

Warm-up:

Periodic Design

The organization of elements in the periodic table lends itself well to a discussion of the orbitals found in atoms. The first two rows contain elements that have all their outermost electrons in their s orbitals. Columns 13-18 contain elements that have all their outermost electrons in their p orbitals. Columns 3-12 contain elements that have all their outermost electrons in their d orbitals. And the lanthanide and actinide series contain elements that have all their outermost electrons in their f orbitals.

Determine which orbital is the outermost for each of the following elements.

a. U - f	e. Fe - d
b. Sr - s	f. Pu - f
c. C - p	g. Na - s
d. Ne - p	h. Ag - d

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Periodic Trends:

① Atomic radius:

• Across from left to right:

RA ↓

↳ increase the # protons → increase in nuclear charge → decrease in size

• Down in group:

RA ↑

↳ increase the number of shells → increases shielding electrons

- Ion: atom with a non-zero net charge → by gaining/losing electrons

↳ Anions: negatively charged → larger radius

↳ Cations: positively charged → smaller radius

ex: Na: $11p^+ + 11e^- = 0$

$Na + e^-$: $11p^+ + 12e^- = -1$

$Na - e^-$: $11p^+ + 10e^- = +1$

② Ionization Energy: amount of energy needed to remove an electron

• Across from left to right:

IE ↑

↳ more protons = stronger charge

• Down group:

IE ↓

↳ more shielding electrons

③ Electronegativity: relative strength that an atom attracts electrons with

• Across from left to right:

EN ↑

↳ stronger nuclear charge

• Down Group:

EN ↓

↳ less nuclear charge is felt

Summary:

