

# The Periodic Table

The Elements

1 H	2 He																	3 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 Ni	28 Cu	29 Zn	30 Ga	31 Ge	32 As	33 Se	34 Br	35 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 Xe							
55 Cs	56 Ba	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	71 Lu							
87 Fr	88 Ra	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	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 Uuq	117 Uus	118 Uuo									

Arranged into  
Columns called **GROUPS** or **FAMILIES**  
(the columns go up and down)  
and  
Rows called **PERIODS**  
(rows go right and left)

# Groups numbered left to right in roman numerals



















1 H Hydrogen																	2 He Helium
3 Li Lithium	4 Be Beryllium											5 B Boron	6 C Carbon	7 N Nitrogen	8 O Oxygen	9 F Fluorine	10 Ne Neon
11 Na Sodium	12 Mg Magnesium											13 Al Aluminium	14 Si Silicon	15 P Phosphorus	16 S Sulfur	17 Cl Chlorine	18 Ar Argon
19 K Potassium	20 Ca Calcium	21 Sc Scandium	22 Ti Titanium	23 V Vanadium	24 Cr Chromium	25 Mn Manganese	26 Fe Iron	27 Co Cobalt	28 Ni Nickel	29 Cu Copper	30 Zn Zinc	31 Ga Gallium	32 Ge Germanium	33 As Arsenic	34 Se Selenium	35 Br Bromine	36 Kr Krypton
37 Rb Rubidium	38 Sr Strontium	39 Y Yttrium	40 Zr Zirconium	41 Nb Niobium	42 Mo Molybdenum	43 Tc Technetium	44 Ru Ruthenium	45 Rh Rhodium	46 Pd Palladium	47 Ag Silver	48 Cd Cadmium	49 In Indium	50 Sn Tin	51 Sb Antimony	52 Te Tellurium	53 I Iodine	54 Xe Xenon
55 Cs Cesium	56 Ba Barium	57 La Lanthanum	72 Hf Hafnium	73 Ta Tantalum	74 W Tungsten	75 Re Rhenium	76 Os Osmium	77 Ir Iridium	78 Pt Platinum	79 Au Gold	80 Hg Mercury	81 Tl Thallium	82 Pb Lead	83 Bi Bismuth	84 Po Polonium	85 At Astatine	86 Rn Radon
87 Fr Francium	88 Ra Radium	89 Ac Actinium	104 Rf Rutherfordium	105 Db Dubnium	106 Sg Seaborgium	107 Bh Bohrium	108 Hs Hassium	109 Mt Meitnerium									
		58 Ce Cerium	59 Pr Praseodymium	60 Nd Neodymium	61 Pm Promethium	62 Sm Samarium	63 Eu Europium	64 Gd Gadolinium	65 Tb Terbium	66 Dy Dysprosium	67 Ho Holmium	68 Er Erbium	69 Tm Thulium	70 Yb Ytterbium	71 Lu Lutetium		
		90 Th Thorium	91 Pa Protactinium	92 U Uranium	93 Np Neptunium	94 Pu Plutonium	95 Am Americium	96 Cm Curium	97 Bk Berkelium	98 Cf Californium	99 Es Einsteinium	100 Fm Fermium	101 Md Mendelevium	102 No Nobelium	103 Lr Lawrencium		

## Groups or Families (columns)

- Go up and down
- numbered left -> right in Roman numerals
- Every element in the Group has the same number of electrons in their outer shells. Or, we say, **VALENCE ELECTRONS**

For groups 1A through 8A, the group number is equal to the number of valence electrons

## Electron Distributions Into Shells for the First Three Periods

	1A	2A	3A	4A	5A	6A	7A	8A
n								He 2
1	H 1 							
2	Li 3 	Be 4 	B 5 	C 6 	N 7 	O 8 	F 9 	Ne 10 
3	Na 11 	Mg 12 	Al 13 	Si 14 	P 15 	S 16 	Cl 17 	Ar 18 

# Periods numbered top to bottom 1 - 7

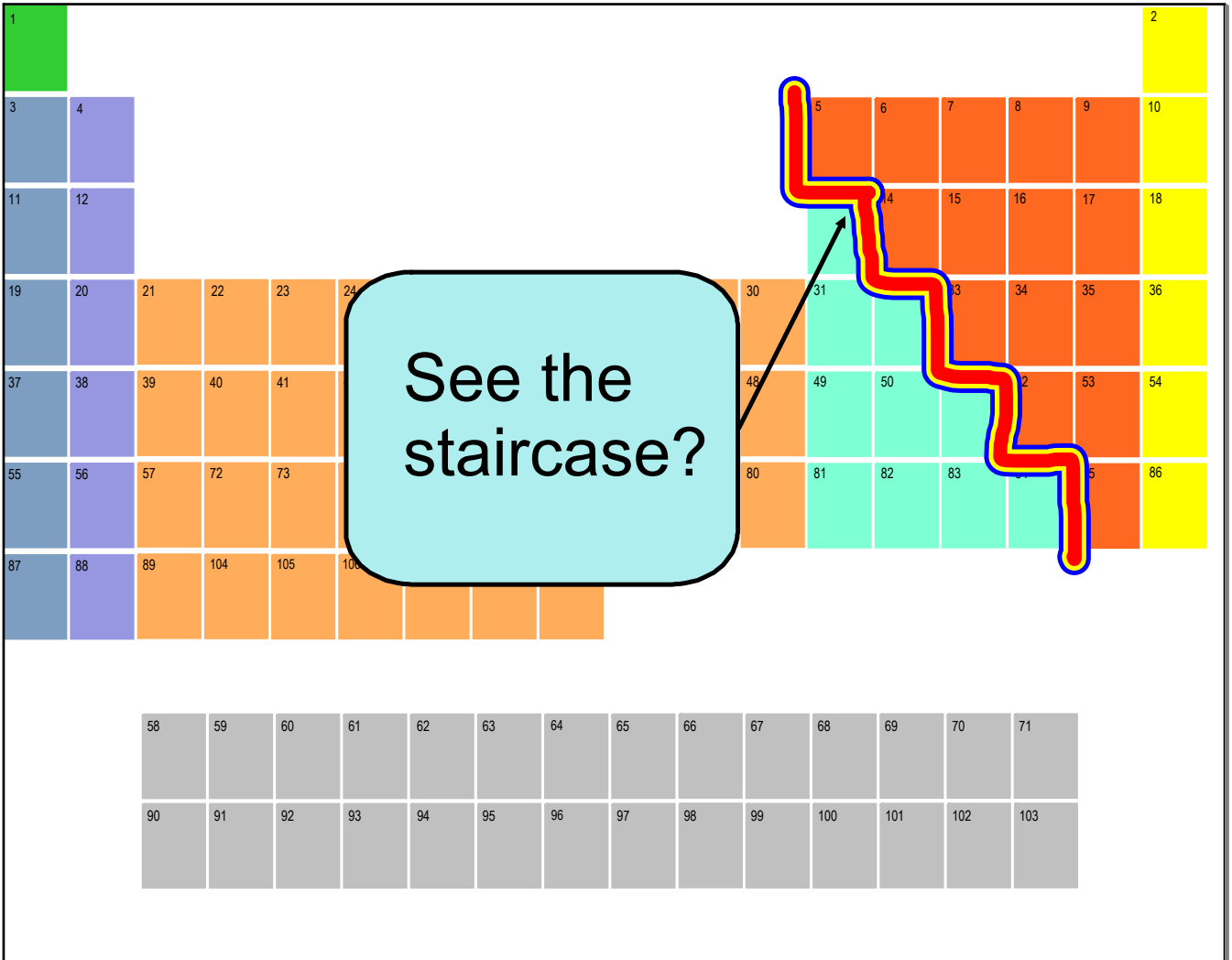
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11 Na Sodium	12 Mg Magnesium											13 Al Aluminium	14 Si Silicon	15 P Phosphorus	16 S Sulfur	17 Cl Chlorine	18 Ar Argon
19 K Potassium	20 Ca Calcium	21 Sc Scandium	22 Ti Titanium	23 V Vanadium	24 Cr Chromium	25 Mn Manganese	26 Fe Iron	27 Co Cobalt	28 Ni Nickel	29 Cu Copper	30 Zn Zinc	31 Ga Gallium	32 Ge Germanium	33 As Arsenic	34 Se Selenium	35 Br Bromine	36 Kr Krypton
37 Rb Rubidium	38 Sr Strontium	39 Y Yttrium	40 Zr Zirconium	41 Nb Niobium	42 Mo Molybdenum	43 Tc Technetium	44 Ru Ruthenium	45 Rh Rhodium	46 Pd Palladium	47 Ag Silver	48 Cd Cadmium	49 In Indium	50 Sn Tin	51 Sb Antimony	52 Te Tellurium	53 I Iodine	54 Xe Xenon
55 Cs Cesium	56 Ba Barium	57 La Lanthanum	72 Hf Hafnium	73 Ta Tantalum	74 W Tungsten	75 Re Rhenium	76 Os Osmium	77 Ir Iridium	78 Pt Platinum	79 Au Gold	80 Hg Mercury	81 Tl Thallium	82 Pb Lead	83 Bi Bismuth	84 Po Polonium	85 At Astatine	86 Rn Radon
87 Fr Francium	88 Ra Radium	89 Ac Actinium	104 Rf Rutherfordium	105 Db Dubnium	106 Sg Seaborgium	107 Bh Bohrium	108 Hs Hassium	109 Mt Meitnerium									
		58 Ce Cerium	59 Pr Praseodymium	60 Nd Neodymium	61 Pm Promethium	62 Sm Samarium	63 Eu Europium	64 Gd Gadolinium	65 Tb Terbium	66 Dy Dysprosium	67 Ho Holmium	68 Er Erbium	69 Tm Thulium	70 Yb Ytterbium	71 Lu Lutetium		
		90 Th Thorium	91 Pa Protactinium	92 U Uranium	93 Np Neptunium	94 Pu Plutonium	95 Am Americium	96 Cm Curium	97 Bk Berkelium	98 Cf Californium	99 Es Einsteinium	100 Fm Fermium	101 Md Mendelevium	102 No Nobelium	103 Lr Lawrencium		

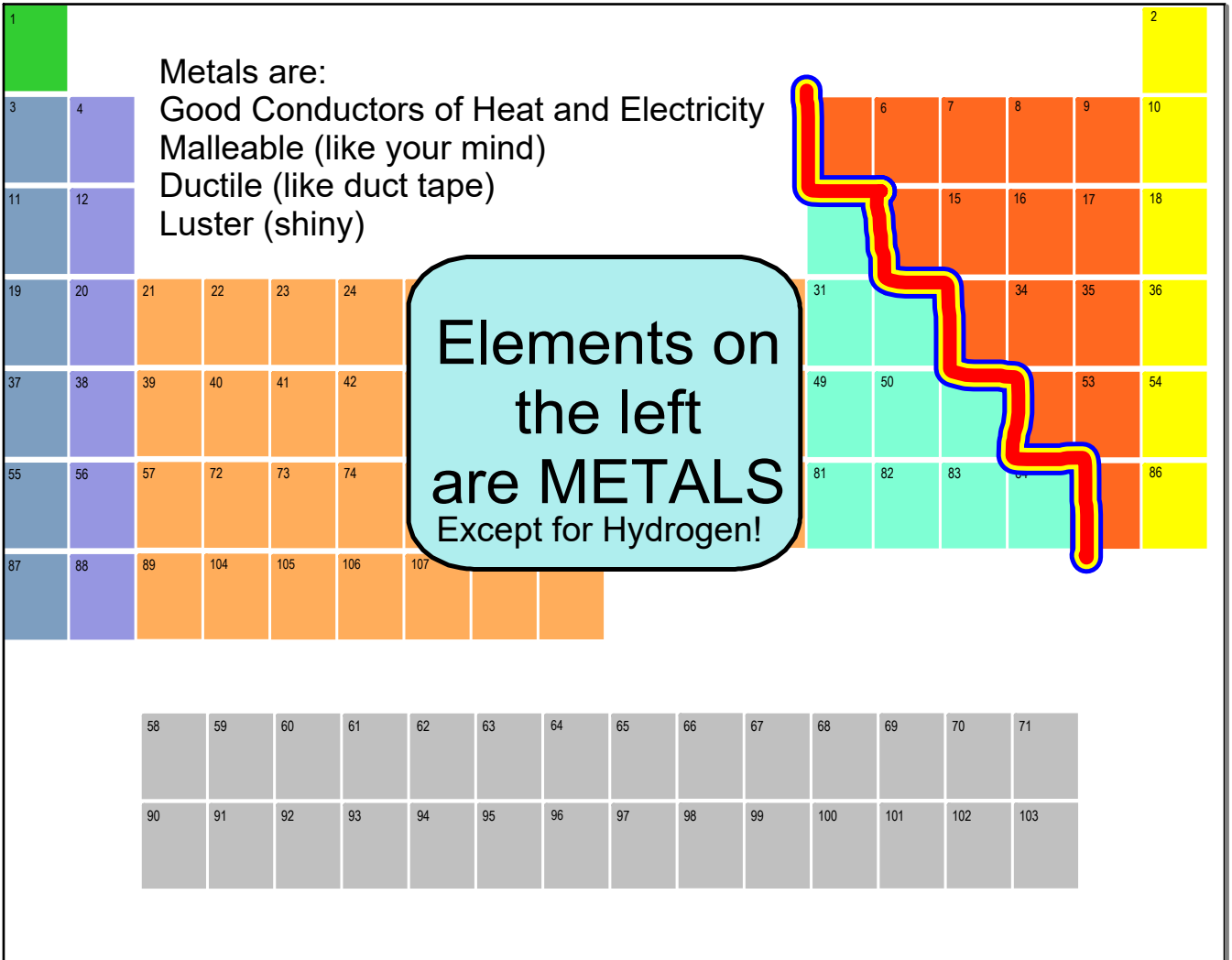
## Periods (rows)

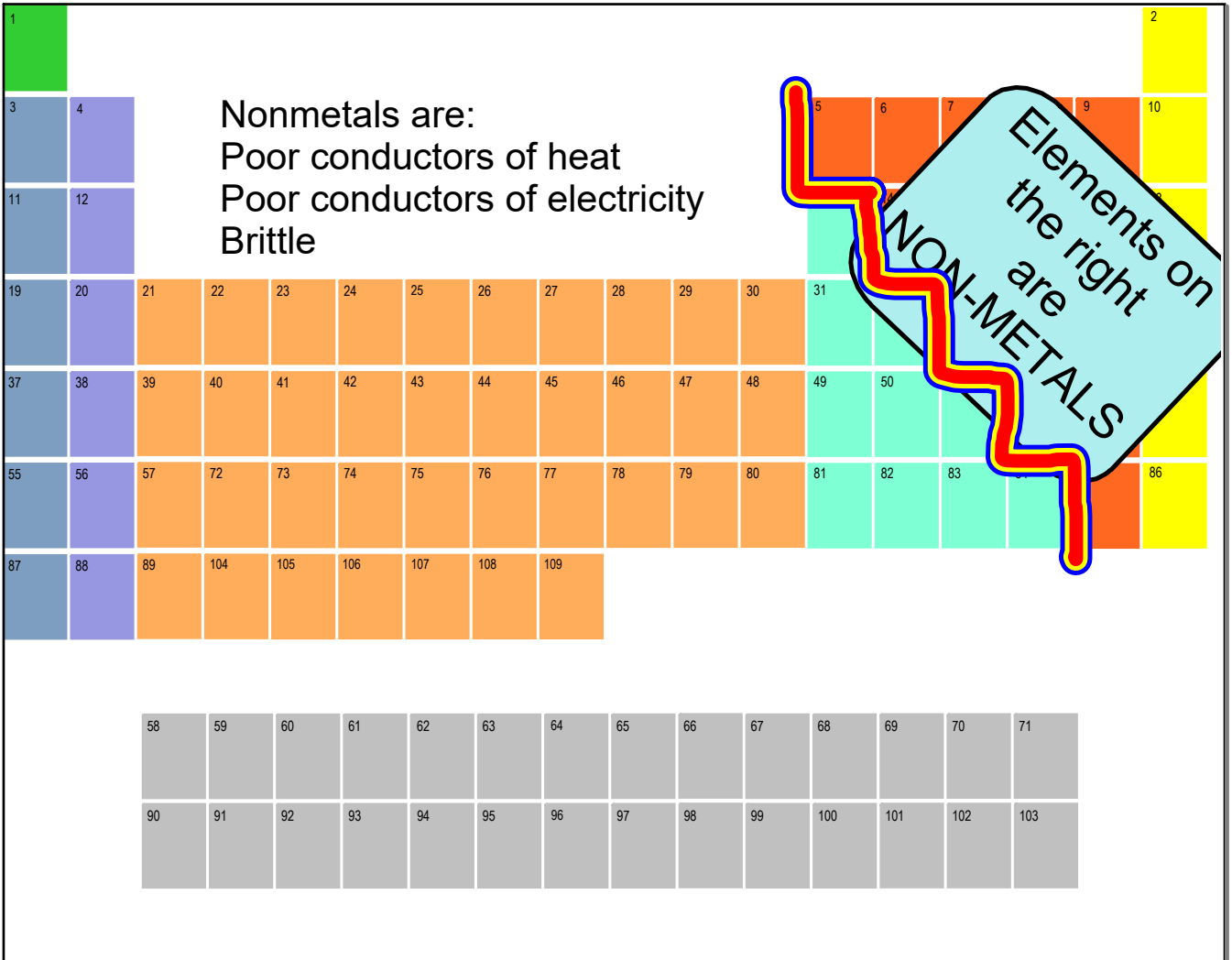
-Rows that go left and right

--have the same number of electron shells (2, 8, 18, then it gets weird)



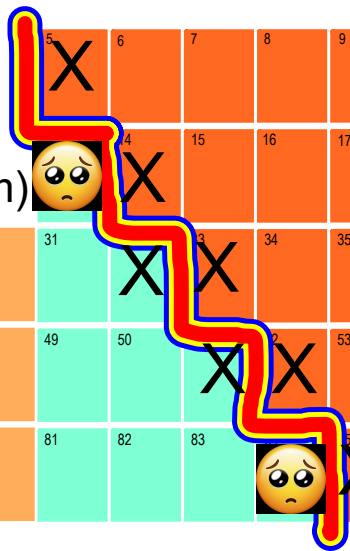






Elements that touch the staircase are called metalloids.  
 (Except for Aluminum and Polonium)

1																	2
3	4											5	6	7	8	9	10
11	12											13	14	15	16	17	18
19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54
55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72
87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104



Cool Groups:

Group I : Fairly Explosive!



Group VIII : The Noble Gases



Two  
Weird  
Groups:

The image shows a standard periodic table with the Lanthanide and Actinide series highlighted in blue. Two red arrows point from the text 'Two Weird Groups:' to these series. The Lanthanide series is located between Barium (56) and Radium (88), and the Actinide series is located between Radium (88) and Francium (87). The periodic table includes element symbols, atomic numbers, and names. A legend at the top identifies various groups: alkali metals, alkaline earth metals, transition metals, lanthanoids, actinoids, metalloids, nonmetals, noble gases, and unknown. A note at the bottom of the table states: 'For elements with no stable isotopes, the mass number of the isotope with the longest half-life is in parentheses.' The copyright information at the bottom reads: 'Design and Interface Copyright © 1997 Michael Dayah (micheel@dayah.com). http://www.ptable.com/'

Lanthanides and Actinides

# Lanthanides and Actinides

The image shows a portion of the periodic table. A blue box highlights the Lanthanide and Actinide series, which are placed below the main body of the table. Two red arrows point from the text 'Lanthanides and Actinides' to this blue box. The main table shows elements from Period 5 to 7, with atomic numbers 57-71 and 89-103 indicated for the lanthanide and actinide series respectively. A copyright notice for Michael Dayah is visible at the bottom of the table.

5	Ku	St	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn
6	Cs	Ba	57-71	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb
7	Fr	Ra	89-103	Rf	Db	Sg	Bh	Hs	Mt	Ds	Rg	Uub	Uut	Uuq

For elements with no stable isotopes, the mass number of the isotope with the long

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Their properties make them belong in  
Group 3, Right under Y (Ytterium),  
**BUT** there are lots of them so  
We drop them below the table

# Lanthanides and Actinides

5	Ku	St	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cu	Hg	Tl	Pb
6	Cs	Ba	57-71	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	
7	Fr	Ra	89-103	Rf	Db	Sg	Bh	Hs	Mt	Ds	Rg	Uub	Uut	Uuq	
				La	Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	
				Ac	Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	

For elements with no stable isotopes, the mass number of the isotope with the long

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Many of them are radioactive, unstable and only exist after nuclear bombs have exploded!



