

Periodic Table of the Elements

| | | | | | | | | | | | | Periodic Table of the Elements | | | | | 18 | | | | | | | | |
|------------|--|---------------|--|---|--|------------|--|--------------|--|-----------|--|-----------------------------------|--|--------------|--|-------|----|-------|--|-------|--|-------|--|-------|--|
| 1 | | 2 | | <div>Atomic #</div> <div>Symbol</div> <div>Element Name</div> <div>Molar/ Atomic Mass</div> | | | | | | | | | | 13 | | 14 | | 15 | | 16 | | 17 | | 18 | |
| 1 | | 2 | | | | | | | | | | | | 5 | | 6 | | 7 | | 8 | | 9 | | 10 | |
| 2 | | 4 | | | | | | | | | | | | 10.81 | | 12.01 | | 14.01 | | 16.00 | | 19.00 | | 20.18 | |
| 3 | | 4 | | 26.98 | | 28.09 | | 30.97 | | 32.07 | | 35.45 | | 39.95 | | | | | | | | | | | |
| 11 | | 12 | | 31 | | 32 | | 33 | | 34 | | 35 | | 36 | | | | | | | | | | | |
| Na | | Mg | | Ga | | Ge | | As | | Se | | Br | | Kr | | | | | | | | | | | |
| Sodium | | Magnesium | | Gallium | | Germanium | | Arsenic | | Selenium | | Bromine | | Krypton | | | | | | | | | | | |
| 22.99 | | 24.31 | | 69.72 | | 72.64 | | 74.92 | | 78.96 | | 79.90 | | 83.80 | | | | | | | | | | | |
| 19 | | 20 | | 21 | | 22 | | 23 | | 24 | | 25 | | 26 | | | | | | | | | | | |
| K | | Ca | | Sc | | Ti | | V | | Cr | | Mn | | Fe | | | | | | | | | | | |
| Potassium | | Calcium | | Scandium | | Titanium | | Vanadium | | Chromium | | Manganese | | Iron | | | | | | | | | | | |
| 39.10 | | 40.08 | | 44.96 | | 47.87 | | 50.94 | | 52.00 | | 54.94 | | 55.85 | | | | | | | | | | | |
| 27 | | 28 | | 29 | | 30 | | 31 | | 32 | | 33 | | 34 | | | | | | | | | | | |
| Co | | Ni | | Cu | | Zn | | Ga | | Ge | | As | | Se | | | | | | | | | | | |
| Cobalt | | Nickel | | Copper | | Zinc | | Gallium | | Germanium | | Arsenic | | Selenium | | | | | | | | | | | |
| 58.93 | | 58.69 | | 63.55 | | 65.39 | | 69.72 | | 72.64 | | 74.92 | | 78.96 | | | | | | | | | | | |
| 45 | | 46 | | 47 | | 48 | | 49 | | 50 | | 51 | | 52 | | | | | | | | | | | |
| Rh | | Pd | | Ag | | Cd | | In | | Sn | | Sb | | Te | | | | | | | | | | | |
| Rhodium | | Palladium | | Silver | | Cadmium | | Indium | | Tin | | Antimony | | Tellurium | | | | | | | | | | | |
| 102.91 | | 106.42 | | 107.87 | | 112.41 | | 114.82 | | 118.71 | | 121.76 | | 127.60 | | | | | | | | | | | |
| 75 | | 76 | | 77 | | 78 | | 79 | | 80 | | 81 | | 82 | | | | | | | | | | | |
| Re | | Os | | Ir | | Pt | | Au | | Hg | | Tl | | Pb | | | | | | | | | | | |
| Rhenium | | Osmium | | Iridium | | Platinum | | Gold | | Mercury | | Thallium | | Lead | | | | | | | | | | | |
| 186.21 | | 190.23 | | 192.21 | | 195.08 | | 196.97 | | 200.59 | | 204.38 | | 207.2 | | | | | | | | | | | |
| 103 | | 104 | | 105 | | 106 | | 107 | | 108 | | 109 | | 110 | | | | | | | | | | | |
| Lr | | Rf | | Db | | Sg | | Bh | | Hs | | Mt | | Ds | | | | | | | | | | | |
| Lawrencium | | Rutherfordium | | Dubnium | | Seaborgium | | Bohrium | | Hassium | | Meitnerium | | Darmstadtium | | | | | | | | | | | |
| 262.11 | | 261.11 | | 262.11 | | 266.12 | | 264.12 | | 269.13 | | 268.14 | | 271.15 | | | | | | | | | | | |
| 87 | | 88 | | 89 | | 90 | | 91 | | 92 | | 93 | | 94 | | | | | | | | | | | |
| Fr | | Ra | | Ac | | Th | | Pa | | U | | Np | | Pu | | | | | | | | | | | |
| Francium | | Radium | | Actinium | | Thorium | | Protactinium | | Uranium | | Neptunium | | Plutonium | | | | | | | | | | | |
| 223.02 | | 226.03 | | 227.03 | | 232.04 | | 231.04 | | 238.03 | | 237.05 | | 244.06 | | | | | | | | | | | |

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|--|--------------------------------------|---|--|--|--|--|---|--|--|--|---------------------------------------|---|--|
| 57 La Lanthanum 138.91 | 58 Ce Cerium 140.12 | 59 Pr Praseodymium 140.91 | 60 Nd Neodymium 144.24 | 61 Pm Promethium 145 | 62 Sm Samarium 150.36 | 63 Eu Europium 151.96 | 64 Gd Gadolinium 157.25 | 65 Tb Terbium 158.93 | 66 Dy Dysprosium 162.50 | 67 Ho Holmium 164.93 | 68 Er Erbium 167.26 | 69 Tm Thulium 168.93 | 70 Yb Ytterbium 173.04 |
| 89 Ac Actinium 227.03 | 90 Th Thorium 232.04 | 91 Pa Protactinium 231.04 | 92 U Uranium 238.03 | 93 Np Neptunium 237.05 | 94 Pu Plutonium 244.06 | 95 Am Americium 243.06 | 96 Cm Curium 247.07 | 97 Bk Berkelium 247.07 | 98 Cf Californium 251.08 | 99 Es Einsteinium 252.08 | 100 Fm Fermium 257.10 | 101 Md Mendelevium 258.10 | 102 No Nobelium 259.10 |



Massachusetts Comprehensive Assessment System

Chemistry Formula and Constants Sheet

Common Polyatomic Ions

| Ion | Ionic Formula |
|-----------|--------------------|
| Ammonium | NH_4^+ |
| Carbonate | CO_3^{2-} |
| Hydroxide | OH^- |
| Nitrate | NO_3^- |
| Phosphate | PO_4^{3-} |
| Sulfate | SO_4^{2-} |

Combined Gas Law: $\frac{P_1 V_1}{T_1} = \frac{P_2 V_2}{T_2}$

Ideal Gas Law: $PV = nRT$

Absolute Temperature Conversion: $K = ^\circ\text{C} + 273$

Moles of Solute: $M_1 V_1 = M_2 V_2$

Definition of pH: $\text{pH} = -\log [\text{H}_3\text{O}^+] = -\log [\text{H}^+]$

Molar Volume of Ideal Gas at STP: 22.4 L/mol

Ideal Gas Constant: $R = 0.0821 \text{ L} \cdot \text{atm/mol} \cdot \text{K} = 8.31 \text{ L} \cdot \text{kPa/mol} \cdot \text{K}$

Avogadro's Number: 6.02×10^{23} particles/mol

STP: 1 atm (101.3 kPa), 273 K (0°C)

Nuclear Symbols

| Name | Symbol |
|----------------|-------------------------------|
| Alpha particle | α or ${}^4_2\text{He}$ |
| Beta particle | β or ${}^0_{-1}e$ |
| Gamma ray | γ |
| Neutron | 1_0n |