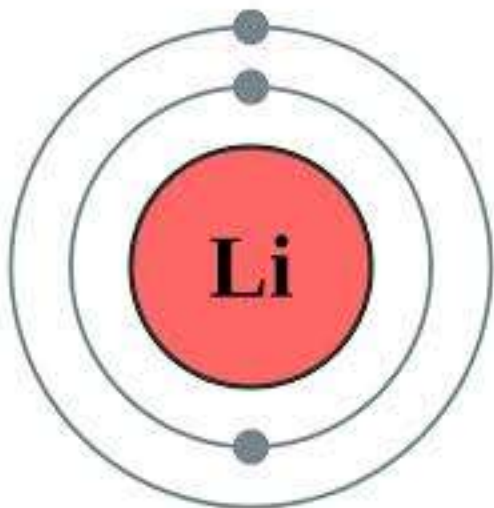


Bohr Diagrams and Lewis Dot Structures



What You've Already Learned in Class

- You learned that electrons can exist in different **energy clouds**
- You learned that the number of electrons in an atom are equal to the number of protons.

Learning Objective

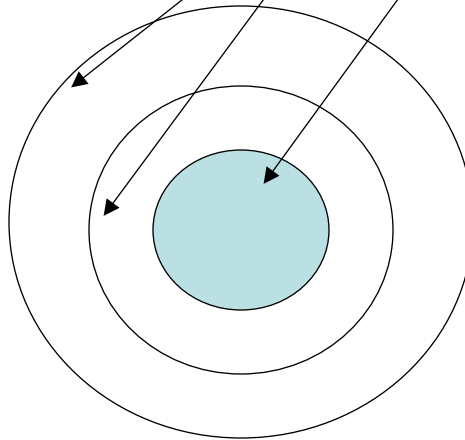
1. Use knowledge of the Periodic Table to draw a Bohr Diagram with electron configurations.
2. To be able to determine how many valence electrons an element has.
3. Use knowledge of valence electrons to draw a Lewis Dot Structure

Review!

Electron Cloud	Maximum Electrons
1	2
2	8
3	8 (happy with 8, but can hold up to 18)

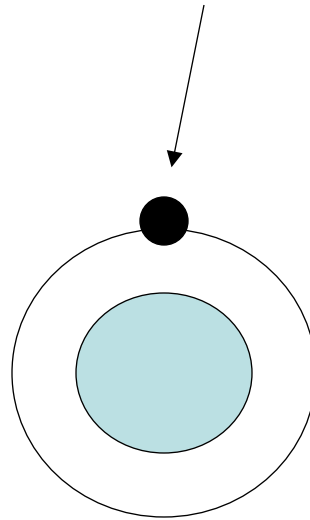
Bohr Diagram

- A model of an atom with the nucleus at the center, and the electrons drawn around it on different **energy levels or electron clouds**.



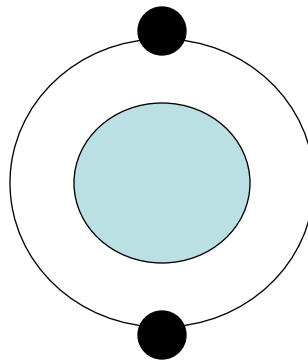
Practice

- For an Atom of **Hydrogen**:
- How many electrons? **1**
- Now, draw the electron

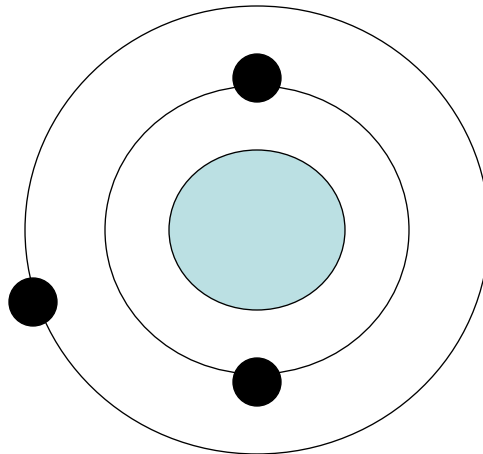


Next

- For an Atom of **Helium**:
- How many electrons? **2**
- Now, draw the electrons



- For an Atom of **Lithium**:
- How many electrons? **3**
- How many electron clouds? **2**
- Now, draw the electrons

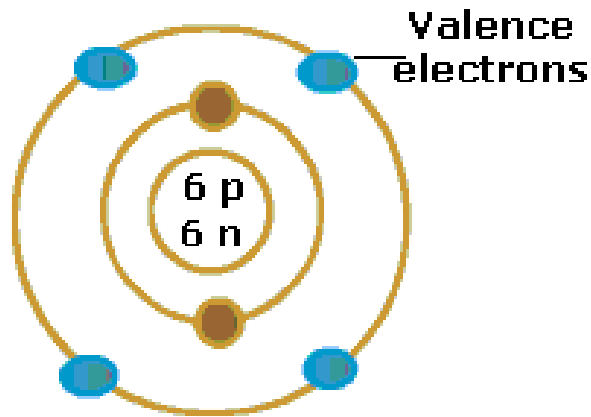


Bohr Diagram Summary

- Draw the nucleus.
- Draw the total number of electrons in the correct cloud arrangement
- Remember:
 - 1st energy level can hold 2 e-
 - 2nd can hold 8 e-
 - 3rd happy with 8 e-

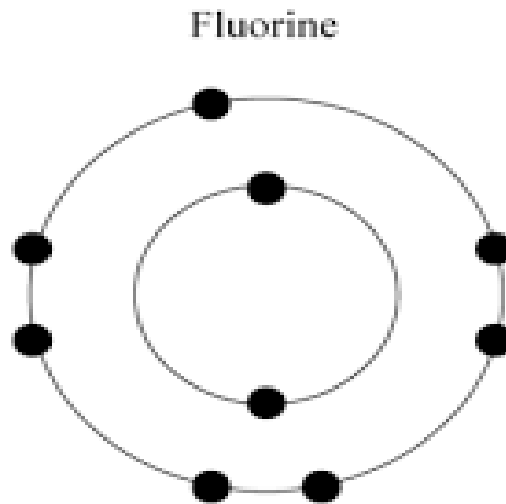
Valence Electrons

- Valence Electrons are the electrons on the outermost electron cloud of an Atom.



4 Valence Electrons

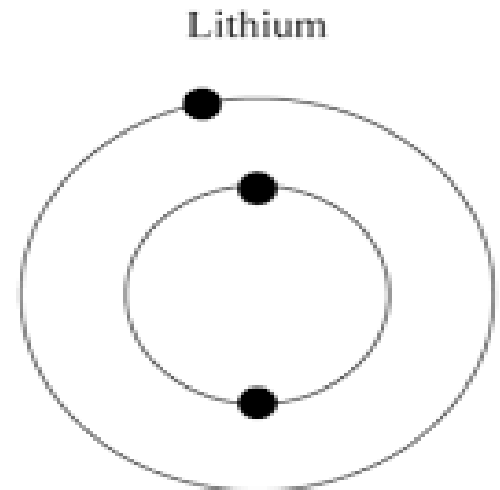
1



Fluorine

How many valence electrons?

Fluorine: 7



Lithium

Lithium:

Valence Electrons

- Determined by the elements Group.
- Groups are the Vertical Columns (up and down) on the Periodic Table.

Lewis Dot Structure

- All elements in the 1st group have only 1 valence electron. All elements in the first group have a Lewis Dot Structure like this:

The diagram shows a simplified periodic table. A vertical arrow on the left is labeled 'Group' and a horizontal arrow at the bottom is labeled 'Period'. An arrow points from the 'group number 1' label to the Hydrogen (H) atom. Above the Hydrogen atom is its Lewis dot structure: a capital 'H' with a single dot above it.

group number 1												8					
H	2											3	4	5	6	7	He
Li	Be											B	C	N	O	F	Ne
Na	Mg											Al	Si	P	S	Cl	Ar
K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr
Period																	

Electrons

- All Elements in the 2nd group have 2 valence e-

group number

1

2

3

4

5

6

7

8

Group

Period

H

Li

Na

K

Be

Mg

Ca

Sc

Ti

V

Cr

Mn

Fe

Co

Ni

Cu

Zn

B

Al

Ga

C

Si

Ge

N

P

As

O

S

Se

F

Cl

Br

He

Ne

Ar

Kr

Be

- S. $\rightarrow$ $\cdot \text{B} \cdot$

group number

1 2 3 4 5 6 7 8

Group

H He

Li Be B C N O F Ne

Na Mg Al Si P S Cl Ar

K Ca Sc Ti V Cr Mn Fe Co Ni Cu Zn Ga Ge As Se Br Kr

Period

Determining Valence Electrons

Skip the middle section, groups 3-12, called the transition metals (These don't always follow the rules. You'll learn about these later.)

later.)

group number

1

2

3

4

5

6

7

8

Group

H																		He
Li	Be											B	C	N	O	F	Ne	
Na	Mg											Al	Si	P	S	Cl	Ar	
K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr	

Period

Example:
Al has 3 valence
Electrons. Lewis
Structure looks like this

• A •

Group

Exception

- Helium (He) is an exception. It's in the 18th group, but only has 2 valence electrons.

group number
1

2

3

4

5

6

7

8

Group

Period

He

Ne

Ar

Kr

H

Li

Na

K

Be

Mg

Ca

Sc

Ti

V

Cr

Mn

Fe

Co

Ni

Cu

Zn

Ga

Ge

As

Se

Br

He

Ne

Ar

Kr

He

Ne

Ar

Kr

Lewis Structure Summary

1. Draw the chemical symbol.
2. Determine valence electrons by atom's group number.
3. Skip the middle when counting groups, and drop the 1 in front of groups 13-18
4. Draw the valence electrons around chemical symbol.

Lewis Structure Practice

Draw the Lewis Structure for a Nitrogen atom.

