

Discussion: The Periodic Table

Discussion Topic, AP Chem

Imagine you are given a mystery element. It is, however, a discovered and known element. You may perform a maximum of two observations or tests to determine its identity. Time and money is critical, so you need to prioritize your tests. If you can get by with a single test, you get 100 super-geek points from your research lab team.

Pick your two tests, number them as #1 and #2, and justify why you think these two will certainly be enough (and why the first might well be enough all by itself.)

The available tests are classification into metal, non-metal, or metalloid, count of valence electrons, count of electron shells, atomic radius (error range: +/- 1 pm), electronegativity (error range: +/- 0.1), first ionization energy (error range: +/- 10 kJ/mole), melting point (error range: +/- 10 C), and boiling point (error range: +/- 20 C).

Choose from these available tests:

- classification into metal, nonmetal, or metalloid
- count of valence electrons
- count of electron shells
- atomic radius (error range: +/- 1 pm)
- electronegativity (error range: +/- 0.1)
- first ionization energy (error range: +/- 10 kJ/mole)
- melting point (error range: +/- 10 C)
- boiling point (error range: +/- 20 C)

Make it very clear what your two choices are and why you chose them.

[These periodic tables may be helpful.](#)

[Element Data](#)

In the guide sheet, there is a link for [Element Data](#). I set up this set of slides so you can look through element data to decide which type to choose so you can answer this discussion question. I think if you scroll down, you will also see screenshots of the software that are in the slides.

Other links that may be useful:

https://en.wikipedia.org/wiki/Molar_ionization_energies_of_the_elements As much as I dislike wikipedia, you can manipulate the table so it sorts based on the ionization energy

<https://learnwithdrscott.com/electronegativity-table/>

<https://learnwithdrscott.com/wp-content/uploads/free-worksheets/Printable-Electronegativity-Table.pdf>

<https://sciencenotes.org/wp-content/uploads/2017/10/PeriodicTableElectronegativity.pdf>

<https://sciencenotes.org/wp-content/uploads/2015/06/ElementElectronegativities.pdf>

<https://www.lenntech.com/periodic-chart-elements/ionization-energy.htm>

<https://www.sciencegeek.net/tables/IonizationNRG.pdf>

<https://www.angstromsciences.com/melting-points-of-elements-reference>

<https://www.lenntech.com/periodic-chart-elements/boiling-point.htm>

<https://www.lenntech.com/periodic-chart-elements/atomic-number.htm>

<https://www.lenntech.com/periodic-chart-elements/atomic-mass.htm>

<https://www.lenntech.com/periodic-chart-elements/electronegativity.htm>

<https://www.lenntech.com/periodic-chart-elements/density.htm>

<https://www.lenntech.com/periodic-chart-elements/melting-point.htm>

<https://www.lenntech.com/periodic-chart-elements/vanderwaals.htm>

<https://www.lenntech.com/periodic-chart-elements/ionization-energy.htm> A comma is used instead of a decimal point

<https://environmentalchemistry.com/yogi/periodic/atomicradius.html> 1 pm is 0.01

Angstrom

<https://periodictable.com/Properties/A/Valence.al.html>

https://www.webassign.net/question_assets/chang11/periodic_table.pdf

<https://periodictable.com/Properties/A/IonizationEnergies.v.html> has units of kJ/mol for ionization energies

<https://www.colby.edu/chemistry/PChem/Hartree.html> will convert units for you, so if you find a website not using the units you need, you can see how they convert at his website.

<https://www.lennotech.com/periodic/name/alphabetic.htm>

<https://periodictable.com/Properties/A/Electronegativity.al.html>

Images that may be useful:

CHEMIX School - PERIODIC TABLE

Properties - Plot

- Name (standard color coding)
- Atomic number
- Relative atomic mass u
- Melting point °C
- Boiling point °C
- Density g/cm³
- Covalent radius *10⁻¹⁰m
- Atomic radius *10⁻¹⁰m
- Atomic volume cm³/mol (293K) *
- First ionization potential V
- Specific heat capacity Jg⁻¹ K⁻¹
- Electrical conductivity *10⁶ Ohm⁻¹cm⁻¹
- Thermal conductivity Wcm⁻¹ K⁻¹
- Electronegativity Pauling
- Heat of fusion kJ/mol
- Heat of vaporization kJ/mol
- Number of stable isotopes
- Acid-base properties of Oxides
- Oxidation states
- Phase (293K)
- Crystal structure
- Electron config. (standard color coding)

Framing of Groups / Blocks

- dff
- Alkali metals
- Alkaline earth metals
- Lanthanides
- Actinides
- Transition metals
- Post-transition metals
- Metalloids
- Other nonmetals
- Halogenes
- Noble gases
- s - block elements
- d - block elements
- p - block elements
- f - block elements

View options

- Properties - Trends by colors
- Properties Pop-Up
- Properties text
- Symbols

[Register CHEMIX School](#)

Period	Group	13/IIIA	14/IVA	15/VA	16/VIA	17/VIIA	18/VIIIA										
1	1/IA Hydrogen H						Helium He										
2	2/IIA Lithium Li Beryllium Be						Neon Ne										
3	Sodium Na Magnesium Mg						Argon Ar										
4	Potassium K Calcium Ca	Scandium Sc	Titanium Ti	Vanadium V	Chromium Cr	Manganese Mn	Iron Fe	Cobalt Co	Nickel Ni	Copper Cu	Zinc Zn	Gallium Ga	Germanium Ge	Arsenic As	Selenium Se	Bromine Br	Krypton Kr
5	Rubidium Rb Strontium Sr	Yttrium Y	Zirconium Zr	Niobium Nb	Molybdenum Mo	Technetium Tc	Ruthenium Ru	Rhodium Rh	Palladium Pd	Silver Ag	Cadmium Cd	Indium In	Tin Sn	Antimony Sb	Tellurium Te	Iodine I	Xenon Xe
6	Cesium Cs Barium Ba	Lanthanum La	Hafnium Hf	Tantalum Ta	Wolfram W	Rhenium Re	Osmium Os	Iridium Ir	Platinum Pt	Gold Au	Mercury Hg	Thallium Tl	Lead Pb	Bismuth Bi	Polonium Po	Astatine At	Radon Rn
7	Francium Fr Radium Ra	Actinium Ac	Lanthanides Actinides														

NOTES:
Underlined symbols: Synthetically prepared
Black symbols: Solid
Blue symbols: Liquid
Red symbols: Gas

Cerium Ce	Praseodymium Pr	Neodymium Nd	Promethium Pm	Samarium Sm	Europium Eu	Gadolinium Gd	Terbium Tb	Dysprosium Dy	Holmium Ho	Erbium Er	Thulium Tm	Ytterbium Yb	Lutetium Lu
Thorium Th	Protactinium Pa	Uranium U	Neptunium Np	Plutonium Pu	Americium Am	Curium Cm	Berkelium Bk	Californium Cf	Einsteinium Es	Fermium Fm	Mendelevium Md	Nobelium No	Lawrencium Lr

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1	1 H	2 He											18/VIIIA He					
2	3 Li	4 Be	13/IIIA B	14/IVA C	15/VA N	16/VIA O	17/VIIA F	18 Ne								10 Ne		
3	11 Na	12 Mg	13 Al	14 Si	15 P	16 S	17 Cl	18 Ar								18 Ar		
4	19 K	20 Ca	21 Sc	22 Ti	23 V	24 Cr	25 Mn	26 Fe	27 Co	28 Ni	29 Cu	30 Zn	31 Ga	32 Ge	33 As	34 Se	35 Br	36 Kr
5	37 Rb	38 Sr	39 Y	40 Zr	41 Nb	42 Mo	43 Tc	44 Ru	45 Rh	46 Pd	47 Ag	48 Cd	49 In	50 Sn	51 Sb	52 Te	53 I	54 Xe
6	55 Cs	56 Ba	57 La	72 Hf	73 Ta	74 W	75 Re	76 Os	77 Ir	78 Pt	79 Au	80 Hg	81 Tl	82 Pb	83 Bi	84 Po	85 At	86 Rn
7	87 Fr	88 Ra	89 Ac	Lanthanides														
			58 Ce	59 Pr	60 Nd	61 Pm	62 Sm	63 Eu	64 Gd	65 Tb	66 Dy	67 Ho	68 Er	69 Tm	70 Yb	71 Lu		
			90 Th	91 Pa	92 U	93 Np	94 Pu	95 Am	96 Cm	97 Bk	98 Cf	99 Es	100 Fm	101 Md	102 No	103 Lr		

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1	1.0079 H	2 He											4.0026 He					
2	6.9410 Li	9.0121 Be	10.811 B	12.011 C	14.006 N	15.999 O	18.998 F	20.179 Ne								20.179 Ne		
3	22.989 Na	24.305 Mg	26.981 Al	28.085 Si	30.973 P	32.066 S	35.452 Cl	39.948 Ar								39.948 Ar		
4	39.098 K	40.077 Ca	44.955 Sc	47.867 Ti	50.941 V	51.996 Cr	54.930 Mn	55.845 Fe	58.933 Co	58.693 Ni	63.546 Cu	65.389 Zn	69.723 Ga	72.610 Ge	74.921 As	78.959 Se	79.903 Br	83.800 Kr
5	85.467 Rb	87.620 Sr	88.905 Y	91.223 Zr	92.906 Nb	95.940 Mo	98.000 Tc	101.07 Ru	102.90 Rh	106.41 Pd	107.86 Ag	112.41 Cd	114.81 In	118.70 Sn	121.76 Sb	127.59 Te	126.90 I	131.28 Xe
6	132.90 Cs	137.32 Ba	138.90 La	178.49 Hf	180.94 Ta	183.83 W	186.20 Re	190.22 Os	192.21 Ir	195.08 Pt	196.96 Au	200.58 Hg	204.38 Tl	207.19 Pb	208.98 Bi	209.00 Po	210.00 At	222.00 Rn
7	223.00 Fr	226.02 Ra	227.02 Ac	Lanthanides														
			140.11 Ce	140.90 Pr	144.24 Nd	145.00 Pm	150.36 Sm	151.96 Eu	157.25 Gd	158.92 Tb	162.50 Dy	164.93 Ho	167.25 Er	168.93 Tm	173.03 Yb	174.96 Lu		
			232.03 Th	231.03 Pa	238.02 U	237.04 Np	244.00 Pu	243.00 Am	247.00 Cm	247.00 Bk	251.00 Cf	252.00 Es	257.00 Fm	258.00 Md	259.00 No	260.00 Lr		

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Melting points table of the elements

CHEMIX School - PERIODIC TABLE

Close

Graphics

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- Heat of fusion kJ/mol
- Heat of vaporization kJ/mol
- Acid-base properties
- Number of stable isotopes

- Electron configuration
- Oxidation states
- Phase 20 °C
- Crystal structure

Group 1/IA		Group 2/IIA		Group 3/IIIB		Group 4/IVB		Group 5/VB		Group 6/VIB		Group 7/VIIB		Group 8/VIII		Group 9/VIII		Group 10/VIII		Group 11/IB		Group 12/IIB		Group 13/IIIA		Group 14/IVA		Group 15/VA		Group 16/VIA		Group 17/VIIA		Group 18/VIIIA											
H	-259.14	Li	180.53	Be	1278.0	Na	97.809	Mg	648.79	K	63.250	Ca	839.00	Sc	1539.0	Ti	1660.0	V	1890.0	Cr	1857.0	Mn	1244.0	Fe	1535.0	Co	1495.0	Ni	1453.0	Cu	1083.4	Zn	419.57	Ga	29.780	Ge	937.400	As	617.00	Se	217.00	Br	-7.2000	Kr	-156.60
Rb	38.889	Sr	769.00	Y	1523.0	Zr	1852.0	Nb	2468.0	Mo	2617.0	Tc	2172.0	Ru	2310.0	Rh	1966.0	Pd	1554.0	Ag	961.92	Cd	320.89	In	156.61	Sn	231.96	Sb	630.73	Te	449.50	I	113.50	Xe	-111.90										
Cs	28.400	Ba	725.00	La	920.00	Hf	2227.0	Ta	2996.0	W	3410.0	Re	3180.0	Os	3045.0	Ir	2410.0	Pt	1772.0	Au	1064.4	Hg	-38.869	Tl	303.50	Pb	327.50	Bi	271.29	Po	254.00	At	302.00	Rn	-71.000										
Fr	27.000	Ra	700.00	Ac	1050.0																																								
Lanthanides ->				Ce	798.00	Pr	931.00	Nd	1010.0	Pm	1080.0	Sm	1072.0	Eu	822.00	Gd	1311.0	Tb	1360.0	Dy	1409.0	Ho	1470.0	Er	1522.0	Tm	1545.0	Yb	824.00	Lu	1656.0														
Actinides ->				Th	1750.0	Pa	1600.0	U	1132.3	Np	640.00	Pu	641.00	Am	994.00	Cm	1340.0	Bk		Cf		Es		Fm		Md		No		Lr															

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Framing of Groups / Blocks

- OFF
- Alkali metals
- Alkaline earth metals
- Lanthanides
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- Transition metals
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- Other nonmetals
- Halogenes
- Noble gases

View options

- Properties - Trends by colors
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- Properties text
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Group 1/IA		Group 2/IIA		Group 3/IIIB		Group 4/IVB		Group 5/VB		Group 6/VIB		Group 7/VIIB		Group 8/VIII		Group 9/VIII		Group 10/VIII		Group 11/IB		Group 12/IIB		Group 13/IIIA		Group 14/IVA		Group 15/VA		Group 16/VIA		Group 17/VIIA		Group 18/VIIIA											
H	-252.8	Li	1342.0	Be	2970.0	Na	882.90	Mg	1090.0	K	759.90	Ca	1484.0	Sc	2832.0	Ti	3287.0	V	3380.0	Cr	2672.0	Mn	1962.0	Fe	2750.0	Co	2870.0	Ni	2732.0	Cu	2567.0	Zn	907.00	Ga	2403.0	Ge	2830.0	As	613.00	Se	684.90	Br	58.779	Kr	-152.3
Rb	686.00	Sr	1384.0	Y	3337.0	Zr	4377.0	Nb	4742.0	Mo	4612.0	Tc	4877.0	Ru	3900.0	Rh	3727.0	Pd	3140.0	Ag	2212.0	Cd	765.00	In	2080.0	Sn	2270.0	Sb	1750.0	Te	989.79	I	184.35	Xe	-107.0										
Cs	669.29	Ba	1640.0	La	3454.0	Hf	4602.0	Ta	5425.0	W	5660.0	Re	5627.0	Os	5027.0	Ir	4130.0	Pt	3827.0	Au	3080.0	Hg	356.57	Tl	1457.0	Pb	1740.0	Bi	1560.0	Po	962.00	At	337.00	Rn	-61.79										
Fr	677.00	Ra	1140.0	Ac	3200.0																																								
Lanthanides				Ce	3257.0	Pr	3212.0	Nd	3127.0	Pm	2460.0	Sm	1778.0	Eu	1597.0	Gd	3233.0	Tb	3041.0	Dy	2335.0	Ho	2720.0	Er	2510.0	Tm	1727.0	Yb	1193.0	Lu	3315.0														
Actinides				Th	4790.0	Pa		U	3818.0	Np	3902.0	Pu	3232.0	Am	2607.0	Cm		Bk		Cf		Es		Fm		Md		No		Lr															

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Boiling points table of the elements

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Graphics																	
<p>Group</p> <p>1/IA -252.86</p> <p>H</p> <p>2/IIA 1342.0 2970.0</p> <p>Li Be</p> <p>882.90 1090.0</p> <p>Na Mg</p> <p>759.90 1484.0 2832.0 3287.0 3380.0 2672.0 1962.0 2750.0 2870.0 2732.0 2567.0 907.00</p> <p>K Ca Sc Ti V Cr Mn Fe Co Ni Cu Zn Ga Ge As Se Br Kr</p> <p>686.00 1384.0 3337.0 4377.0 4742.0 4612.0 4877.0 3900.0 3727.0 3140.0 2212.0 765.00</p> <p>Rb Sr Y Zr Nb Mo Tc Ru Rh Pd Ag Cd In Sn Sb Te I Xe</p> <p>669.29 1640.0 3454.0 4602.0 5425.0 5660.0 5627.0 5027.0 4130.0 3827.0 3080.0 356.57</p> <p>Cs Ba La Hf Ta W Re Os Ir Pt Au Hg Tl Pb Bi Po At Rn</p> <p>677.00 1140.0 3200.0</p> <p>Fr Ra Ac</p>	<p><input type="radio"/> Atomic number</p> <p><input type="radio"/> Name</p> <p><input type="radio"/> Relative atomic mass u</p> <p><input type="radio"/> Melting point °C</p> <p><input checked="" type="radio"/> Boiling point °C</p> <p><input type="radio"/> Density g/cm³</p> <p><input type="radio"/> Covalent radius *10⁻¹⁰m</p> <p><input type="radio"/> Atomic radius *10⁻¹⁰m</p> <p><input type="radio"/> Atomic volume cm³/mol</p>	<p><input type="radio"/> First ionization potential V</p> <p><input type="radio"/> Specific heat capacity Jg⁻¹K⁻¹</p> <p><input type="radio"/> Electrical conductivity *10⁶ Ohm⁻¹cm⁻¹</p> <p><input type="radio"/> Thermal conductivity Wcm⁻¹K⁻¹</p> <p><input type="radio"/> Electronegativity Pauling</p> <p><input type="radio"/> Heat of fusion kJ/mol</p> <p><input type="radio"/> Heat of vaporization kJ/mol</p> <p><input type="radio"/> Acid-base properties</p> <p><input type="radio"/> Number of stable isotopes</p>	<p><input type="radio"/> Electron configuration</p> <p><input type="radio"/> Oxidation states</p> <p><input type="radio"/> Phase 20 °C</p> <p><input type="radio"/> Crystal structure</p>	<p>18/VIIIA -268.93</p> <p>He</p> <p>13/IIIA 14/IVA 15/VA 16/VIA 17/VIIA</p> <p>2550.0 4827.0 -195.80 -182.96 -188.13 -246.04</p> <p>B C N O F Ne</p> <p>2467.0 2355.0 280.00 444.67 -34.599 -185.69</p> <p>Al Si P S Cl Ar</p>													
<p>Lanthanides →</p> <p>Ce Pr Nd Pm Sm Eu Gd Tb Dy Ho Er Tm Yb Lu</p>	<p>3257.0 3212.0 3127.0 2460.0 1778.0 1597.0 3233.0 3041.0 2335.0 2720.0 2510.0 1727.0 1193.0 3315.0</p>																
<p>Actinides →</p> <p>Th Pa U Np Pu Am Cm Bk Cf Es Fm Md No Lr</p>	<p>4790.0 3818.0 3902.0 3232.0 2607.0</p>																

CHEMIX School - PERIODIC TABLE

Properties - Plot

View options

Register CHEMIX School

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2	2/II A Li Be	B	C	N	O	F	Ne								
3	3/IIIB Na Mg	Al	Si	P	S	Cl	Ar								
4	4/IVB K Ca Sc Ti V Cr Mn Fe Co Ni Cu Zn	Ga	Ge	As	Se	Br	Kr								
5	5/VB Rb Sr Y Zr Nb Mo Tc Ru Rh Pd Ag Cd	In	Sn	Sb	Te	I	Xe								
6	6/VIB Cs Ba La Hf Ta W Re Os Ir Pt Au Hg	Tl	Pb	Bi	Po	At	Rn								
7	7/VIB Fr Ra Ac														
		Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu
		Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No	Lr

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<https://www.colby.edu/chemistry/PChem/Hartree.html>

Energy Units Converter

Enter your energy value in the box with the appropriate units, then press "tab" or click outside of the input box.

0.00381	Hartrees
0.104	eV
10	kJ/mol
2.39	kcal/mol
836	cm ⁻¹
0.104	V for 1e ⁻ transfer
1200	K (equivalent temperature)
0.0177	Boltzman population ratio at 298.15K

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1		2.20 H																		He
2		0.98 Li	1.57 Be											2.04 B	2.55 C	3.04 N	3.44 O	3.98 F	Ne	
3		0.93 Na	1.31 Mg											1.61 Al	1.90 Si	2.19 P	2.58 S	3.16 Cl	Ar	
4		0.82 K	1.00 Ca	1.36 Sc	1.54 Ti	1.63 V	1.66 Cr	1.55 Mn	1.83 Fe	1.88 Co	1.91 Ni	1.90 Cu	1.65 Zn	1.81 Ga	2.01 Ge	2.18 As	2.55 Se	2.96 Br	Kr	
5		0.82 Rb	0.95 Sr	1.22 Y	1.33 Zr	1.60 Nb	2.16 Mo	1.90 Tc	2.20 Ru	2.28 Rh	2.20 Pd	1.93 Ag	1.69 Cd	1.78 In	1.96 Sn	2.05 Sb	2.10 Te	2.66 I	Xe	
6		0.79 Cs	0.89 Ba	1.10 La	1.30 Hf	1.50 Ta	2.36 W	1.90 Re	2.20 Os	2.20 Ir	2.28 Pt	2.54 Au	2.00 Hg	2.04 Tl	2.33 Pb	2.02 Bi	2.00 Po	2.20 At	Rn	
7		0.70 Fr	0.90 Ra	1.10 Ac																

NOTES:
 Underlined symbols: Synthetically prepared
 Black symbols: Solid
 Blue symbols: Liquid
 Red symbols: Gas

Properties - Plot

- Name (standard color coding)
- Atomic number
- Relative atomic mass u
- Melting point °C
- Boiling point °C
- Density g/cm³
- Covalent radius *10⁻¹⁰m
- Atomic radius *10⁻¹⁰m
- Atomic volume cm³/mol (293K) *
- First ionization potential V
- Specific heat capacity Jg⁻¹ K⁻¹
- Electrical conductivity *10⁶ Ohm⁻¹cm⁻¹
- Thermal conductivity Wcm⁻¹ K⁻¹
- Electronegativity Pauling
- Heat of fusion kJ/mol
- Heat of vaporization kJ/mol
- Number of stable isotopes
- Acid-base properties of Oxides
- Oxidation states
- Phase (293K)
- Crystal structure
- Electron config. (standard color coding)

Framing of Groups / Blocks

- dff
- s - block elements
- Alkali metals
- Alkaline earth metals
- Lanthanides
- Actinides
- Transition metals
- Post-transition metals
- Metalloids
- Other nonmetals
- Halogenes
- Noble gases
- p - block elements
- d - block elements
- f - block elements

View options

- Properties - Trends by colors
- Properties Pop-Up
- Properties text
- Symbols

[Register CHEMIX School](#)

Period	Group	1/IA	2/IIA	3/IIIB	4/IVB	5/VB	6/VIB	7/VIIB	8/VIII	9/VIII	10/VIII	11/IB	12/IIIB	13/IIIA	14/IVA	15/VA	16/VIA	17/VIIA	18/VIIIA	
1		Hydrogen H																		Helium He
2		Lithium Li	Beryllium Be											B	C	N	O	F	Neon Ne	
3		Sodium Na	Magnesium Mg											Aluminium Al	Silicon Si	Phosphorus P	Sulfur S	Chlorine Cl	Argon Ar	
4		Potassium K	Calcium Ca	Scandium Sc	Titanium Ti	Vanadium V	Chromium Cr	Manganese Mn	Iron Fe	Cobalt Co	Nickel Ni	Copper Cu	Zinc Zn	Gallium Ga	Germanium Ge	Arsenic As	Selenium Se	Bromine Br	Krypton Kr	
5		Rubidium Rb	Strontium Sr	Yttrium Y	Zirconium Zr	Niobium Nb	Molybdenum Mo	Technetium Tc	Ruthenium Ru	Rhodium Rh	Palladium Pd	Silver Ag	Cadmium Cd	Indium In	Tin Sn	Antimony Sb	Tellurium Te	Iodine I	Xenon Xe	
6		Cesium Cs	Barium Ba	Lanthanum La	Hafnium Hf	Tantalum Ta	Wolfram W	Rhenium Re	Osmium Os	Iridium Ir	Platinum Pt	Gold Au	Mercury Hg	Thallium Tl	Lead Pb	Bismuth Bi	Polonium Po	Astatine At	Radon Rn	
7		Francium Fr	Radium Ra	Actinium Ac																

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CHEMIX School - PERIODIC TABLE

Properties - Plot

- Name (standard color coding)
- Atomic number
- Relative atomic mass u
- Melting point °C
- Boiling point °C
- Density g/cm³
- Covalent radius *10⁻¹⁰m
- Atomic radius *10⁻¹⁰m
- Atomic volume cm³/mol (293K) *
- First ionization potential V
- Specific heat capacity Jg⁻¹ K⁻¹
- Electrical conductivity *10⁶ Ohm⁻¹cm⁻¹
- Thermal conductivity Wcm⁻¹ K⁻¹
- Electronegativity Pauling
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- Acid-base properties of Oxides
- Oxidation states
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Framing of Groups / Blocks

- OFF
- s - block elements
- d - block elements
- Alkali earth metals
- Lanthanides
- Actinides
- Transition metals
- Post-transition metals
- Metalloids
- Other nonmetals
- Halogenes
- Noble gases

View options

- Properties - Trends by colors
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[Register CHEMIX School](#)

1	1/IA H Hydrogen	2/IIA He Helium	18/VIIIA															
2	Li Lithium	Be Beryllium	B Boron	C Carbon	N Nitrogen	O Oxygen	F Fluorine	Ne Neon										
3	Na Sodium	Mg Magnesium	3/IIIB	Al Aluminium	Si Silicon	P Phosphorus	S Sulfur	Cl Chlorine	Ar Argon									
4	K Potassium	Ca Calcium	Sc Scandium	Ti Titanium	V Vanadium	Cr Chromium	Mn Manganese	Fe Iron	Co Cobalt	Ni Nickel	Cu Copper	Zn Zinc	Ga Gallium	Ge Germanium	As Arsenic	Se Selenium	Br Bromine	Kr Krypton
5	Rb Rubidium	Sr Strontium	Y Yttrium	Zr Zirconium	Nb Niobium	Mo Molybdenum	Tc Technetium	Ru Ruthenium	Rh Rhodium	Pd Palladium	Ag Silver	Cd Cadmium	In Indium	Sn Tin	Sb Antimony	Te Tellurium	I Iodine	Xe Xenon
6	Cs Cesium	Ba Barium	La Lanthanum	Hf Hafnium	Ta Tantalum	W Wolfram	Re Rhenium	Os Osmium	Ir Iridium	Pt Platinum	Au Gold	Hg Mercury	Tl Thallium	Pb Lead	Bi Bismuth	Po Polonium	At Astatine	Rn Radon
7	Fr Francium	Ra Radium	Ac Actinium	Lanthanides / Actinides														
NOTES:				Ce Cerium	Pr Praseodymium	Nd Neodymium	Pm Promethium	Sm Samarium	Eu Europium	Gd Gadolinium	Tb Terbium	Dy Dysprosium	Ho Holmium	Er Erbium	Tm Thulium	Yb Ytterbium	Lu Lutetium	
				Th Thorium	Pa Protactinium	U Uranium	Np Neptunium	Pu Plutonium	Am Americium	Cm Curium	Bk Berkelium	Cf Californium	Es Einsteinium	Fm Fermium	Md Mendelevium	No Nobelium	Lr Lawrencium	

CHEMIX School - PERIODIC TABLE

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- Lanthanides
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View options

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[Register CHEMIX School](#)

1	1/IA H Hydrogen	2/IIA He Helium	18/VIIIA															
2	Li Lithium	Be Beryllium	B Boron	C Carbon	N Nitrogen	O Oxygen	F Fluorine	Ne Neon										
3	Na Sodium	Mg Magnesium	3/IIIB	Al Aluminium	Si Silicon	P Phosphorus	S Sulfur	Cl Chlorine	Ar Argon									
4	K Potassium	Ca Calcium	Sc Scandium	Ti Titanium	V Vanadium	Cr Chromium	Mn Manganese	Fe Iron	Co Cobalt	Ni Nickel	Cu Copper	Zn Zinc	Ga Gallium	Ge Germanium	As Arsenic	Se Selenium	Br Bromine	Kr Krypton
5	Rb Rubidium	Sr Strontium	Y Yttrium	Zr Zirconium	Nb Niobium	Mo Molybdenum	Tc Technetium	Ru Ruthenium	Rh Rhodium	Pd Palladium	Ag Silver	Cd Cadmium	In Indium	Sn Tin	Sb Antimony	Te Tellurium	I Iodine	Xe Xenon
6	Cs Cesium	Ba Barium	La Lanthanum	Hf Hafnium	Ta Tantalum	W Wolfram	Re Rhenium	Os Osmium	Ir Iridium	Pt Platinum	Au Gold	Hg Mercury	Tl Thallium	Pb Lead	Bi Bismuth	Po Polonium	At Astatine	Rn Radon
7	Fr Francium	Ra Radium	Ac Actinium	Lanthanides / Actinides														
NOTES:				Ce Cerium	Pr Praseodymium	Nd Neodymium	Pm Promethium	Sm Samarium	Eu Europium	Gd Gadolinium	Tb Terbium	Dy Dysprosium	Ho Holmium	Er Erbium	Tm Thulium	Yb Ytterbium	Lu Lutetium	
				Th Thorium	Pa Protactinium	U Uranium	Np Neptunium	Pu Plutonium	Am Americium	Cm Curium	Bk Berkelium	Cf Californium	Es Einsteinium	Fm Fermium	Md Mendelevium	No Nobelium	Lr Lawrencium	

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Register CHEMIX School

1	1/IA	Hydrogen H	2/IIA		13/IIIA	14/IVA	15/VA	16/VIA	17/VIIA	18/VIIIA						
2	Lithium Li	Beryllium Be			Boron B	Carbon C	Nitrogen N	Oxygen O	Fluorine F	Neon Ne						
3	Sodium Na	Magnesium Mg	3/IIIB	4/IVB	5/VB	6/VIB	7/VIIB	8/VIII	9/VIII	10/VIII	11/IB	12/IIIB				
4	Potassium K	Calcium Ca	Scandium Sc	Titanium Ti	Vanadium V	Chromium Cr	Manganese Mn	Iron Fe	Cobalt Co	Nickel Ni	Copper Cu	Zinc Zn				
5	Rubidium Rb	Strontium Sr	Yttrium Y	Zirconium Zr	Niobium Nb	Molybdenum Mo	Technetium Tc	Ruthenium Ru	Rhodium Rh	Palladium Pd	Silver Ag	Cadmium Cd				
6	Cesium Cs	Barium Ba	Lanthanum La	Hafnium Hf	Tantalum Ta	Wolfram W	Rhenium Re	Osmium Os	Iridium Ir	Platinum Pt	Gold Au	Mercury Hg				
7	Francium Fr	Radium Ra	Actinium Ac	Lanthanides Actinides												
			Cerium Ce	Praseodymium Pr	Neodymium Nd	Promethium Pm	Samarium Sm	Europium Eu	Gadolinium Gd	Terbium Tb	Dysprosium Dy	Holmium Ho	Erbium Er	Thulium Tm	Ytterbium Yb	Lutetium Lu
			Thorium Th	Protactinium Pa	Uranium U	Neptunium Np	Plutonium Pu	Americium Am	Curium Cm	Berkelium Bk	Californium Cf	Einsteinium Es	Fermium Fm	Mendelevium Md	Nobelium No	Lawrencium Lr

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Register CHEMIX School

1	1/IA	1s ¹ H	2/IIA		13/IIIA	14/IVA	15/VA	16/VIA	17/VIIA	18/VIIIA						
2	Lithium Li	Beryllium Be			Boron B	Carbon C	Nitrogen N	Oxygen O	Fluorine F	Neon Ne						
3	[Ne]3s ¹ Na	[Ne]3s ² Mg	3/IIIB	4/IVB	5/VB	6/VIB	7/VIIB	8/VIII	9/VIII	10/VIII	11/IB	12/IIIB				
4	[Ar]4s ¹ K	[Ar]4s ² Ca	[Ar]3d ¹ 4s ² Sc	[Ar]3d ² 4s ² Ti	[Ar]3d ³ 4s ² V	[Ar]3d ⁴ 4s ² Cr	[Ar]3d ⁵ 4s ² Mn	[Ar]3d ⁶ 4s ² Fe	[Ar]3d ⁷ 4s ² Co	[Ar]3d ⁸ 4s ² Ni	[Ar]3d ⁹ 4s ¹ Cu	[Ar]3d ¹⁰ 4s ² Zn				
5	[Kr]5s ¹ Rb	[Kr]5s ² Sr	[Kr]4d ¹ 5s ² Y	[Kr]4d ² 5s ² Zr	[Kr]4d ³ 5s ² Nb	[Kr]4d ⁴ 5s ¹ Mo	[Kr]4d ⁵ 5s ² Tc	[Kr]4d ⁶ 5s ¹ Ru	[Kr]4d ⁷ 5s ¹ Rh	[Kr]4d ⁸ 5s ¹ Pd	[Kr]4d ⁹ 5s ¹ Ag	[Kr]4d ¹⁰ 5s ² Cd				
6	[Xe]6s ¹ Cs	[Xe]6s ² Ba	[Xe]5d ¹ 6s ² La	[Xe]4f ¹⁴ 5d ² 6s ² Hf	[Xe]4f ¹⁴ 5d ³ 6s ² Ta	[Xe]4f ¹⁴ 5d ⁴ 6s ² W	[Xe]4f ¹⁴ 5d ⁵ 6s ² Re	[Xe]4f ¹⁴ 5d ⁶ 6s ² Os	[Xe]4f ¹⁴ 5d ⁷ 6s ¹ Ir	[Xe]4f ¹⁴ 5d ⁸ 6s ¹ Pt	[Xe]4f ¹⁴ 5d ⁹ 6s ¹ Au	[Xe]4f ¹⁴ 5d ¹⁰ 6s ² Hg				
7	[Rn]7s ¹ Fr	[Rn]7s ² Ra	[Rn]6d ¹ 7s ² Ac	Lanthanides Actinides												
			[Xe]4f ² 5d ⁰ 6s ² Ce	[Xe]4f ³ 5d ⁰ 6s ² Pr	[Xe]4f ⁴ 5d ⁰ 6s ² Nd	[Xe]4f ⁵ 5d ⁰ 6s ² Pm	[Xe]4f ⁶ 5d ⁰ 6s ² Sm	[Xe]4f ⁷ 5d ⁰ 6s ² Eu	[Xe]4f ⁷ 5d ¹ 6s ² Gd	[Xe]4f ⁷ 5d ¹ 6s ² Tb	[Xe]4f ⁹ 5d ⁰ 6s ² Dy	[Xe]4f ¹⁰ 5d ⁰ 6s ² Ho	[Xe]4f ¹¹ 5d ⁰ 6s ² Er	[Xe]4f ¹² 5d ⁰ 6s ² Tm	[Xe]4f ¹³ 5d ⁰ 6s ² Yb	[Xe]4f ¹⁴ 5d ⁰ 6s ² Lu
			[Rn]5f ⁰ 6d ² 7s ² Th	[Rn]5f ² 6d ¹ 7s ² Pa	[Rn]5f ³ 6d ¹ 7s ² U	[Rn]5f ⁴ 6d ¹ 7s ² Np	[Rn]5f ⁶ 6d ⁰ 7s ² Pu	[Rn]5f ⁷ 6d ⁰ 7s ² Am	[Rn]5f ⁷ 6d ¹ 7s ² Cm	[Rn]5f ⁷ 6d ¹ 7s ² Bk	[Rn]5f ⁹ 6d ⁰ 7s ² Cf	[Rn]5f ¹⁰ 6d ⁰ 7s ² Es	[Rn]5f ¹¹ 6d ⁰ 7s ² Fm	[Rn]5f ¹² 6d ⁰ 7s ² Md	[Rn]5f ¹³ 6d ⁰ 7s ² No	[Rn]5f ¹⁴ 6d ¹ 7s ² Lr

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Include complete URLs for all of the websites you use to answer the discussion questions. If you use the Chemix software, mention which panels you used.