

Warm Up

Classify the following elements as metals, nonmetals, or metalloids:

1. Silicon
2. Bromine
3. Sodium

Warm Up

The modern periodic table has elements arranged in order of:

- a) colors.
- b) melting and boiling points.
- c) increasing atomic mass.
- d) increasing atomic number.

Objectives

TSWBAT:

1. Summarize atomic properties (including electron configuration, ionization energy, electron affinity, atomic size, and ionic size.)
2. Summarize the periodic table's property trends.
This includes electron configuration, ionization energy, electron affinity, atomic size, ionic size, and reactivity.

Families (Groups) in the periodic table:

some families have common names that you will have to memorize.

These include:

Group 1A: Alkali Metals

Group 2A: Alkaline Earth Metals

Group 7A: Halogens

Group 8A: Noble Gases

Representative Elements

Transition Elements

- Alkali Metals
- Alkaline Earth Metals
- Other Metals
- Metalloids
- Nonmetals
- Noble Gases
- Transition Metals
- Inner transition metals

1 1A H Hydrogen 1.0079																	18 8A He Helium 4.0026	
3 Li Lithium 6.941	4 Be Beryllium 9.0122											5 B Boron 10.81	6 C Carbon 12.011	7 N Nitrogen 14.007	8 O Oxygen 15.999	9 F Fluorine 18.998	10 Ne Neon 20.179	
11 Na Sodium 22.990	12 Mg Magnesium 24.305	13 Al Aluminum 26.982	14 Si Silicon 28.086	15 P Phosphorus 30.974	16 S Sulfur 32.06	17 Cl Chlorine 35.453	18 Ar Argon 39.948											
19 K Potassium 39.098	20 Ca Calcium 40.08	21 Sc Scandium 44.956	22 Ti Titanium 47.88	23 V Vanadium 50.941	24 Cr Chromium 51.996	25 Mn Manganese 54.938	26 Fe Iron 55.847	27 Co Cobalt 58.933	28 Ni Nickel 58.71	29 Cu Copper 63.546	30 Zn Zinc 65.38	31 Ga Gallium 69.72	32 Ge Germanium 72.59	33 As Arsenic 74.922	34 Se Selenium 78.96	35 Br Bromine 79.904	36 Kr Krypton 83.80	
37 Rb Rubidium 85.468	38 Sr Strontium 87.62	39 Y Yttrium 88.906	40 Zr Zirconium 91.22	41 Nb Niobium 92.906	42 Mo Molybdenum 95.94	43 Tc Technetium (98)	44 Ru Ruthenium 101.07	45 Rh Rhodium 102.91	46 Pd Palladium 106.4	47 Ag Silver 107.87	48 Cd Cadmium 112.41	49 In Indium 114.82	50 Sn Tin 118.69	51 Sb Antimony 121.75	52 Te Tellurium 127.60	53 I Iodine 126.90	54 Xe Xenon 131.30	
55 Cs Cesium 132.91	56 Ba Barium 137.33	57 Lu Lutetium 174.97	58 Hf Hafnium 178.49	59 Ta Tantalum 180.95	60 W Tungsten 183.85	61 Re Rhenium 186.21	62 Os Osmium 190.2	63 Ir Iridium 192.22	64 Pt Platinum 195.09	65 Au Gold 196.97	66 Hg Mercury 200.59	67 Tl Thallium 204.37	68 Pb Lead 207.2	69 Bi Bismuth 208.98	70 Po Polonium (209)	71 At Astatine (210)	72 Rn Radon (222)	
87 Fr Francium (223)	88 Ra Radium (226)	89 Lr Lawrencium (262)	90 Rf Rutherfordium (261)	91 Db Dubnium (262)	92 Sg Seaborgium (263)	93 Bh Bohrium (264)	94 Hs Hassium (265)	95 Mt Meitnerium (266)	96 Ds Darmstadtium (269)	97 Rg Roentgenium (272)	98 Uub Ununbium (277)							
												114 Uuq Ununquadium						

Elements 104-106 are the transactinide elements.

*Name not officially assigned.

Lanthanide Series

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 150.4	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
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Actinide Series

89 Ac Actinium (227)	90 Th Thorium 232.04	91 Pa Protactinium 231.04	92 U Uranium 238.03	93 Np Neptunium (237)	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)
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Warm Up:

Another name for Group 7A is:

One trend we want to note in the periodic table is the repetition of similar electron configurations in family groups.

The Noble Gases

The noble gases are the elements in Group 8A of the periodic table. The electron configurations for the first four noble gases in Group 8A are listed below.

Helium (He)	$1s^2$
Neon (Ne)	$1s^2 2s^2 2p^6$
Argon (Ar)	$1s^2 2s^2 2p^6 3s^2 3p^6$
Krypton (Kr)	$1s^2 2s^2 2p^6 3s^2 3p^6 3d^{10} 4s^2 4p^6$

In atoms of the Group **1A** elements below, there is only **one electron** in the highest occupied energy level.

Lithium (Li)	$1s^2 2s^1$
Sodium (Na)	$1s^2 2s^2 2p^6 3s^1$
Potassium (K)	$1s^2 2s^2 2p^6 3s^2 3p^6 4s^1$

In atoms of the Group **4A** element below, there are **four electrons** in the highest occupied energy level.

Carbon (C)	$1s^2 2s^2 2p^2$
Silicon (Si)	$1s^2 2s^2 2p^6 3s^2 3p^2$
Germanium (Ge)	$1s^2 2s^2 2p^6 3s^2 3p^6 3d^{10} 4s^2 4p^2$

The Representative Elements

Elements in groups 1A through 7A are often referred to as **representative elements** because they display a wide range of physical and chemical properties.

- The s and p sublevels of the highest occupied energy level are not filled.
- The **group number** equals the **number of electrons in the highest occupied energy level.**
(Valence Electrons.)

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The Group numbers included in the "representative elements" category are _____.

Transition Elements

There are two types of transition elements—

transition metals and inner transition metals.

They are classified based on their electron configurations.

Objectives

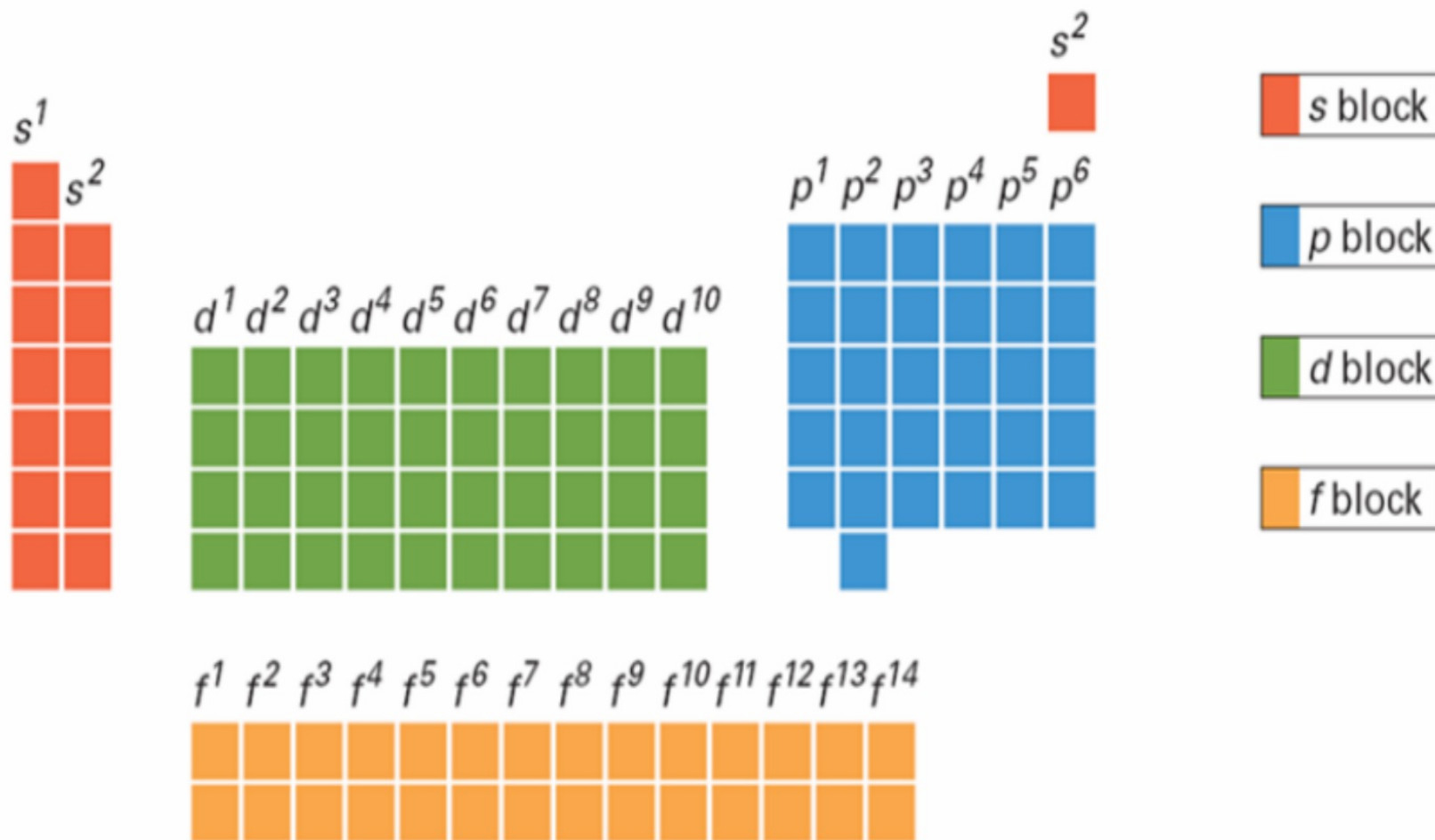
TSWBAT

Predict properties of various elements based on trends in the periodic table.

In atoms of a **transition metal**, the highest occupied **s** sublevel and a nearby **d** sublevel contain electrons.

In atoms of an **inner transition metal**, the highest occupied **s** sublevel and a nearby **f** sublevel generally contain electrons.

Blocks of Elements



Learning Check:

An alkali metal would have in the highest occupied energy level

- a) an s^2 electron.
- b) an s^1 electron.
- c) p^2 electrons.
- d) p^6 electrons.

Learning Check:

Which one of the following is incorrectly labeled?

- a. Ne, noble gas
- b. Cu, transition metal
- c. Ga, transition metal
- d. Cl, halogen