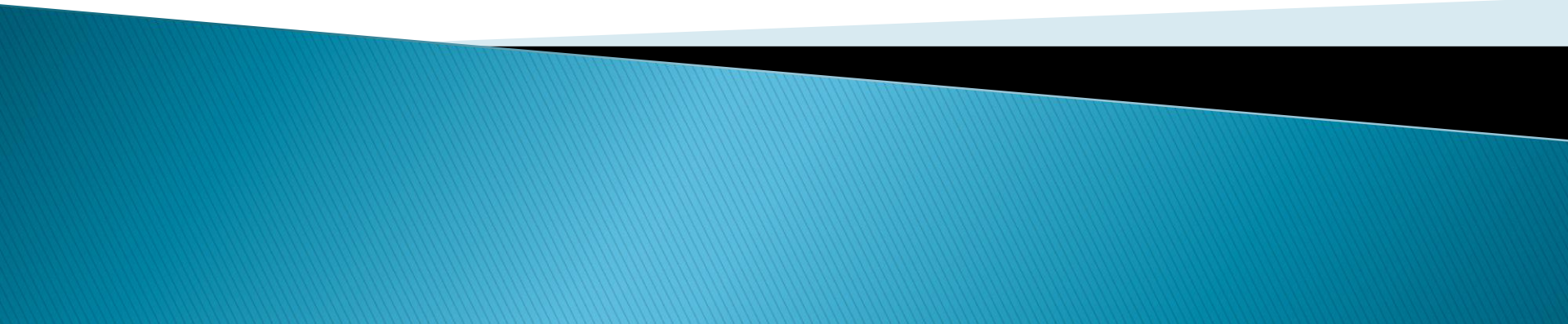
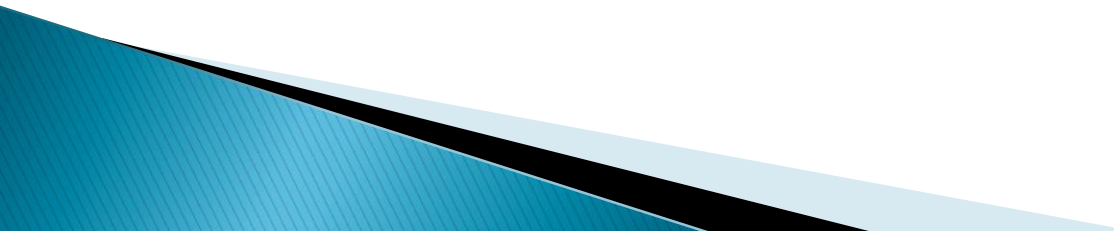


Combining Capacity of Elements



Learning Goals

- ▶ I can use diagrams to show atoms and molecules.
 - ▶ I can classify compounds as ionic or covalent.
- 

Combining Capacity of Elements

Definition of Combining Capacity:

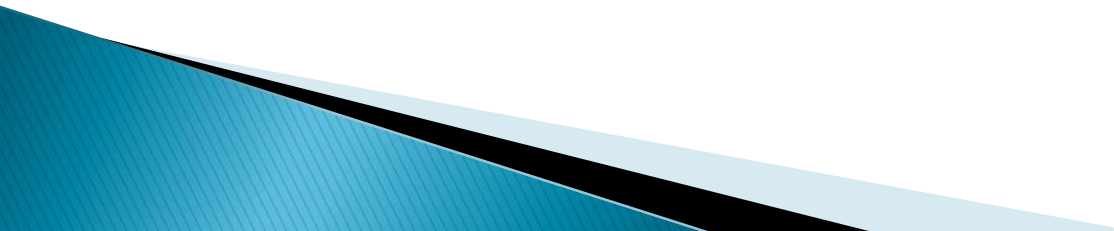
- An element's combining capacity is the number of **electrons** it needs to **gain or lose** in order to be a **stable ion**.
- It is also the subsequent **ionic charge** that the element possesses.

NOTE: Combining capacity will be used later on to predict chemical formulas so it is **essential** that you know how to figure them out.

Recall:

- ▶ Metals lose electrons.
(positive ion → **CATION**)
- ▶ Non-metals gain electrons.
(negative ion → **ANION**)

We will use examples to help you learn about combining capacities.



Element and its Lewis Diagrams

1. lithium



Combining Capacity/Ionic Charge

Element and its Lewis Diagrams

1. lithium

- **needs to lose**
Li **1 electron to**
be stable

Combining Capacity/Ionic Charge



Element and its Lewis Diagrams

1. lithium



Combining Capacity/Ionic Charge

+ 1

Element and its Lewis Diagrams

2. beryllium



Combining Capacity/Ionic Charge

Element and its Lewis Diagrams

2. beryllium

- needs to lose
- Be 2 electrons to
- be stable

Combining Capacity/Ionic Charge

Element and its Lewis Diagrams

2. beryllium



Combining Capacity/Ionic Charge

+2

Element and its Lewis Diagrams

3. boron



Combining Capacity/Ionic Charge

Element and its Lewis Diagrams

3. boron

- needs to lose
- B 3 electrons to
- be stable

Combining Capacity/Ionic Charge

Element and its Lewis Diagrams

3. boron



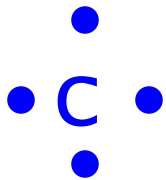
Combining Capacity/Ionic Charge

+3

NOTE: ALWAYS treat boron as a metal!

Element and its Lewis Diagrams

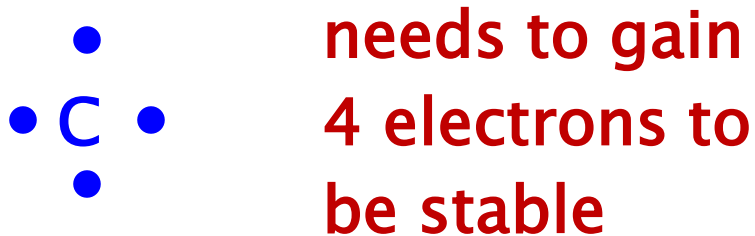
4. carbon



Combining Capacity/Ionic Charge

Element and its Lewis Diagrams

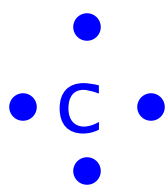
4. carbon



Combining Capacity/Ionic Charge

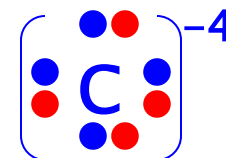
Element and its Lewis Diagrams

4. carbon



needs to gain
4 electrons to
be stable

becomes

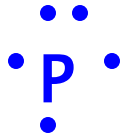


Combining Capacity/Ionic Charge

-4

Element and its Lewis Diagrams

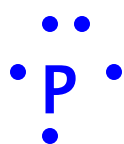
5. phosphorus



Combining Capacity/Ionic Charge

Element and its Lewis Diagrams

5. phosphorus

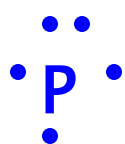


needs to gain
3 electrons to
be stable

Combining Capacity/Ionic Charge

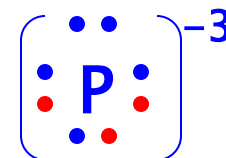
Element and its Lewis Diagrams

5. phosphorus



needs to gain
3 electrons to
be stable

becomes

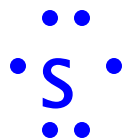


Combining Capacity/Ionic Charge

-3

Element and its Lewis Diagrams

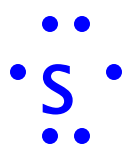
6. sulfur



Combining Capacity/Ionic Charge

Element and its Lewis Diagrams

6. sulfur

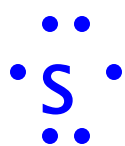


needs to gain
2 electrons to
be stable

Combining Capacity/Ionic Charge

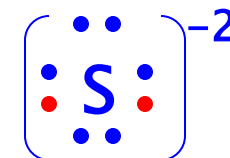
Element and its Lewis Diagrams

6. sulfur



needs to gain
2 electrons to
be stable

becomes

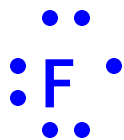


Combining Capacity/Ionic Charge

-2

Element and its Lewis Diagrams

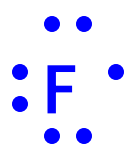
7. fluorine



Combining Capacity/Ionic Charge

Element and its Lewis Diagrams

7. fluorine

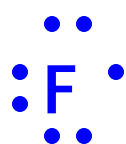


needs to gain
1 electron to
be stable

Combining Capacity/Ionic Charge

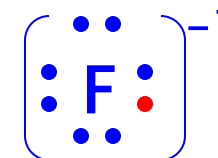
Element and its Lewis Diagrams

7. fluorine



needs to gain
1 electron to
be stable

becomes



Combining Capacity/Ionic Charge

-1

Summary:

Combining Capacities of Elements (red)

Number of Valence Electrons in Outermost Shell (blue)

1 2
+1 +2

13 14 15 16 17 18
+3 -4 -3 -2 -1 0

The diagram shows a skeletal periodic table grid with 18 columns and 5 rows. Red arrows point downwards from the top of the first and second columns of the first two rows, and from the top of the thirteenth, fourteenth, fifteenth, sixteenth, seventeenth, and eighteenth columns of the third row. The grid is otherwise empty.

