

Atomic Radius — size

-Measured as half the distance between the nuclei of adjacent atoms

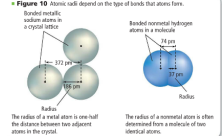


Figure 10 Atomic radii depend on the type of bonds that atoms form.

Superior metallic radius of atoms in a crystal lattice.

Bohr's covalent hydrogen atoms in a molecule.

The radius of a metal atom is one-half the distance between two adjacent atoms in the crystal.

The radius of a nonmetal atom is often determined from a molecule of two identical atoms.

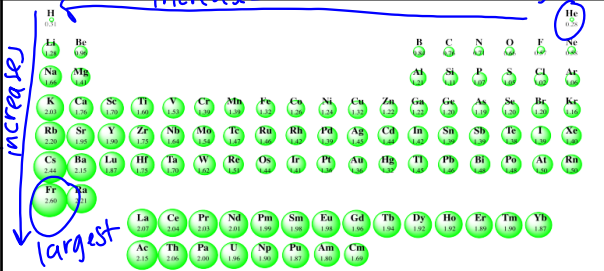
-Tends to **decrease across a period** because **L-R**

- nuclear charge (# of protons) increases
- no new energy levels or shielding

-Tends to **increase down a group** because

- energy levels are being added which increases shielding

Atomic Radius



← increases →

↑ increases ↓

largest (Fr)

smallest (He)

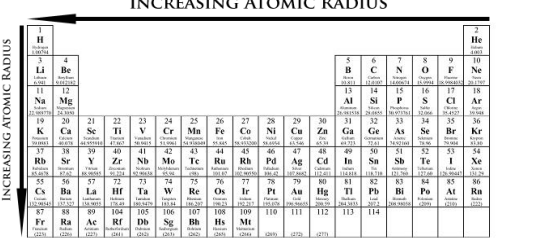
1. Beatty, Cleckley et al., *Chemistry: Matter and Change*, 2008, 21-2933-2938.

- Which element has the largest atomic radius? **Fr**
- Which element has the smallest atomic radius? **He**

Oct 3-3:01 PM

Oct 4-7:40 AM

INCREASING ATOMIC RADIUS



1	H	2	He																																																										
3	Li	4	Be																																																										
5	B	6	C	7	N	8	O	9	F	10	Ne																																																		
11	Na	12	Mg	13	Al	14	Si	15	P	16	S	17	Cl	18	Ar																																														
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																										
37	Rb	38	Sr	39	Y	40	Zr	41	Nb	42	Tc	43	Ru	44	Rh	45	Pd	46	Ag	47	Cd	48	In	49	Sn	50	Sb	51	Te	52	I	53	Xe																												
55	Cs	56	Ba	57	La	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																												
87	Fr	88	Ra	89	Ac	90	Th	91	Pa	92	U	93	Np	94	Pu	95	Am	96	Cm	97	Bk	98	Cf	99	Es	100	Fm	101	Mn	102	Nb	103	Mo	104	Tc	105	Ru	106	Rh	107	Pd	108	Ag	109	Cd	110	In	111	Sn	112	Sb	113	Te	114	Bi	115	Po	116	At	117	Rn

Oct 4-7:41 AM

Oct 4-12:39 PM

Practice:

- Na** or Li
- Na** or F
- Fr** or He
- Cl** or Ar
- F or **Br**

Electronegativity

-- The ability of an element to attract electrons.

Which elements would really like additional electrons?

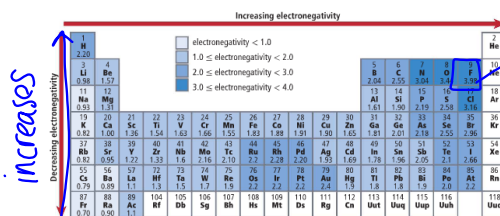
Why? — halogens (17)
— top group

Which elements would not like to have additional electrons? Why? — noble gases (do not have electrons)

— alkali — lose 1e⁻

Oct 4-7:42 AM

Electronegativity



Which element is the most electronegative? Why? F

Which element is the least electronegative? Why? Fr/He

Why do the noble gases not have electronegativity values?
full octet

Oct 4-7:43 AM

Practice:

Which element has a higher electronegativity?

- a. Mg or O
- b. N or As
- c. Cl or Ne
- d. Si or Sn

Oct 4-12:54 PM