

5 • What Do Atoms Look Like?

RECOGNIZING TRENDS 1

In each group of atoms, circle the atom with the...

largest atomic radius

Li	Be
Na	Mg

largest ionization energy

C	N
Al	Si

smallest atomic radius

S	Cl
Se	Br

smallest ionization energy

Cl	Ar
Br	Kr

Iodine, I, would have properties most like:

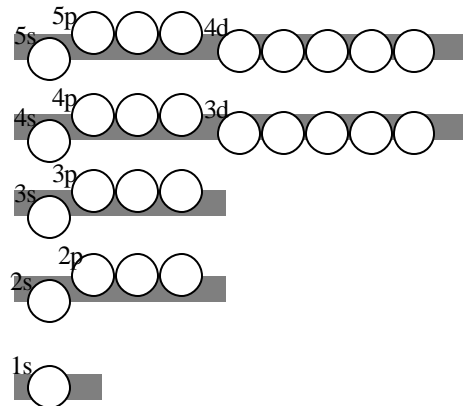
- N, nitrogen
- Cl, chlorine
- Te, tellurium
- Xe, xenon

				N			
						Cl	
					Te	I	Xe

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VALENCE ELECTRONS 2

Draw the orbital diagram for **As** (Z=33)
Draw a box around the **valence electrons**.



For each element below, write in the number of **valence electrons** that it has:

H							He
Li	Be	B	C	N	O	F	Ne
Na	Mg	Al	Si	P	S	Cl	Ar

Which orbital(s) are farthest from the nucleus? _____
Which orbital(s) are highest energy? _____

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FAMILY QUESTIONS 3

Use the following KEY to answer these questions (more than one answer may be correct):

H = hydrogen AM = alkali metals AEM = alkaline earth metals HALO = halogens NG = noble gases

- | | |
|-------------------------------------|--|
| _____ 1. Form 2+ ions | _____ 6. Highest ionization energies |
| _____ 2. All are diatomic | _____ 7. Lowest ionization energies |
| _____ 3. Have full valence orbitals | _____ 8. Gain 1 electron when forming ions |
| _____ 4. React quickly with water | _____ 9. Family only has one member |
| _____ 5. Form 1- ions | _____ 10. Members include (s), (l), & (g) |

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METALS, NONMETALS & SEMIMETALS 4

Use the following KEY to answer these questions:

M = metals

NM = nonmetals

S = semimetals

- | | |
|---------------------------------------|--------------------------------------|
| _____ 1. Shiny and ductile | _____ 6. Argon, Ar, is an example |
| _____ 2. Poor conductors | _____ 7. Also called semiconductors |
| _____ 3. Magnesium, Mg, is an example | _____ 8. Silicon, Si, is an example |
| _____ 4. Brittle | _____ 9. Good conductors |
| _____ 5. Arsenic, As, is an example | _____ 10. Hydrogen, H, is an example |

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SIZES OF ATOMS & IONS 5

For each pair, circle the LARGER one (size, not mass):



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ELECTRONS OF IONS 6

Complete the following tables:

	O ²⁻	F ⁻	Ne	Na ⁺	Mg ²⁺
# protons			10		
# electrons			10		

	S ²⁻	Cl ⁻	Ar	K ⁺	Ca ²⁺
# protons			18		
# electrons			18		

Al³⁺ has the same number of electrons as the noble gas, _____

Γ has the same number of electrons as the noble gas, _____

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PERIODIC PUZZLERS 7

The following elements belong together in families as grouped below. Use the clues to fill in the chart.

AQ, MB, GNC

1	
	2

	13	14	15	16	17	18

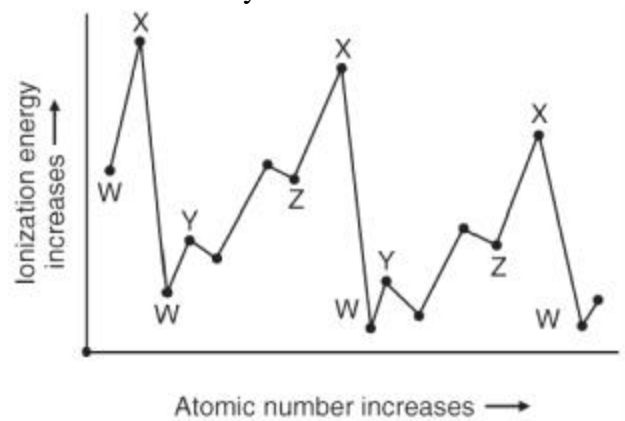
Clues:

1. A is the second most abundant gas in the atmosphere.
2. G has the highest ionization energy of any atom.
3. M forms 2+ ions.
4. N is the largest member of its group.
5. B has a greater atomic radius than M.

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IONIZATION ENERGIES 8

This is a graph of the ionization energies for the first 20 elements by atomic number.



Use the information on this chart to determine which families are W, X, and Y:

	1	2	13	14	15	16	17	18
	H 131		Ionization Energy					He 237
1	Li 52	Be 90	B 80	C 109	N 140	O 131	F 168	Ne 208
2	Na 49	Mg 74	Al 58	Si 79	P 106	S 100	Cl 126	Ar 152
3	K 42	Ca 59						
4								

W is the _____ family.
 X is the _____ family.
 Y is the _____ family.

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THE SUBATOMIC PARTICLES 9

Use the following KEY to answer these questions (more than one answer may apply):

P = protons

N = neutrons

E = electrons

- | | |
|--|--|
| _____ 1. Most of the mass of the atom | _____ 6. Size of a softball in a 6-mile atom |
| _____ 2. 1+ charge | _____ 7. 1/2000 th amu |
| _____ 3. Mass of 1 amu | _____ 8. No charge |
| _____ 4. Makes up the nucleus | _____ 9. Found outside the nucleus |
| _____ 5. Determines the radius of the atom | _____ 10. Charge of 1- |