

# Periodic Table of the Elements

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GROUP 1

IA

1

1.00794

<sup>2</sup>S<sub>1/2</sub>

2.2

H

Hydrogen

0.0899

13.5984

-259.14

-252.87

(v) 37

1s<sup>1</sup>

+1,-1

2

9.012182

<sup>1</sup>S<sub>0</sub>

1.57

Be

Beryllium

0.535

5.3917

1287

2470

(m) 112

HCP

[He] 2s<sup>2</sup>

+2

11

22.989767

<sup>2</sup>S<sub>1/2</sub>

0.93

Na

Sodium

0.968

5.1391

97.72

883

(m) 186

BCC

[Ne] 3s<sup>1</sup>

+1

12

24.3050

<sup>1</sup>S<sub>0</sub>

1.31

Mg

Magnesium

1.738

7.6462

650

1090

(m) 160

HCP

[Ne] 3s<sup>2</sup>

+2

13

10.811

<sup>2</sup>P<sub>1/2</sub>

2.04

B

Boron

2.46

8.2980

2075

4000

(v) 82

rhomb.

[He] 2s<sup>2</sup> 2p<sup>1</sup>

+3

14

12.0107

<sup>2</sup>P<sub>0</sub>

2.55

C

Carbon

2.26

11.2603

3550

4027

(v) 77

hex

[He] 2s<sup>2</sup> 2p<sup>2</sup>

+2,4

15

14.0067

<sup>4</sup>S<sub>3/2</sub>

3.04

N

Nitrogen

1.251

14.5341

-210.1

-195.79

(v) 75

-

[He] 2s<sup>2</sup> 2p<sup>3</sup>

+2,3,4,5,-2,-3

16

15.9994

<sup>3</sup>P<sub>2</sub>

3.44

O

Oxygen

1.429

13.6181

-218.3

-182.9

(v) 73

-

[He] 2s<sup>2</sup> 2p<sup>4</sup>

-2

17

18.9984032

<sup>2</sup>P<sub>3/2</sub>

3.98

F

Fluorine

1.696

17.4228

-219.6

-188.12

(v) 71

-

[He] 2s<sup>2</sup> 2p<sup>5</sup>

-1

18

20.1797

<sup>1</sup>S<sub>0</sub>

3

Ne

Neon

0.9

21.5645

-248.59

-246.08

(v) 69

-

[He] 2s<sup>2</sup> 2p<sup>6</sup>

0

19

39.0983

<sup>4</sup>S<sub>3/2</sub>

0.82

K

Potassium

0.856

4.3407

43.38

759

(m) 227

BCC

[Ar] 4s<sup>1</sup>

+1

20

40.078

<sup>1</sup>S<sub>0</sub>

1.00

Ca

Calcium

1.55

6.1132

842

1484

(m) 197

FCC

[Ar] 4s<sup>2</sup>

+2

21

44.955910

<sup>2</sup>D<sub>3/2</sub>

1.36

Sc

Scandium

2.985

6.5615

1541

2830

(m) 162

HCP

[Ar] 3d<sup>1</sup> 4s<sup>2</sup>

+3

22

47.867

<sup>2</sup>F<sub>7/2</sub>

1.54

Ti

Titanium

4.507

6.8281

1668

3287

(m) 147

HCP

[Ar] 3d<sup>2</sup> 4s<sup>2</sup>

+2,3,4,5

23

50.9415

<sup>4</sup>F<sub>3/2</sub>

1.63

V

Vanadium

6.11

6.7462

1910

3407

(m) 134

BCC

[Ar] 3d<sup>3</sup> 4s<sup>2</sup>

+2,3,4,5

24

51.9961

<sup>5</sup>S<sub>2</sub>

1.66

Cr

Chromium

7.14

6.7665

1907

2671

(m) 128

BCC

[Ar] 3d<sup>5</sup> 4s<sup>1</sup>

+2,3,6

25

54.938049

<sup>6</sup>S<sub>5/2</sub>

1.55

Mn

Manganese

7.47

7.4340

1246

2061

(m) 127

scubic

[Ar] 3d<sup>5</sup> 4s<sup>2</sup>

+2,3,6,7

26

55.845

<sup>5</sup>D<sub>4</sub>

1.83

Fe

Iron

7.874

7.9024

1538

2861

(m) 126

BCC

[Ar] 3d<sup>6</sup> 4s<sup>2</sup>

+2,3

27

58.93200

<sup>5</sup>D<sub>3</sub>

1.88

Co

Cobalt

8.9

7.8810

1495

2927

(m) 142

HCP

[Ar] 3d<sup>7</sup> 4s<sup>2</sup>

+2,3

28

58.6934

<sup>4</sup>F<sub>9/2</sub>

1.91

Ni

Nickel

8.908

7.6398

1455

2913

(m) 124

FCC

[Ar] 3d<sup>8</sup> 4s<sup>2</sup>

+2,3

29

63.546

<sup>2</sup>S<sub>1/2</sub>

1.90

Cu

Copper

8.92

7.7264

1084.62

2927

(m) 128

FCC

[Ar] 3d<sup>10</sup> 4s<sup>1</sup>

+1,2

30

65.409

<sup>1</sup>S<sub>0</sub>

1.65

Zn

Zinc

7.14

9.3942

419.53

907

(m) 143

cubic

[Ar] 3d<sup>10</sup> 4s<sup>2</sup>

+2

31

69.723

<sup>2</sup>P<sub>1/2</sub>

1.81

Ga

Gallium

5.904

5.9993

29.76

2204

(m) 135

SBCC

[Ar] 3d<sup>10</sup> 4s<sup>2</sup> 4p<sup>1</sup>

+3

32

72.64

<sup>3</sup>P<sub>0</sub>

2.01

Ge

Germanium

5.323

7.8994

938.3

2820

(v) 122

scubic

[Ar] 3d<sup>10</sup> 4s<sup>2</sup> 4p<sup>2</sup>

+2,4

33

74.92160

<sup>4</sup>S<sub>3/2</sub>

2.18

As

Arsenic

5.727

7.9886

817

614

(v) 119

rhomb.

[Ar] 3d<sup>10</sup> 4s<sup>2</sup> 4p<sup>3</sup>

+3,-3,5

34

78.96

<sup>3</sup>P<sub>2</sub>

2.55

Se

Selenium

4.819

7.9524

211

685

(v) 116

shex

[Ar] 3d<sup>10</sup> 4s<sup>2</sup> 4p<sup>4</sup>

+2,4,-2

35

79.904

<sup>2</sup>P<sub>3/2</sub>

2.96

Br

Bromine

4.819

7.9524

211

685

(v) 114

BCO

[Ar] 3d<sup>10</sup> 4s<sup>2</sup> 4p<sup>5</sup>

+1,5,-1

36

83.798

<sup>3</sup>P<sub>3/2</sub>

2.96

Kr

Krypton

3.75

13.9996

-189.3

-185.8

(v) 110

-

[Ar] 3d<sup>10</sup> 4s<sup>2</sup> 4p<sup>6</sup>

0

37

85.4678

<sup>2</sup>S<sub>1/2</sub>

0.82

Rb

Rubidium

1.532

4.1771

39.31

688

(m) 248

BCC

[Kr] 5s<sup>1</sup>

+1

38

87.62

<sup>1</sup>S<sub>0</sub>

0.95

Sr

Strontium

2.63

5.6949

777

1329

(m) 215

FCC

[Kr] 4d<sup>1</sup> 5s<sup>2</sup>

+2

39

88.90585

<sup>2</sup>D<sub>3/2</sub>

1.22

Y

Yttrium

4.472

6.2173

1526

3345

(m) 180

HCP

[Kr] 4d<sup>1</sup> 5s<sup>2</sup>

+3

40

91.224

<sup>2</sup>F<sub>7/2</sub>

1.33

Zr

Zirconium

6.511

6.6339

1855

4409

(m) 160

HCP

[Kr] 4d<sup>2</sup> 5s<sup>2</sup>

+4

41

92.90638

<sup>6</sup>D<sub>1/2</sub>

1.60

Nb

Niobium

8.57

6.7589

2477

4744

(m) 146

BCC

[Kr] 4d<sup>4</sup> 5s<sup>1</sup>

+3,5

42

95.94

<sup>5</sup>S<sub>2</sub>

2.16

Mo

Molybdenum

10.28

7.0924

2623

4639

(m) 139

BCC

[Kr] 4d<sup>5</sup> 5s<sup>1</sup>

+2,3,4,5,6

43

98.906

<sup>6</sup>S<sub>5/2</sub>

1.9

Tc

Technetium

11.57

7.28

2157

4265

(m) 136

HCP

[Kr] 4d<sup>5</sup> 5s<sup>2</sup>

+4,7

44

101.07

<sup>5</sup>D<sub>4</sub>

2.20

Ru

Ruthenium

12.37

7.3605

2334

4150

(m) 134

HCP

[Kr] 4d<sup>6</sup> 5s<sup>1</sup>

+2,3,4,6,8

45

102.90550

<sup>5</sup>D<sub>3</sub>

2.28

Rh

Rhodium

12.45

7.4599

1964

3695

(m) 134

FCC

[Kr] 4d<sup>7</sup> 5s<sup>1</sup>

+2,3,4

46

106.42

<sup>2</sup>S<sub>1/2</sub>

1.93

Pd

Palladium

12.023

8.3369

1245

2659

(m) 137

FCC

[Kr] 4d<sup>10</sup> 5s<sup>1</sup>

+2,4

47

107.8682

<sup>2</sup>S<sub>1/2</sub>

1.93

Ag

Silver

10.49

7.5762

961.78

2162

(m) 144

FCC

[Kr] 4d<sup>10</sup> 5s<sup>1</sup>

+1

48

112.411

<sup>1</sup>S<sub>0</sub>

1.69

Cd

Cadmium

8.65

8.9938

327.46

767

(m) 151

shex

[Kr] 4d<sup>10</sup> 5s<sup>2</sup>

+2

49

114.818

<sup>2</sup>P<sub>1/2</sub>

1.78

In

Indium

7.31

7.3439

156.6

2072

(m) 167

shetra.

[Kr] 4d<sup>10</sup> 5s<sup>2</sup> 5p<sup>3</sup>

+3

50

118.710

<sup>3</sup>P<sub>0</sub>

1.96

Sn

Tin

7.31

7.3439

231.93

2602

(v) 141

shetra.

[Kr] 4d<sup>10</sup> 5s<sup>2</sup> 5p<sup>2</sup>

+2,4

51

121.760

<sup>3</sup>S<sub>3/2</sub>

2.05

Sb

Antimony

6.697

8.6084

630.63

1587

(v) 138

shrhomb.

[Kr] 4d<sup>10</sup> 5s<sup>2</sup> 5p<sup>3</sup>

+3,-3,5

52

127.60

<sup>3</sup>P<sub>2</sub>

2.10

Te

Tellurium

6.24

9.0096

449.51

988

(v) 135

hex

[Kr] 4d<sup>10</sup> 5s<sup>2</sup> 5p<sup>4</sup>

+2,4,-2

53

126.90447

<sup>2</sup>P<sub>3/2</sub>

2.66

I

Iodine

4.94

10.4513

113.7

184.3

(v) 133

BCO

[Kr] 4d<sup>10</sup> 5s<sup>2</sup> 5p<sup>5</sup>

+1,5,-1

54

131.293

<sup>1</sup>S<sub>0</sub>

2.60

Xe

Xenon

5.9

12.1298

-111.8

-108

(v) 130

-

[Kr] 4d<sup>10</sup> 5s<sup>2</sup> 5p<sup>6</sup>

0

55

132.90545

<sup>2</sup>S<sub>1/2</sub>

0.79

Cs

Cesium

1.879

3.8939

28.44

671

(m) 265

BCC

[Xe] 6s<sup>1</sup>

+1

56

137.327

<sup>1</sup>S<sub>0</sub>

0.89

Ba

Barium

3.51

5.2117

727

1870

(m) 222

BCC

[Xe] 6s<sup>2</sup>

+2

57

178.49

<sup>2</sup>F<sub>7/2</sub>

1.3

Hf

Hafnium

13.31

6.8251

2331

4603

(m) 159

HCP

[Xe] 4f<sup>14</sup> 5d<sup>2</sup> 6s<sup>2</sup>

+4

58

180.9479

<sup>2</sup>F<sub>7/2</sub>

1.5

Ta

Tantalum

16.65

7.5496

3017

5458

(m) 146

BCC

[Xe] 4f<sup>14</sup> 5d<sup>3</sup> 6s<sup>2</sup>

+5

59

183.84

<sup>2</sup>F<sub>7/2</sub>

2.36

W

Tungsten

19.25

7.8640

3422

5555

(m) 139

BCC

[Xe] 4f<sup>14</sup> 5d<sup>4</sup> 6s<sup>2</sup>

+2,3,4,5,6

60

186.207

<sup>5</sup>S<sub>2</sub>

1.9

Re

Rhenium

21.02

7.8335

3186

5596

(m) 137

HCP

[Xe] 4f<sup>14</sup> 5d<sup>5</sup> 6s<sup>2</sup>

+2,4,6,-1,7

61

190.23

<sup>5</sup>D<sub>4</sub>

2.2

Os

Osmium

22.61

8.482

3033

5012

(m) 135

HCP

[Xe] 4f<sup>14</sup> 5d<sup>6</sup> 6s<sup>2</sup>

+2,3,4,6,8

62

192.227

<sup>4</sup>F<sub>9/2</sub>

2.2

Ir

Iridium

22.65

8.9670

2466

4428

(m) 136

FCC

[Xe] 4f<sup>14</sup> 5d<sup>7</sup> 6s<sup>2</sup>

+2,3,4,6

63

195.078

<sup>5</sup>D<sub>3</sub>

2.28

Pt

Platinum

21.08

9.5888

2169.3

3825

(m) 139

FCC

[Xe] 4f<sup>14</sup> 5d<sup>9</sup> 6s<sup>1</sup>

+2,4

64

196.96655

<sup>2</sup>S<sub>1/2</sub>

2.54

Au

Gold

19.3

9.2255

1064.18

2856

(m) 144

FCC

[Xe] 4f<sup>14</sup> 5d<sup>10</sup> 6s<sup>1</sup>

+1,3

65

200.59

<sup>1</sup>S<sub>0</sub>

2

Hg

Mercury

13.534

10.4375

383.83

356.73

(m) 151

shrhomb.

[Xe] 4f<sup>14</sup> 5d<sup>10</sup> 6s<sup>2</sup>

+1,2

66

204.3833

<sup>2</sup>P<sub>1/2</sub>

1.62

Tl

Thallium

11.85

6.1082

304

1473

(m) 170

HCP

[Xe] 4f<sup>14</sup> 5d<sup>10</sup> 6s<sup>2</sup> 6p<sup>1</sup>

+1,3

67

208.9804

<sup>3</sup>P<sub>0</sub>

2.33

Pb

Lead

11.34

7.4167

327.46

1749

(m) 173

FCC

[Xe] 4f<sup>14</sup> 5d<sup>10</sup> 6s<sup>2</sup> 6p<sup>2</sup>

+2,4

68

208.9804

<sup>4</sup>S<sub>3/2</sub>

2.02

Bi

Bismuth

9.78

7.2855

271.3

1564

(v) 146

shrhomb.

[Xe] 4f<sup>14</sup> 5d<sup>10</sup> 6s<sup>2</sup> 6p<sup>3</sup>

+3,5

69

208.9804

<sup>3</sup>P<sub>2</sub>

2.0

Po

Polonium

9.196

8.414

254

962

(m) 176

shex

[Xe] 4f<sup>14</sup> 5d<sup>10</sup> 6s<sup>2</sup> 6p<sup>4</sup>

+2,4

70

209

<sup>2</sup>P<sub>3/2</sub>

2.2

At

Astatine

9.73

10.7485

302

-

(v) 145

-

[Xe] 4f<sup>14</sup> 5d<sup>10</sup> 6s<sup>2</sup> 6p<sup>5</sup>

+1,5,-1

71

222

<sup>1</sup>S<sub>0</sub>

2.2

Rn

Radon

9.73

10.7485

-111.8

-108

(v) 145

-

[Xe] 4f<sup>14</sup> 5d<sup>10</sup> 6s<sup>2</sup> 6p<sup>6</sup>

0

72

138.9055

<sup>2</sup>D<sub>3/2</sub>

1.12

La

Lanthanum

6.146

5.5769

920

3464

(m) 187

shex

[Xe] 5d<sup>1</sup> 6s<sup>2</sup>

+3

73

140.116

<sup>1</sup>G<sub>7/2</sub>

1.12

Ce

Cerium

6.689

5.5387

798

3360

(m) 182

FCC

[Xe] 5d<sup>1</sup> 6s<sup>2</sup>

+3,4

74

140.90765

<sup>4</sup>F<sub>9/2</sub>

1.13

Pr

Praseodymium

6.64

5.473

931

3290

(m) 182

shex

[Xe] 4f<sup>1</sup> 6s<sup>2</sup>

+3,4

75

144.24

<sup>3</sup>F<sub>4</sub>

1.14

Nd

Neodymium

7.01

5.5250

1021

3100

(m) 181

shex

[Xe] 4f<sup>2</sup> 6s<sup>2</sup>

+3

76

150.36

<sup>6</sup>H<sub>5/2</sub>

1.17

Pm

Promethium

7.264

5.582

1072

1803

(m) 180

shex

[Xe] 4f<sup>3</sup> 6s<sup>2</sup>

+3

77

151.964

<sup>5</sup>S<sub>2</sub>

1.72

Sm

Samarium

7.353

5.6437

1072

1803

(m) 180

BCC

[Xe] 4f<sup>6</sup> 6s<sup>2</sup>

+2,3

78

157.25

<sup>5</sup>D<sub>4</sub>

1.20

Eu

Europium

7.901

6.1498

822

1527

(m) 180

BCC

[Xe] 4f<sup>7</sup> 6s<sup>2</sup>

+3

79

158.92534

<sup>4</sup>F<sub>9/2</sub>

1.52

Gd

Gadolinium

8.219

5.8638

1313

3250

(m) 177

HCP

[Xe] 4f<sup>7</sup> 6s<sup>2</sup>

+3,4

80

162.50

<sup>3</sup>F<sub>4</sub>

1.22

Tb

Terbium

8.551

5.9389

1412

2567

(m) 178

HCP

[Xe] 4f<sup>9</sup> 6s<sup>2</sup>

+3

81

164.93032

<sup>4</sup>F<sub>9/2</sub>

1.23

Dy

Dysprosium

8.795

6.0215

1474

2700

(m) 176

HCP

[Xe] 4f<sup>10</sup> 6s<sup>2</sup>

+3

82

167.259

<sup>3</sup>F<sub>4</sub>

1.24

Ho

Holmium

9.066

6.1077

1497

2868

(m) 176

HCP

[Xe] 4f<sup>11</sup> 6s<sup>2</sup>

+3

83

168.93421

<sup>2</sup>F<sub>7/2</sub>

1.25

Er

Erbium

9.321

6.1843

1545

1950

(m) 176

HCP

[Xe] 4f<sup>12</sup> 6s<sup>2</sup>

+3

84

173.04

<sup>1</sup>S<sub>0</sub>

1.27

Tm

Thulium

6.57

6.2542

819

1196

(m) 176

FCC

[Xe] 4f<sup>13</sup> 6s<sup>2</sup>

+3

85

174.967

<sup>2</sup>D<sub>3/2</sub>

1.27

Yb

Ytterbium

6.57

6.2542

819

1196

(m) 174

HCP

[Xe] 4f<sup>14</sup> 6s<sup>2</sup>

+3

86

174.967

<sup>1</sup>S<sub>0</sub>

1.27

Lu

Lutetium

9.841

5.4259

1663

3402

(m) 174

HCP

[Xe] 4f<sup>14</sup> 6s<sup>2</sup>

+3

87

232.0381

<sup>3</sup>F<sub>4</sub>

1.3

Th

Thorium

11.724

6.3067

1750

4820

(m) 179

FCC

[Rn] 6d<sup>2</sup> 7s<sup>2</sup>

+4

88

231.0359

<sup>4</sup>K<sub>1/2</sub>

1.5

Pa

Protactinium

15.37

5.89

1572

4000

(m) 156

BCP

[Rn] 5f<sup>2</sup> 6d<sup>2</sup> 7s<sup>2</sup>

+4,5

89

238.0289

<sup>3</sup>L<sub>3</sub>

1.38

U

Uranium

19.05

6.1941

1135

3927

(m) 156

BCP

[Rn] 5f<sup>3</sup> 6d<sup>1</sup> 7s<sup>2</sup>

+3,4,5,6

Notes:

- Density units are g/cm<sup>3</sup> for solids and g/L or kg/cm<sup>3</sup> at 0° Celsius for gases
- Atomic Weight based on <sup>12</sup>C
- ( ) indicate mass number of most stable isotope
- Common Oxidation States in bold
- Electron Config. based on IUPAC guidelines
- \$ indicates crystal structure is unusual or may require explanation
- (m) Metallic radius, (v) Covalent radius

References:  
 \*NIST.gov, \*Wolfram.com (Mathematica),  
 CRC Handbook of Chemistry and Physics  
 81st Edition, 2000-2001, and others

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