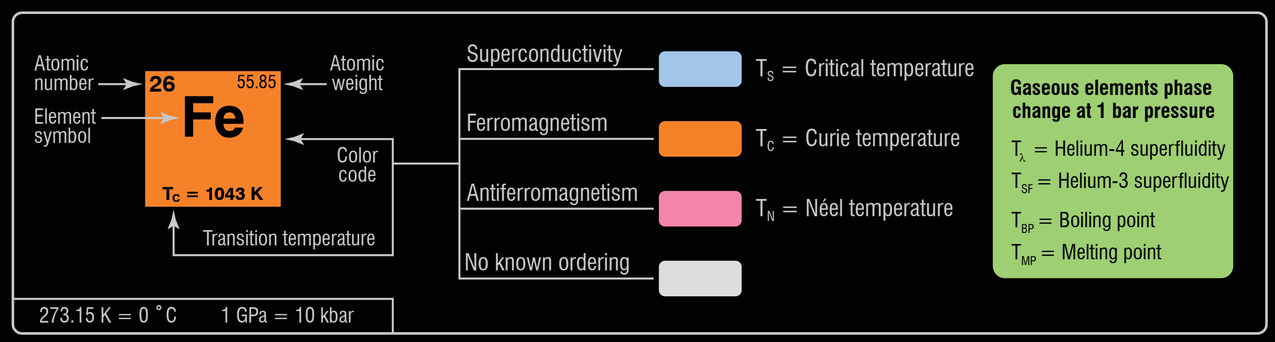
Periodic Table of Elements

Selected Phase Transition Temperatures

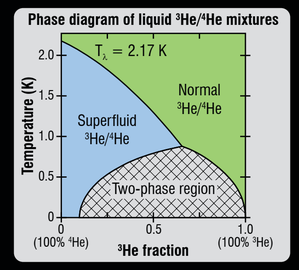


Gaseous elements phase change at 1 bar pressure

T_λ = Helium-4 superfluidity
T_{SF} = Helium-3 superfluidity
T_{BP} = Boiling point
T_{MP} = Melting point

Helium-3 isotope

2 3.0 **He**
T_{BP} = 3.19 K
T_{SF} = 0.0025 K



1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6
1 1.008 **H** T_{BP} = 20.3 K T_{MP} = 13.8 K															2 4.003 **He** T_{BP} = 4.21 K T_λ = 2.17 K
3 6.941 **Li** T_S = 0.0004 K	4 9.012 **Be** T_S = 0.026 K									5 10.81 **B** Boron	6 12.01 **C** Carbon	7 14.01 **N** T_{BP} = 77.4 K T_{MP} = 63.3 K	8 16.00 **O** T_{BP} = 90.2 K T_{MP} = 54.4 K $T_{\gamma\to\beta}$ = 43 K	9 19.00 **F** T_{BP} = 85.0 K T_{MP} = 53.5 K	10 20.18 **Ne** T_{BP} = 27.1 K T_{MP} = 24.6 K
11 22.99 **Na** Sodium	12 24.31 **Mg** Magnesium									13 26.98 **Al** T_S = 1.14 K	14 28.09 **Si** Silicon	15 30.97 **P** Phosphorus	16 32.07 **S** Sulfur	17 35.45 **Cl** T_{BP} = 239.1 K T_{MP} = 171.7 K	18 39.95 **Ar** T_{BP} = 87.3 K T_{MP} = 83.8 K
19 39.10 **K** Potassium	20 40.08 **Ca** Calcium	21 44.96 **Sc** Scandium	22 47.87 **Ti** T_S = 0.39 K	23 50.94 **V** T_S = 5.38 K	24 52.00 **Cr** T_N = 311 K	25 54.94 **Mn** (α) T_N = 100 K	26 55.85 **Fe** T_C = 1043 K	27 58.93 **Co** T_C = 1388 K	28 58.69 **Ni** T_C = 627 K	29 63.55 **Cu** Copper	30 65.41 **Zn** T_S = 0.875 K	31 69.72 **Ga** T_S = 1.091 K	32 72.64 **Ge** Germanium	33 74.92 **As** Arsenic	34 78.96 **Se** Selenium	35 79.90 **Br** Bromine	36 83.80 **Kr** T_{BP} = 119.9 K T_{MP} = 115.8 K
37 85.47 **Rb** Rubidium	38 87.62 **Sr** Strontium	39 88.91 **Y** Yttrium	40 91.22 **Zr** T_S = 0.546 K	41 92.91 **Nb** T_S = 9.20 K	42 95.94 **Mo** T_S = 0.92 K	43 (98) **Tc** T_S = 7.77 K	44 101.1 **Ru** T_S = 0.51 K	45 102.9 **Rh** T_S = 0.00033 K	46 106.4 **Pd** Palladium	47 107.9 **Ag** Silver	48 112.4 **Cd** T_S = 0.52 K	49 114.8 **In** T_S = 3.404 K	50 118.7 **Sn** T_S = 3.722 K	51 121.8 **Sb** Antimony	52 127.6 **Te** Tellurium	53 126.9 **I** Iodine	54 131.3 **Xe** T_{BP} = 165.0 K T_{MP} = 161.3 K
55 132.9 **Cs** Cesium	56 137.3 **Ba** Barium		72 178.5 **Hf** T_S = 0.12 K	73 180.9 **Ta** T_S = 4.483 K	74 183.8 **W** T_S = 0.012 K	75 186.2 **Re** T_S = 1.4 K	76 190.2 **Os** T_S = 0.655 K	77 192.2 **Ir** T_S = 0.14 K	78 195.1 **Pt** Platinum	79 197.0 **Au** Gold	80 200.6 **Hg** (α) T_S = 4.153 K	81 204.4 **Tl** T_S = 2.39 K	82 207.2 **Pb** T_S = 7.193 K	83 209.0 **Bi** Bismuth	84 (209) **Po** Polonium	85 (210) **At** Astatine	86 (222) **Rn** T_{BP} = 211.5 K T_{MP} = 202.2 K
87 (223) **Fr** Francium	88 (226) **Ra** Radium		104 (261) **Rf** Rutherfordium	105 (262) **Db** Dubnium	106 (266) **Sg** Seaborgium	107 (264) **Bh** Bohrium	108 (277) **Hs** Hassium										

Magnetic standard reference materials

Platinum	χ_{DC}(297 K) = 1.01 x 10^{-6} emu/g·Oe	(NIST SRM #764a)
Palladium	χ_{DC}(298 K) = 5.25 x 10^{-6} emu/g·Oe	(Quantum Design part #4500-658)
Nickel	M_{sat}(298 K, 5000 Oe) = 54.9 emu/g	(NIST SRM #772a)

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M. Brian Maple, University of California, San Diego

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Dedicated to the memory of Bernd Matthias

1	2	3	4	5	6	7	8	9	10	11	12	13	14
57 138.9 **La** (fcc) T_S = 6.00 K	58 140.1 **Ce** $T_{N\text{-}hex}$ = 13.7 K	59 140.9 **Pr** $T_{N\text{-}hex}$ = 0.03 K	60 144.2 **Nd** $T_{N\text{-}hex}$ = 19.9 K $T_{N\text{-}cub}$ = 7.5 K	61 (145) **Pm** Promethium	62 150.4 **Sm** $T_{N\text{-}hex}$ = 109 K $T_{N\text{-}cub}$ = 14.0 K	63 152.0 **Eu** $T_{N\text{-}cub}$ = 90.4 K	64 157.3 **Gd** T_C = 293 K	65 158.9 **Tb** $T_{N\text{-}hex}$ = 230 K T_C = 220 K	66 162.5 **Dy** $T_{N\text{-}hex}$ = 180 K T_C = 90.5 K	67 164.9 **Ho** $T_{N\text{-}hex}$ = 132 K T_C = 19.5 K	68 167.3 **Er** $T_{N\text{-}hex}$ = 85 K T_C = 18.7 K	69 168.9 **Tm** $T_{N\text{-}hex}$ = 58 K T_C = 32 K	70 173.0 **Yb** Ytterbium	71 175.0 **Lu** Lutetium
89 (227) **Ac** Actinium	90 232.0 **Th** T_S = 1.368 K	91 231.0 **Pa** T_S = 1.4 K	92 238.0 **U** (β) T_S = 0.8 K	93 (237) **Np** Neptunium	94 (244) **Pu** Plutonium	95 (243) **Am** T_S = 0.79 K	96 (247) **Cm** T_N = 64 K	97 (247) **Bk** T_N = 34 K	98 (251) **Cf** T_C = 51 K	99 (252) **Es** Einsteinium	100 (257) **Fm** Fermium	101 (258) **Md** Mendelevium	102 (259) **No** Nobelium	103 (262) **Lr** Lawrencium

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