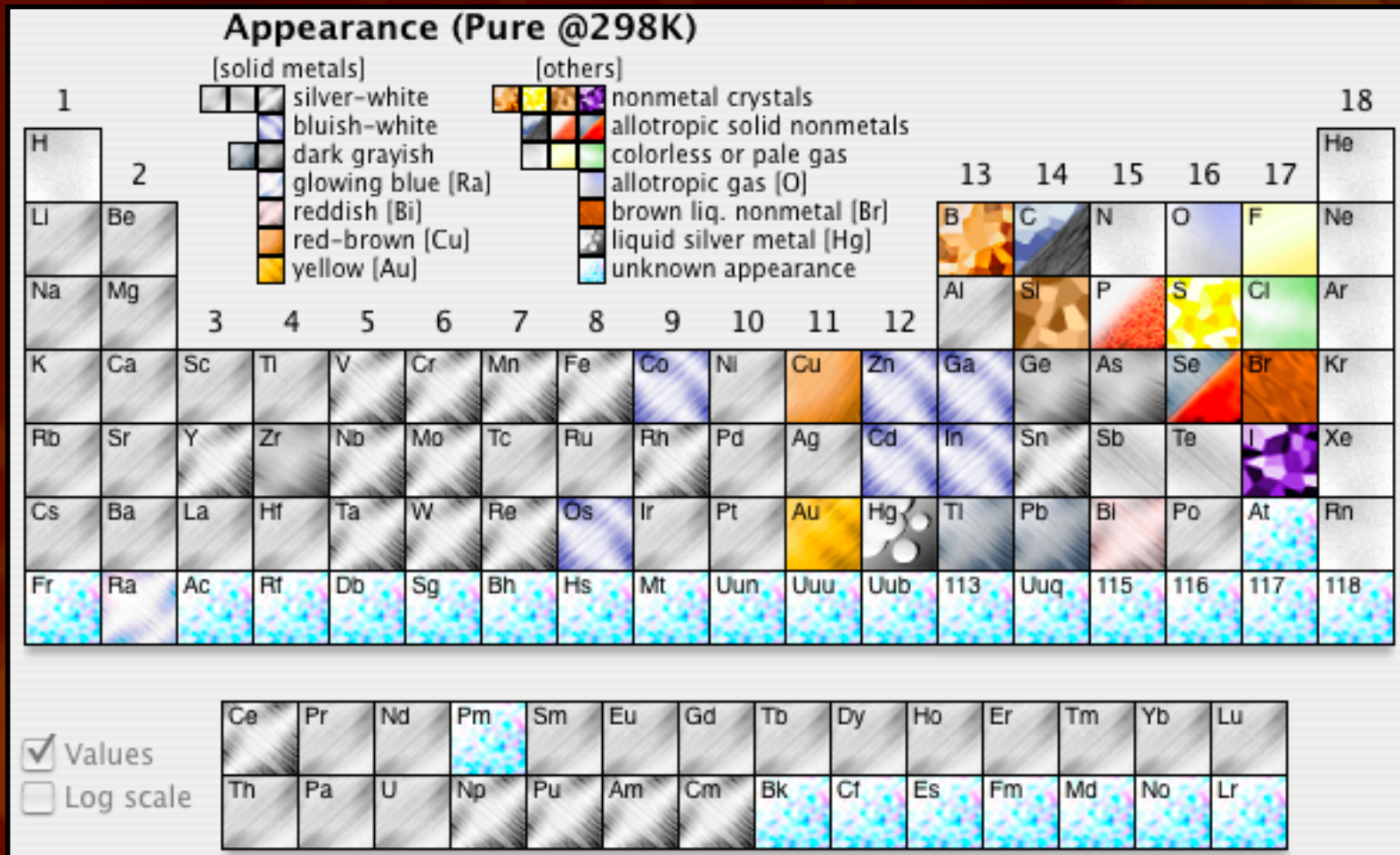
# Properties of the Elements: Density



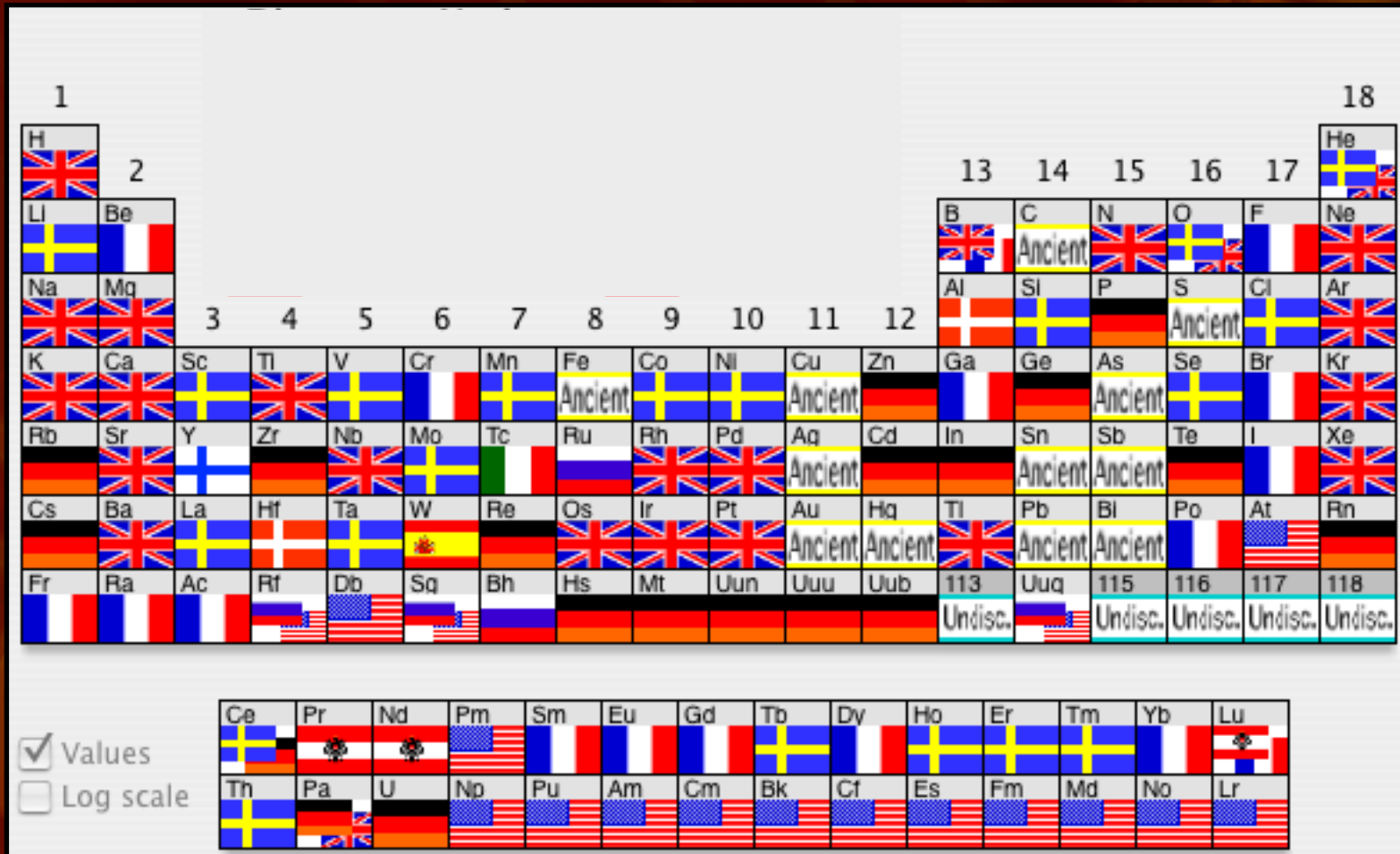
<input type="checkbox"/> Log scale	11.7	12.4	18.90	20.4	19.8	13.6	13.51	--	--	--	--	--	--	--
<input type="checkbox"/> Values	Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No	Lr
	11.7	15.4	18.90	20.4	19.8	13.6	13.51	--	--	--	--	--	--	--



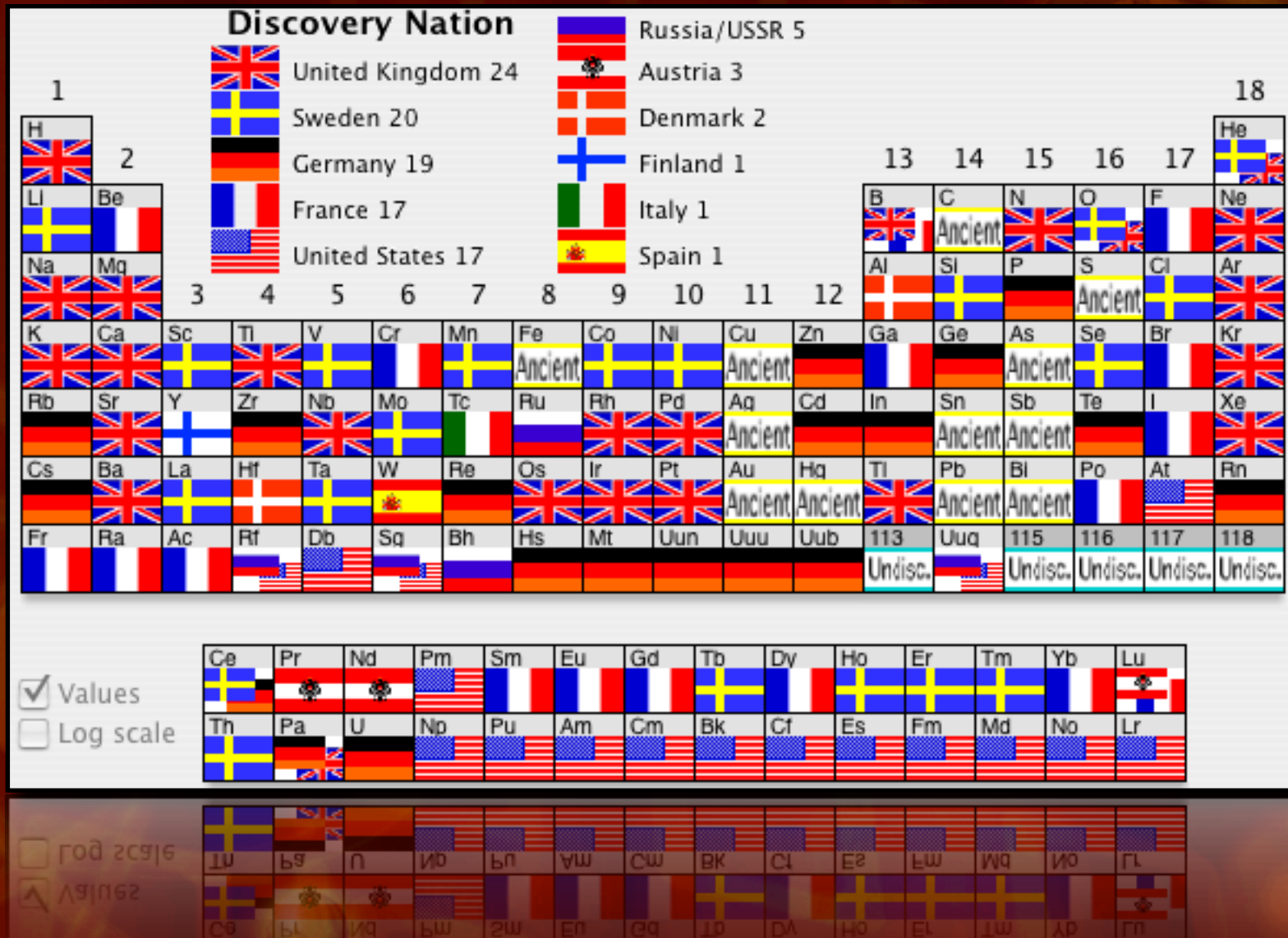
# Properties of the Elements: Color



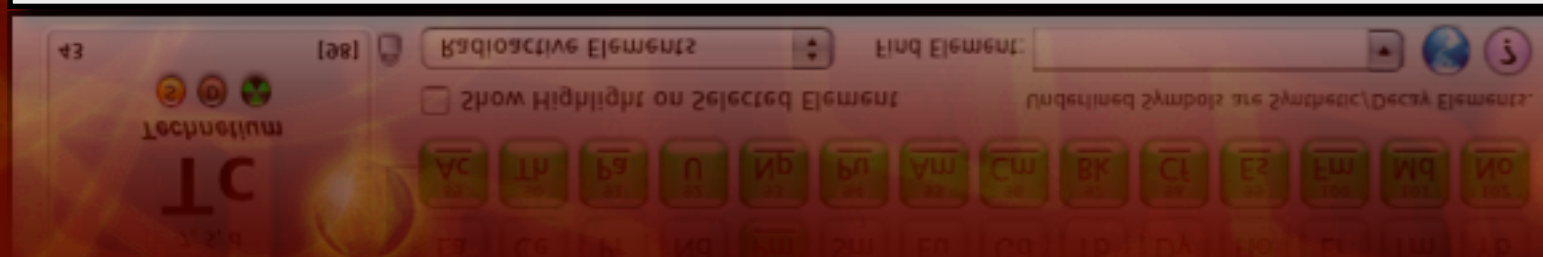
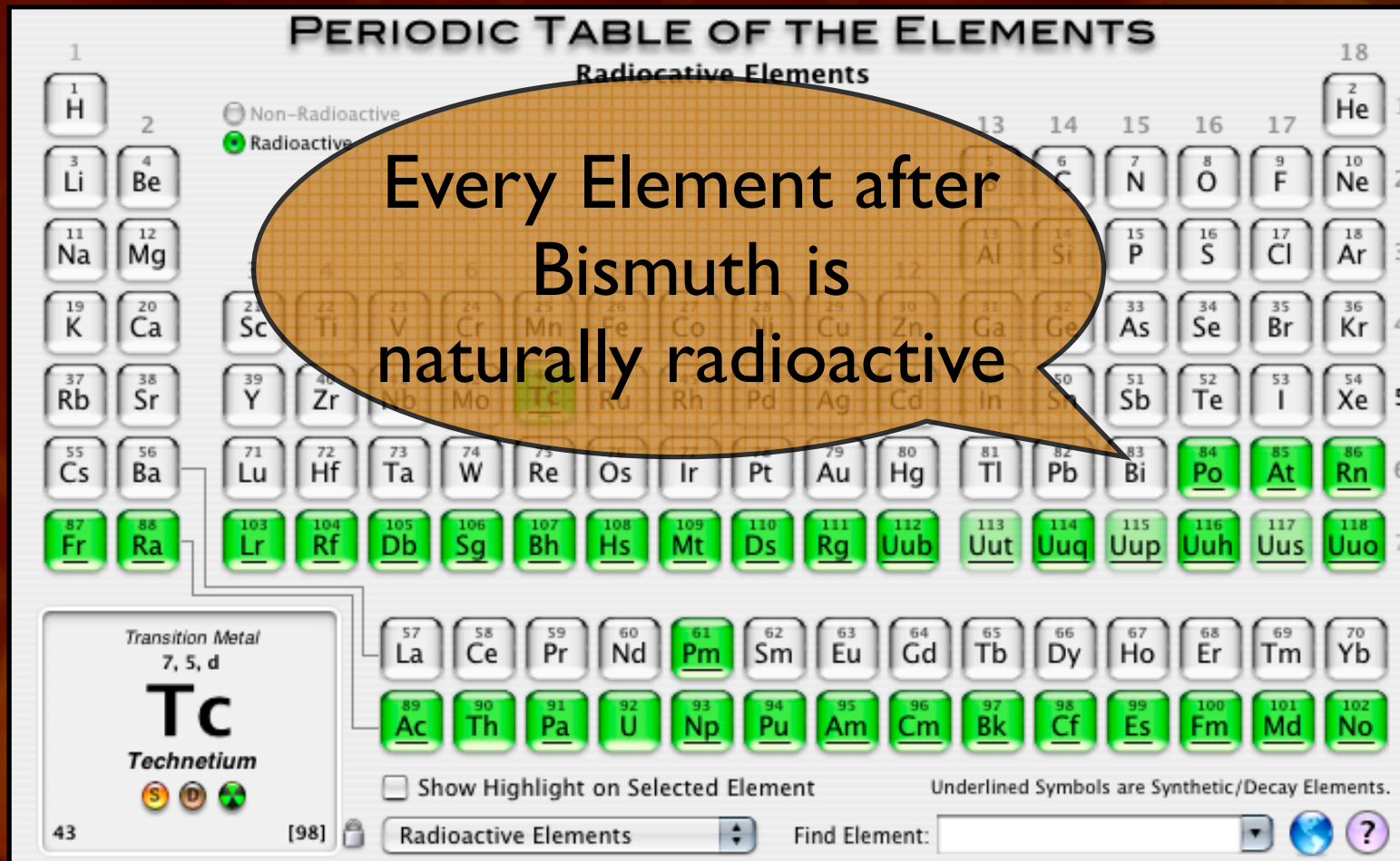
# Properties of the Elements: Discovery Nation



# Properties of the Elements: Discovery Nation



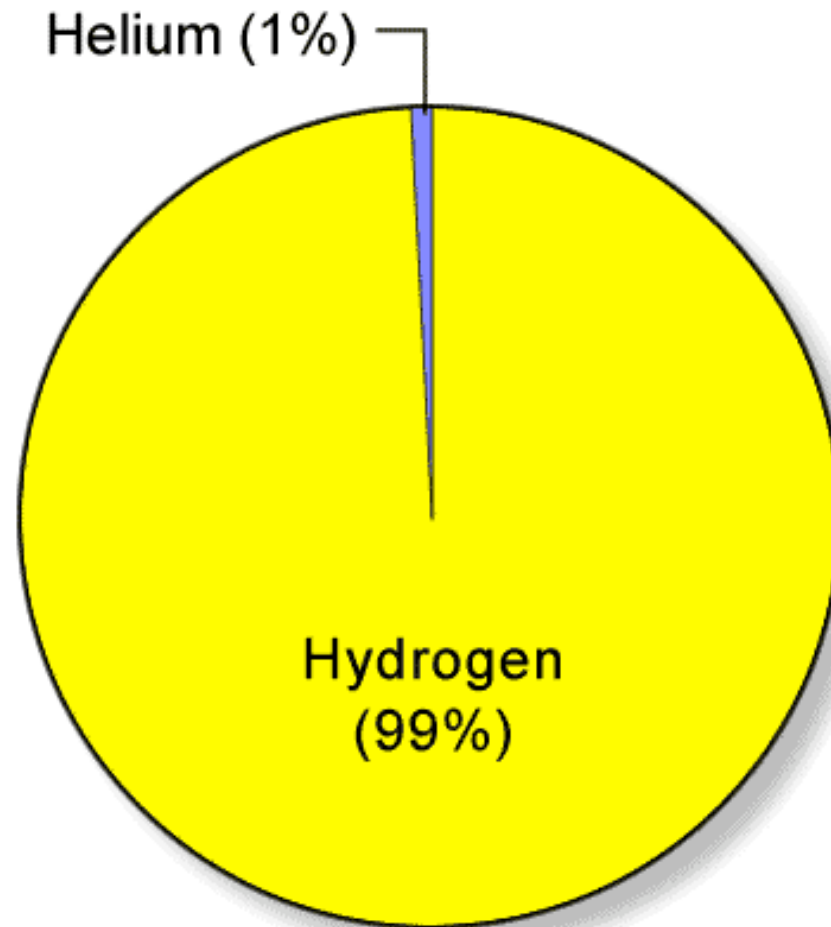
# Properties of the Elements: Radioactivity



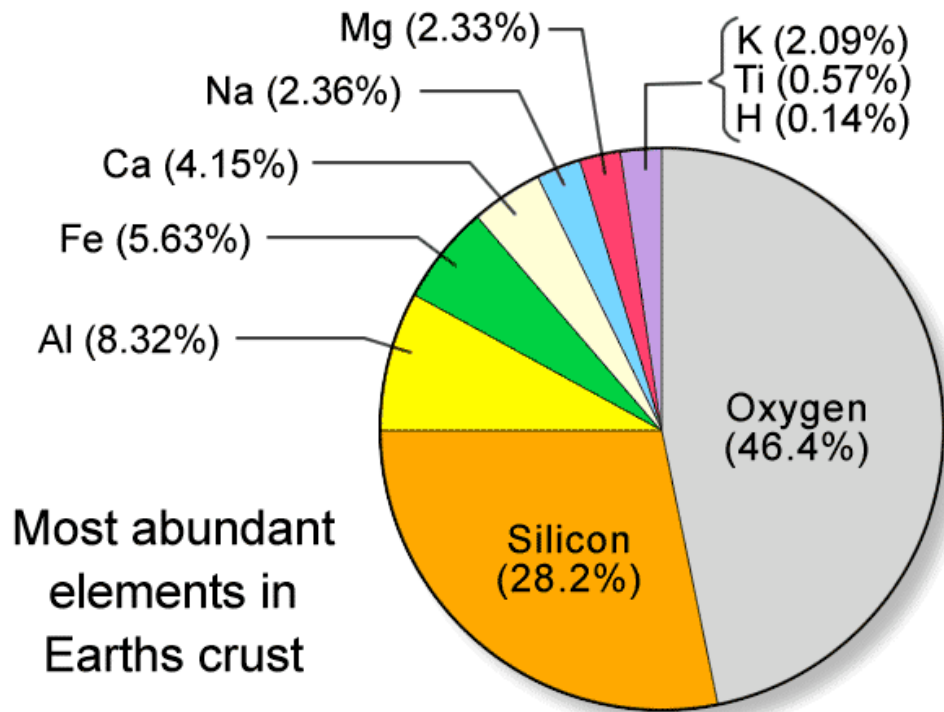
# Most Abundant Element

All stars create energy by converting hydrogen to helium.

Most abundant elements in the Universe

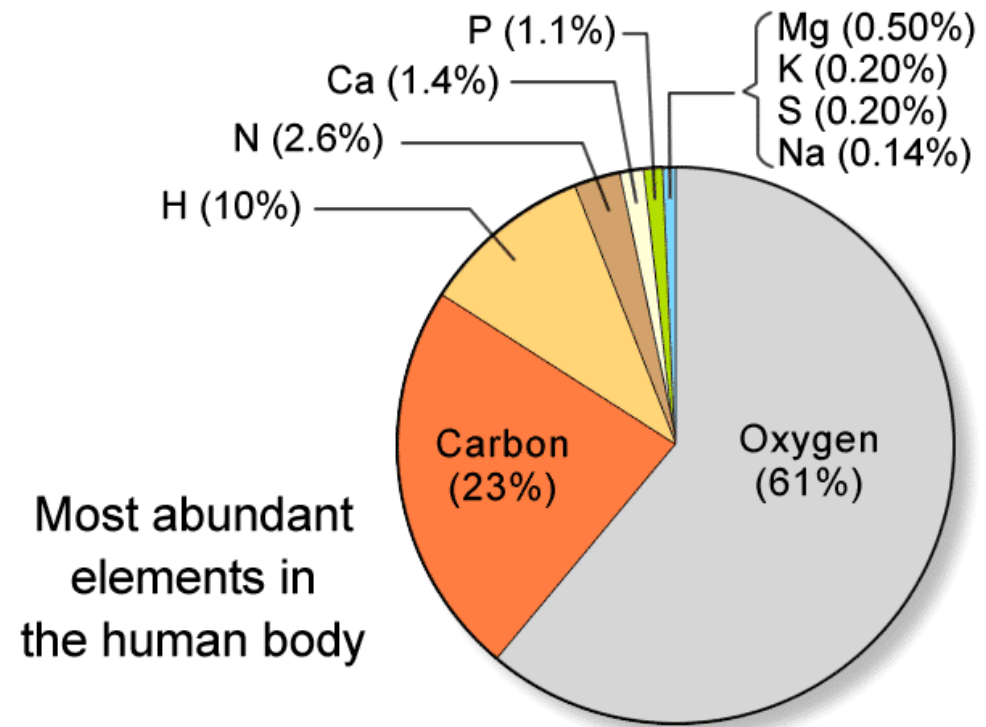


# Most Abundant Elements



Most abundant elements in Earth's crust

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Most abundant elements in the human body

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