

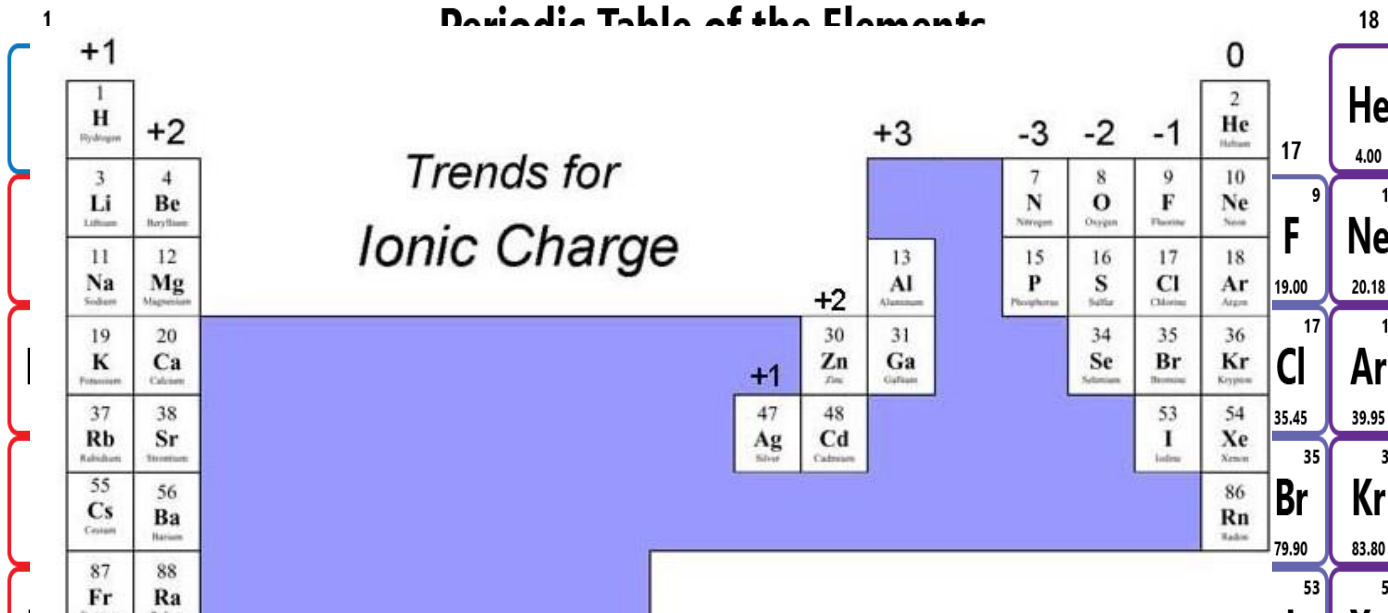
## Chemical Elements

### Periodic Table of Elements

Identifying Chemical Elements

**Periodic Table of the Elements**

*Trends for Ionic Charge*



1 H Hydrogen																	2 He Helium		
3 Li Lithium	4 Be Beryllium											7 N Nitrogen	8 O Oxygen	9 F Fluorine	10 Ne Neon	17 F Fluorine	18 Ar Argon		
11 Na Sodium	12 Mg Magnesium											13 Al Aluminum	15 P Phosphorus	16 S Sulfur	17 Cl Chlorine	18 Ar Argon	19.00 F Fluorine	20.18 Ne Neon	
19 K Potassium	20 Ca Calcium											30 Zn Zinc	31 Ga Gallium	34 Se Selenium	35 Br Bromine	36 Kr Krypton	35.45 Cl Chlorine	39.95 Ar Argon	
37 Rb Rubidium	38 Sr Strontium											47 Ag Silver	48 Cd Cadmium			53 I Iodine	54 Xe Xenon	35.45 Br Bromine	39.95 Kr Krypton
55 Cs Cesium	56 Ba Barium															86 Rn Radon	79.90 Br Bromine	83.80 Kr Krypton	
87 Fr Francium	88 Ra Radium															53 I Iodine	54 Xe Xenon	79.90 Br Bromine	83.80 Kr Krypton
85.47	87.62	88.91	91.22	92.91	95.95	98.91	101.07	102.91	106.42	107.87	112.41	114.82	118.71	121.76	127.6	126.90	131.29		
55 Cs Cesium	56 Ba Barium	57-71 Lanthanides	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		
132.91	137.33		178.49	180.95	183.85	186.21	190.23	192.22	195.08	196.97	200.59	204.38	207.20	208.98	[208.98]	209.98	222.02		
87 Fr Francium	88 Ra Radium	89-103 Actinides	104 Rf Rutherfordium	105 Db Dubnium	106 Sg Seaborgium	107 Bh Bohrium	108 Hs Hassium	109 Mt Meitnerium	110 Ds Darmstadtium	111 Rg Roentgenium	112 Cn Copernicium	113 Nh Nihonium	114 Fl Flerovium	115 Mc Moscovium	116 Lv Livermorium	117 Ts Tennessine	118 Og Oganesson		
223.02	226.03		[261]	[262]	[266]	[264]	[269]	[278]	[281]	[280]	[285]	[286]	[289]	[289]	[293]	[294]	[294]		
57 La Lanthanum	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					
138.91	140.12	140.91	144.24	144.91	150.36	151.96	157.25	158.93	162.50	164.93	167.26	168.93	173.06	174.97					
89 Ac Actinium	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					
227.03	232.04	231.04	238.03	237.05	244.06	243.06	247.07	247.07	251.08	[254]	257.10	258.10	259.10	[262]					

- Alkali Metal
- Alkaline Earth
- Transition Metal
- Basic Metal
- Semimetal
- Nonmetal
- Halogen
- Noble Gas
- Lanthanide
- Actinide

## ACADEMIC CENTER FOR EXCELLENCE CONTENT TEAM

- **Protons (Atomic Number)** = Mass Number (atomic weight) - # of neutrons
- **Neutrons** = Mass Number – Protons
- **Mass Number** = # of electrons + # of neutrons + ion charge
- **Electrons** = # of protons  $\pm$  ion charge
  - If there is a positive charge (+) contained, we subtract the # of and the ion charge to get the # of electrons
  - If there is a negative charge (-) contained, we add the # of protons and the ion charge to get the # of electrons

### Identify Unknown Chemical Elements of their Electrons, Protons, Neutrons, Ionic Charges, and Mass Numbers

#### Step #1:

- Look at what the question is asking for to find the unknown chemical element.
- Example Question: Write the unknown chemical symbol of: an ion of 1+ charge, atomic number 55, and mass number 133.

#### Step #2:

- Find the atomic number (protons), charge, and mass number in the periodic table.
- Hint: the atomic number will always give you the unknown chemical element as the answer!

#### Step #3:

- After looking for the given charge, atomic number, and mass number, identify the unknown element. Cs (Cesium) is the unknown chemical element symbol.

#### Example 1:

Write the unknown chemical symbol of: 18 electrons, 18 neutrons, and an ion charge of 1–.

#### Step #1:

- Look at what the question is asking for to find the unknown chemical element.

**Step #2:**

- Since the atomic number (protons), and mass number are not given, find the protons first to get the mass number from the periodic table and subtract by the number of neutrons.
- Hint: the atomic number or the formula to find the # of protons will always give you the unknown chemical element as the answer!
- **Protons** = Mass Number – # of neutrons
- **Mass Number** = # of electrons + # of neutrons + ion charge  
$$= (18 + 18 - 1) = 35$$
- **Protons** =  $35 - 18 = 17$  protons (atomic number)

**Step #3:**

- After finding the # of protons of the given formula, look at the periodic table and find the unknown chemical element to get the answer. Cl (Chlorine) is the unknown chemical element symbol.

**Example 2:**

Write the unknown chemical symbol of: The ion charge of  $2+$ , atomic number 38, and mass number 87.

**Step #1:**

- Look at what the question is asking for to find the unknown chemical element.

**Step #2:**

- Find the atomic number (protons), charge, and mass number in the periodic table or use the formula for finding the # of protons.
- Hint: the atomic number will always give you the unknown chemical element as the answer!

- **Protons** = Mass Number – # of neutrons, where **Mass Number** = # of electrons + # of neutrons + ion charge
- **Ion charge** = +2
- **Electrons** = 38 + 2 ion charge  $\Rightarrow 38 - 2 = 36$
- **Neutrons** = Mass Number – Atomic Number =  $87 - 38 = 49$
- **Protons** =  $(36 + 49 + 2) - 49$   
 $= 87 - 49 = 38$  protons

**Step #3:**

- After looking for the given charge, atomic number, and mass number, identify the unknown element from the periodic table. Sr (Strontium) is the unknown chemical element.

**Example 3:**

Write the unknown chemical symbol of: 86 electrons, 142 neutrons, and an ion charge of 4+.

**Step #1:**

- Look at what the question is asking for to find the unknown chemical element.

**Step #2:**

- Since the atomic number (protons), and mass number are not given, find the protons first to get the mass number from the periodic table and subtract by the number of neutrons.
- Hint: the atomic number will always give you the unknown chemical element as the answer!
- **Protons** = Mass Number – # of neutrons
- **Mass Number** = # of electrons + # of neutrons + ion charge  
 $= (86 + 142 + 4) = 232$
- **Protons** =  $232 - 142 = 90$  protons (atomic number)

**Step #3:**

- After finding the # of protons of the given formula, look at the periodic table and find the unknown chemical element to get the answer. Th (Thorium) is the unknown chemical element.

**Disclaimer:** We did not include all of the resources conferred to formulate this handout. We encourage students to conduct further research to find additional resources. The format of this list is not commensurate with a standard format.

