

# Module 5: Minerals

## Topic 1 Content: The Periodic Table of Elements Presentation Notes

# The Periodic Table of Elements

**Legend:**

- Nonmetals:**
  - Other nonmetals (Yellow)
  - Halogens (Green)
  - Noble gases (Purple)
- Metals:**
  - Alkali metals (Orange)
  - Alkaline earth metal (Light Orange)
  - Lanthanoids (Pink)
  - Actinoids (Light Pink)
  - Transition metals (Light Green)
- Metalloids:** (Light Blue)
- Post-transition metals:** (Light Purple)

**Table Headers:** Group - IUPAC (1-18), Period (1-7), Atomic number, Symbol, Element name, Atomic mass.

*\* Mass numbers marked with an asterisk are those of the most stable or most common isotope.*

Chemical elements have different properties that make their organization somewhat tricky. One of the most recognized and famous methods of classification of chemical elements is the modern periodic table of elements. The periodic table of elements is a table that displays chemical elements according to trends in the elements' properties. As new elements and information about chemical properties are discovered over time, the table changes to reflect advances in chemistry.

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The periodic table is titled 'Atomic Number' at the top. A yellow box highlights the element Oxygen (O). Inside the box, the atomic number 8 is displayed at the top, followed by the chemical symbol 'O' with a small starburst effect, the element name 'Oxygen', and the atomic mass '15.9994'. A white arrow points from the text 'Atomic Number' to the number 8. Another white arrow points from the text 'Element's Name' to the name 'Oxygen'. The periodic table background is color-coded by groups: yellow for alkali metals, blue for alkaline earth metals, green for transition metals, purple for other nonmetals, pink for halogens, and light blue for noble gases. A legend on the left side of the table identifies these groups.

\* Mass numbers marked with an asterisk are those of the most stable or most common isotope.

On the periodic table, elements are arranged by their atomic numbers. The smallest “division” on the periodic table is the block that provides information about each named element. In addition to the element’s name, the information for each element should include the atomic number of the element. This number is an indication of the number of protons in an atom’s nucleus and is specific to the element.

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**Atomic Symbol**

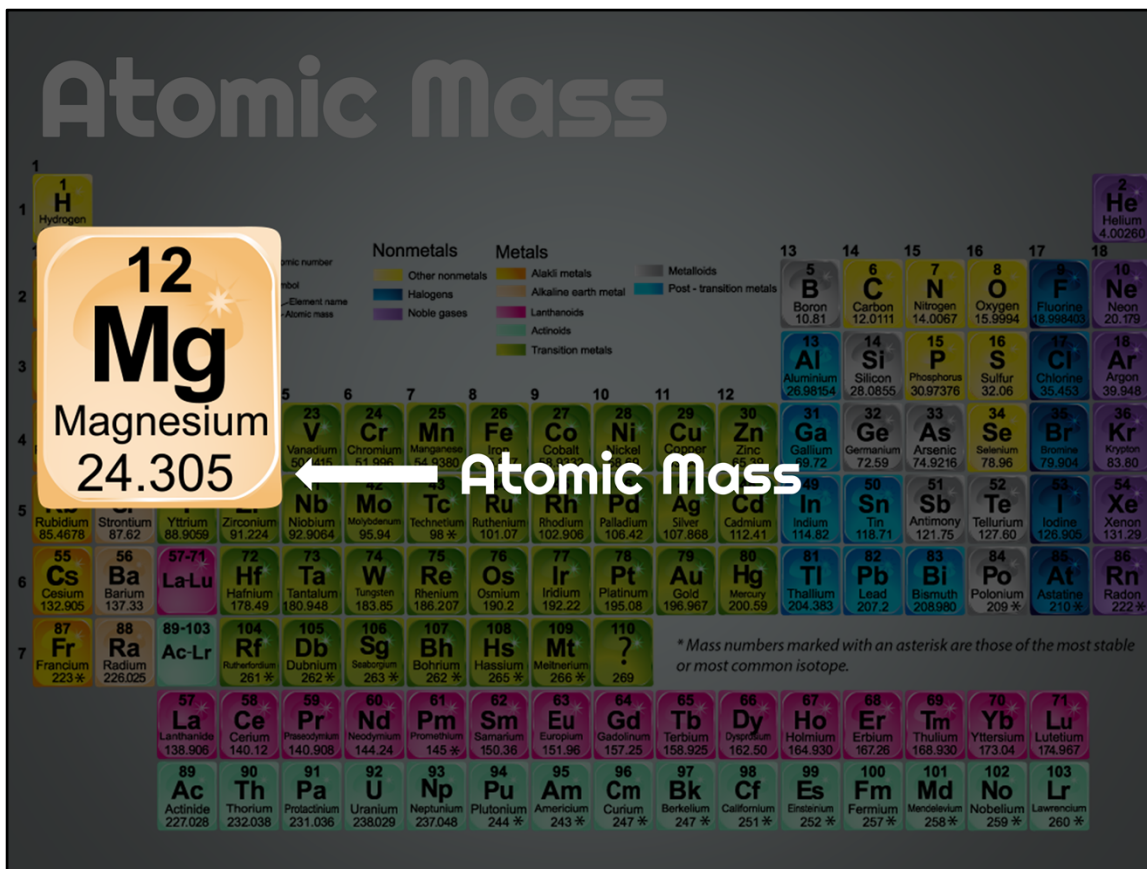
Group - IUPAC	1	2	13	14	15	16	17	18										
Period 1	1 H Hydrogen 1.00794							2 He Helium 4.00260										
Period 2	3 Li Lithium 6.941	4 Be Beryllium 9.01218		5 B Boron 10.81	6 C Carbon 12.0111	7 N Nitrogen 14.0067	8 O Oxygen 15.9994	9 F Fluorine 18.998403	10 Ne Neon 20.179									
Period 3	11 Na Sodium 22.98977	12 Mg Magnesium 24.305		13 Al Aluminum 26.98154	14 Si Silicon 28.0855	15 P Phosphorus 30.97376	16 S Sulfur 32.06	17 Cl Chlorine 35.453	18 Ar Argon 39.948									
Period 4	19 K Potassium 39.0983	20 Ca Calcium 40.08	21 Sc Scandium 44.9559	22 Ti Titanium 47.88	23 V Vanadium 50.9415	24 Cr Chromium 51.9961	25 Mn Manganese 54.938045	26 Fe Iron 55.845	27 Co Cobalt 58.9332	28 Ni Nickel 58.69	29 Cu Copper 63.546	30 Zn Zinc 65.39	31 Ga Gallium 69.723	32 Ge Germanium 72.630	33 As Arsenic 74.9216	34 Se Selenium 78.96	35 Br Bromine 79.904	36 Kr Krypton 83.80
Period 5	37 Rb Rubidium 85.4678	38 Sr Strontium 87.62	39 Y Yttrium 88.9059	40 Zr Zirconium 91.224	41 Nb Niobium 92.90638	42 Mo Molybdenum 95.94	43 Tc Technetium 98	44 Ru Ruthenium 101.07	45 Rh Rhodium 102.9055	46 Pd Palladium 106.42	47 Ag Silver 107.8682	48 Cd Cadmium 112.411	49 In Indium 114.818	50 Sn Tin 118.710	51 Sb Antimony 121.757	52 Te Tellurium 127.60	53 I Iodine 126.905	54 Xe Xenon 131.29
Period 6	55 Cs Cesium 132.905	56 Ba Barium 137.33	57-71 La-Lu Lanthanides	72 Hf Hafnium 178.49	73 Ta Tantalum 180.948	74 W Tungsten 183.85	75 Re Rhenium 186.207	76 Os Osmium 190.2	77 Ir Iridium 192.22	78 Pt Platinum 195.08	79 Au Gold 196.967	80 Hg Mercury 200.59	81 Tl Thallium 204.383	82 Pb Lead 207.2	83 Bi Bismuth 208.980	84 Po Polonium 209	85 At Astatine 210	86 Rn Radon 222
Period 7	87 Fr Francium 223	88 Ra Radium 226.025	89-103 Ac-Lr Actinides	104 Rf Rutherfordium 261	105 Db Dubnium 262	106 Sg Seaborgium 263	107 Bh Bohrium 264	108 Hs Hassium 265	109 Mt Meitnerium 266	110 ? Unbinilium 269								
	89 La Lanthanide 138.905	90 Ce Cerium 140.12	91 Pr Praseodymium 140.908	92 Nd Neodymium 144.24	93 Pm Promethium 145	94 Sm Samarium 150.36	95 Eu Europium 151.96	96 Gd Gadolinium 157.25	97 Tb Terbium 158.925	98 Dy Dysprosium 162.50	99 Ho Holmium 164.930	100 Er Erbium 167.26	101 Tm Thulium 168.930	102 Yb Ytterbium 173.04	103 Lu Lutetium 174.967			
	89 Ac Actinide 227.028	90 Th Thorium 232.038	91 Pa Protactinium 231.036	92 U Uranium 238.029	93 Np Neptunium 237.048	94 Pu Plutonium 244	95 Am Americium 243	96 Cm Curium 247	97 Bk Berkelium 247	98 Cf Californium 251	99 Es Einsteinium 252	100 Fm Fermium 257	101 Md Mendelevium 258	102 No Nobelium 259	103 Lr Lawrencium 260			

\* Mass numbers marked with an asterisk are those of the most stable or most common isotope.

An element's **symbol** is the one, two, or three letter symbol that represents the element. In this image, you can see that the chemical symbol for copper is Cu. It is important that the first letter in the symbol is capitalized and the second and third letters are lowercase. For example cobalt has an atomic number of twenty-seven and the symbol Co. If you made a mistake and capitalized the second letter making the symbol CO, you would create the chemical symbol for the compound carbon monoxide.

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The **atomic mass** is the total mass of a single atom of an element. In the image shown, you can see that the atomic mass for magnesium is 24.305. The atomic mass of an element's atom is provided in atomic mass units, or amu.

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# Groups

**Legend:**

- Other nonmetals
- Alkali metals
- Metalloids
- Halogens
- Alkaline earth metal
- Post-transition metals
- Noble gases
- Lanthanoids
- Actinoids
- Transition metals

**Table Data:**

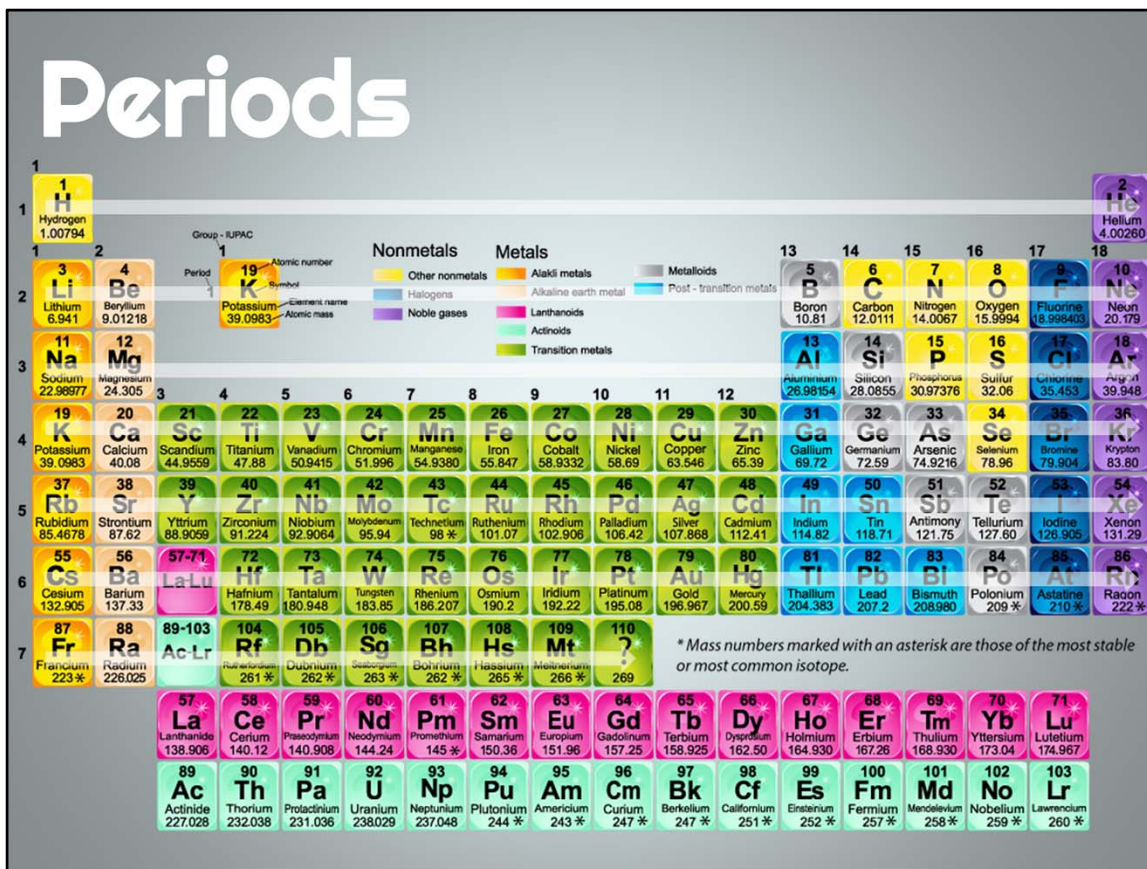
Group	1	2	13	14	15	16	17	18
1	H (1)							He (2)
2	Li (3)	Be (4)						Ne (10)
3	Na (11)	Mg (12)						Ar (18)
4	K (19)	Ca (20)						Kr (36)
5	Rb (37)	Sr (38)						Xe (54)
6	Cs (55)	Ba (56)						Rn (86)
7	Fr (87)	Ra (88)						

*\* Mass numbers marked with an asterisk are those of the most stable or most common isotope.*

On the periodic table, a **group** is a column that shares similar physical and chemical properties. One example of a group is Group 18. Group 18 is commonly known as the Noble Gases. These elements all share the property of being non-reactive.

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On the periodic table, a **period** is a row of elements. You may notice that the number of elements in a period varies. For example, Period 1 only contains two elements - hydrogen and helium.

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Most Common Elements on Earth's Surface	
Element	Approximate Percentage by Weight
Oxygen (O)	46.6
Silicon (Si)	27.7
Aluminum (Al)	8.1
Iron (Fe)	5.0
Calcium (Ca)	3.6
Sodium (Na)	2.8
Potassium (K)	2.6
Magnesium (Mg)	2.1
All others	1.7

One thing that Earth scientists have determined by studying the periodic table is that six of the eight most common elements on Earth are metals. These metals are circled on the table shown here. All metals share the specific characteristic of being able to be shaped and bent into a wire. Metals can also conduct electricity.