

Atommodelle

Leukipp, Demokrit (5. Jhd. v. Chr.)

Materie: kleinste nicht teilbare Teilchen

Dalton (Anfang 19. Jhd.)

Chemisches Element: gleiche unteilbare Atome

Atommodelle

Thomson (Mitte 19. Jhd.)

Atome: positiv geladene Materiekugeln mit eingebetteten Elektronen

Rutherford (1911)

Atom ($d \approx 10^{-10}$ m): Atomkern ($d \approx 10^{-14}$ m), Atomhülle

Atommodelle

Bohr (1913)

Elektronenbahnen: Quantelung von Bahndrehimpuls und Energie

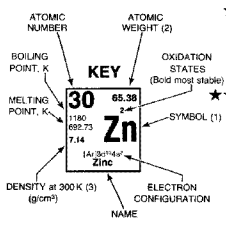
Heisenberg, Schrödinger, Pauli (ab 1925)

Elektronenorbitale, Periodensystem der Elemente

PERIODIC TABLE OF THE ELEMENTS

Table of Selected Radioactive Isotopes

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Naturally occurring radioactive isotopes are designated by a mass number in blue (though some are also manufactured). Letter in brackets indicates an isomer of another isotope of the same mass number. Half-lives follow in parentheses, where s, min, h, d, and y stand respectively for seconds, minutes, hours, days, and years. The table includes mainly the longer-lived radioactive isotopes; many others have been prepared. Isotopes known to be radioactive but with half-lives exceeding 10 ¹⁰ y have not been included. Symbols describing the principal mode (or modes) of decay are as follows (these processes are generally accompanied by gamma radiation):																	
α alpha particle emission β ⁻ beta particle (electron) emission β ⁺ positron emission EC orbital electron capture IT isomeric transition from upper to lower isomeric state SF spontaneous fission																	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1.0079	4.0026	6.941	9.01218	10.81	12.01	14.0067	15.9994	18.998403	20.179	22.989769	24.30469	26.981538	28.961157	30.973762	32.006	34.961488	36.965803
H	He	Li	Be	B	C	N	O	F	Ne	Na	Mg	Al	Si	P	S	Cl	Ar
1H	3He	6Li	9Be	10B	12C	14N	16O	19F	20Ne	23Na	24Mg	27Al	28Si	31P	32S	35Cl	36Ar
1.007825	3.016029	6.940898	9.012182	10.81107	12.010738	14.003074	15.994915	18.9984032	20.1797	22.98976928	24.3046888	26.9815386	28.9611578	30.9737625	32.0055	34.96148888	36.9658032
1s ¹	1s ²	1s ² 2s ¹	1s ² 2s ²	1s ² 2s ² 2p ¹	1s ² 2s ² 2p ²	1s ² 2s ² 2p ³	1s ² 2s ² 2p ⁴	1s ² 2s ² 2p ⁵	1s ² 2s ² 2p ⁶	1s ² 2s ² 2p ⁶ 3s ¹	1s ² 2s ² 2p ⁶ 3s ²	1s ² 2s ² 2p ⁶ 3s ² 3p ¹	1s ² 2s ² 2p ⁶ 3s ² 3p ²	1s ² 2s ² 2p ⁶ 3s ² 3p ³	1s ² 2s ² 2p ⁶ 3s ² 3p ⁴	1s ² 2s ² 2p ⁶ 3s ² 3p ⁵	1s ² 2s ² 2p ⁶ 3s ² 3p ⁶
19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
39.0983	40.08	44.9559	47.90	50.9418	51.996	54.9380	55.847	58.9332	58.93	63.546	65.38	68.72	72.59	74.9216	78.96	79.904	83.80
K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr
39.0983	40.078	44.955912	47.88	50.941861	51.996161	54.938043	55.845	58.933195	58.933195	63.546	65.38	68.72	72.59	74.9216	78.96	79.904	83.80
1s ² 3s ¹	1s ² 3s ²	1s ² 3s ² 3d ¹	1s ² 3s ² 3d ²	1s ² 3s ² 3d ³	1s ² 3s ² 3d ⁵	1s ² 3s ² 3d ⁵ 4s ¹	1s ² 3s ² 3d ⁶ 4s ²	1s ² 3s ² 3d ⁷ 4s ²	1s ² 3s ² 3d ⁸ 4s ²	1s ² 3s ² 3d ¹⁰ 4s ¹	1s ² 3s ² 3d ¹⁰ 4s ²	1s ² 3s ² 3d ¹⁰ 4s ² 4p ¹	1s ² 3s ² 3d ¹⁰ 4s ² 4p ²	1s ² 3s ² 3d ¹⁰ 4s ² 4p ³	1s ² 3s ² 3d ¹⁰ 4s ² 4p ⁴	1s ² 3s ² 3d ¹⁰ 4s ² 4p ⁵	1s ² 3s ² 3d ¹⁰ 4s ² 4p ⁶
37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54
85.4678	87.62	88.9059	91.22	92.9064	95.94	98.906	101.07	102.9055	106.4	107.868	112.41	114.82	118.69	121.75	127.6	126.904	131.30
Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I	Xe
85.4678	87.62	88.9059	91.224	92.90638	95.94	98.90625	101.07	102.9055	106.4	107.868	112.41	114.82	118.69	121.75	127.6	126.904	131.30
1s ² 4d ¹	1s ² 4d ²	1s ² 4d ² 5s ¹	1s ² 4d ² 5s ²	1s ² 4d ⁴ 5s ¹	1s ² 4d ⁵ 5s ¹	1s ² 4d ⁵ 5s ²	1s ² 4d ⁷ 5s ¹	1s ² 4d ⁸ 5s ¹	1s ² 4d ¹⁰ 5s ¹	1s ² 4d ¹⁰ 5s ¹	1s ² 4d ¹⁰ 5s ²	1s ² 4d ¹⁰ 5s ² 4p ¹	1s ² 4d ¹⁰ 5s ² 4p ²	1s ² 4d ¹⁰ 5s ² 4p ³	1s ² 4d ¹⁰ 5s ² 4p ⁴	1s ² 4d ¹⁰ 5s ² 4p ⁵	1s ² 4d ¹⁰ 5s ² 4p ⁶
55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72
132.9054	137.33	138.9055	178.49	178.9186	180.9479	186.207	190.23	192.22	198.907	198.9065	200.59	204.37	207.2	208.9804	208.9804	208.9804	222.01758
Cs	Ba	La	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At	Rn
132.9054	137.33	138.9055	178.49	178.9186	180.9479	186.207	190.23	192.22	198.907	198.9065	200.59	204.37	207.2	208.9804	208.9804	208.9804	222.01758
1s ² 4f ¹	1s ² 4f ¹ 5d ¹	1s ² 4f ¹ 5d ¹ 6s ²	1s ² 4f ¹ 5d ² 6s ²	1s ² 4f ¹ 5d ³ 6s ²	1s ² 4f ¹ 5d ⁴ 6s ²	1s ² 4f ¹ 5d ⁵ 6s ²	1s ² 4f ¹ 5d ⁶ 6s ²	1s ² 4f ¹ 5d ⁷ 6s ²	1s ² 4f ¹ 5d ⁸ 6s ²	1s ² 4f ¹ 5d ¹⁰ 6s ¹	1s ² 4f ¹ 5d ¹⁰ 6s ²	1s ² 4f ¹ 5d ¹⁰ 6s ² 6p ¹	1s ² 4f ¹ 5d ¹⁰ 6s ² 6p ²	1s ² 4f ¹ 5d ¹⁰ 6s ² 6p ³	1s ² 4f ¹ 5d ¹⁰ 6s ² 6p ⁴	1s ² 4f ¹ 5d ¹⁰ 6s ² 6p ⁵	1s ² 4f ¹ 5d ¹⁰ 6s ² 6p ⁶
87	88	89	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118
223	226.0254	227.0278	(261)	(262)	(263)	208.9804	208.9804	208.9804	208.9804	208.9804	208.9804	208.9804	208.9804	208.9804	208.9804	208.9804	208.9804
Fr	Ra	Ac	Uuq	Uup	Uuh	Uuq	Uup	Uuh	Uuq	Uup	Uuh	Uuq	Uup	Uuh	Uuq	Uup	Uuh
1s ² 5f ¹	1s ² 5f ¹ 6d ¹	1s ² 5f ¹ 6d ¹ 7s ²	1s ² 5f ¹ 6d ¹ 7s ² 8p ¹	1s ² 5f ¹ 6d ¹ 7s ² 8p ¹	1s ² 5f ¹ 6d ¹ 7s ² 8p ¹	1s ² 5f ¹ 6d ¹ 7s ² 8p ¹	1s ² 5f ¹ 6d ¹ 7s ² 8p ¹	1s ² 5f ¹ 6d ¹ 7s ² 8p ¹	1s ² 5f ¹ 6d ¹ 7s ² 8p ¹	1s ² 5f ¹ 6d ¹ 7s ² 8p ¹	1s ² 5f ¹ 6d ¹ 7s ² 8p ¹	1s ² 5f ¹ 6d ¹ 7s ² 8p ¹	1s ² 5f ¹ 6d ¹ 7s ² 8p ¹	1s ² 5f ¹ 6d ¹ 7s ² 8p ¹	1s ² 5f ¹ 6d ¹ 7s ² 8p ¹	1s ² 5f ¹ 6d ¹ 7s ² 8p ¹	1s ² 5f ¹ 6d ¹ 7s ² 8p ¹



NOTES:
(1) Black — solid
Red — gas
Blue — liquid
Outline — synthetically prepared.
(2) Based upon carbon-12, (1) indicates most stable or best known isotope.
(3) Entries marked with asterisks refer to the gaseous state at 273 K and 1 atm and are given in units of g/l.

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