Chapter 8: Chemical Bonding

Nov 9, 2022

Chemistry Department, Cypress College

Class Announcements

Lab

- Experiment 17 Lewis Structures and Molecular Models
- Basic steps for lewis structures
- Reminder - Need 70% of laborator points to pass the course

Lecture

- Finish up Ch 7 and begin Ch 8
- Go over homework 9 (EC for students who present)
- Quiz and Homework assignment released Fri, Nov 11th at 3pm

Outline

Principles for Filling Atomic Orbitals

Aufbau principle - electrons fill an orbital starting with the lowest energy level

Pauli exclusion princple - No two electrons with the same spin can occupy the same orbital

Hund's Rule - Maximize the number of unpaired electrons

Electron Configurations of Ions

Cations - Remove electrons from the highest energy atomic orbitals

Anions - Follow the same Aufbau principle by filling orbitals with the lowest energy level

Electron Configurations of Ions

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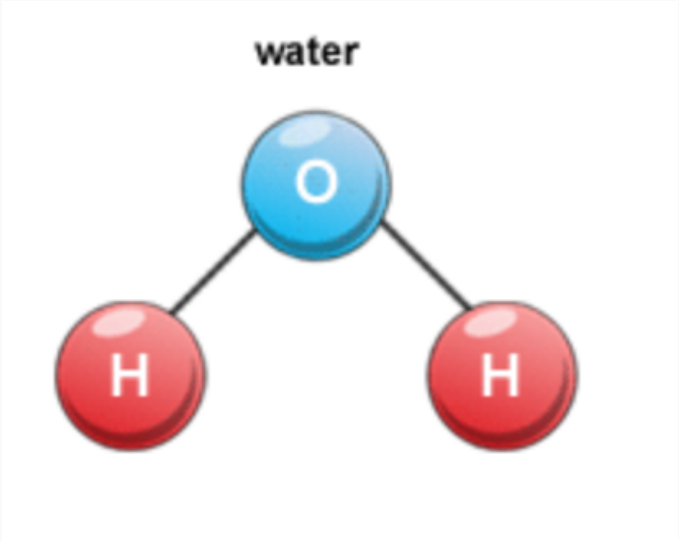
Q: For transition metals, which atomic orbitals, s or d, do you begin removing electrons from?

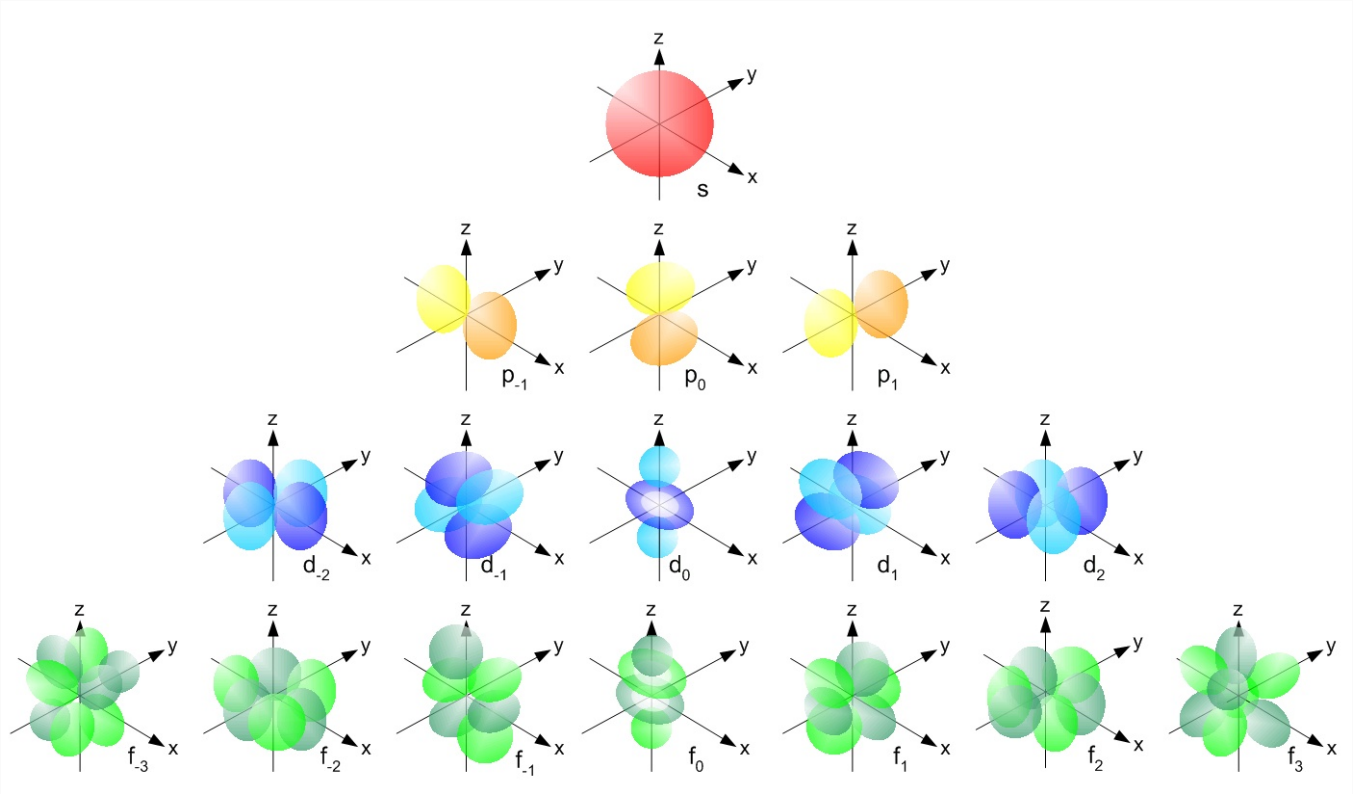
Outline

Water is Life



- Liquid water made up of moles upon moles of water molecules
- Molecules are made up of atoms connected by “chemical bonds”

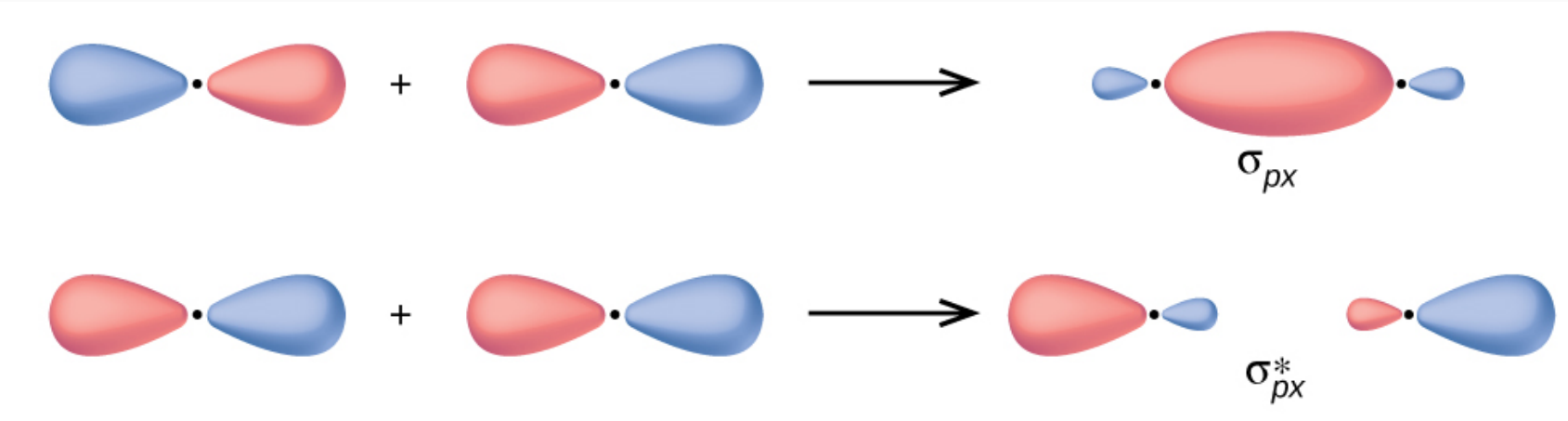
What are Chemical Bonds?



Bonds are made up of atomic orbitals

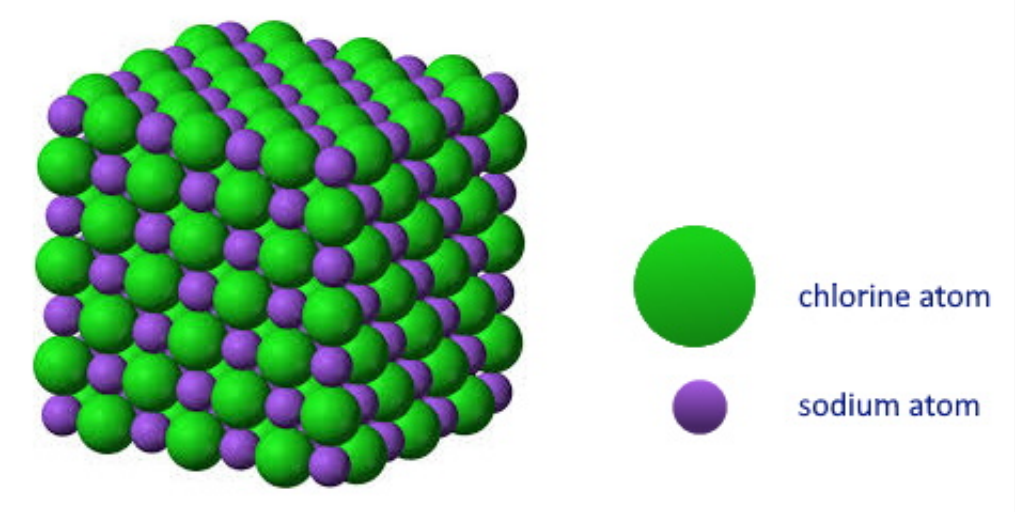
- Overlap of atomic orbitals lead to the formation of molecular orbitals (same energy and specific orientation)

Example of p-orbitals



- Depending on the orientation, p-orbitals will form a bond

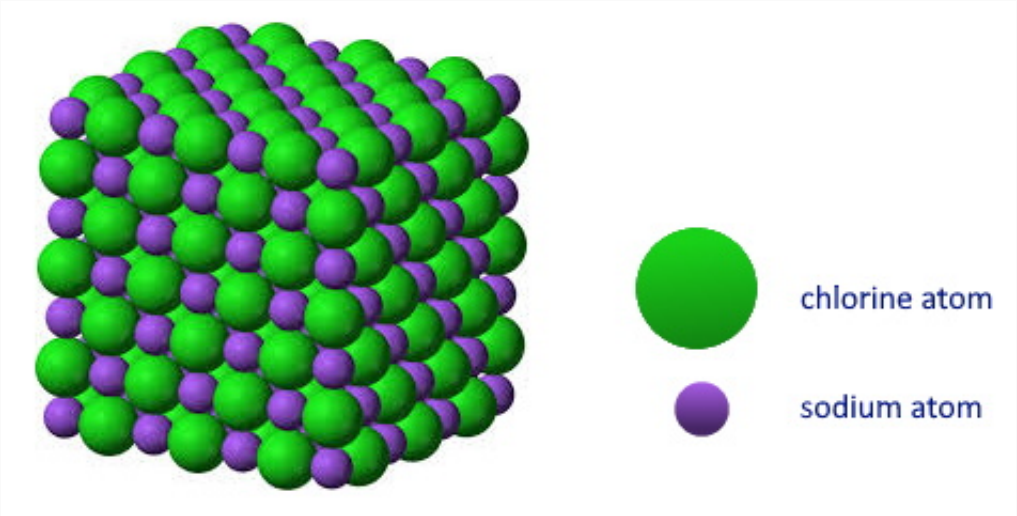
Ionic Bonds



Ionic Compounds - Made up of cation and anion

Ionic Bonds - Hold the cations and anions together; purely electrostatic interaction

Ionic Bonds

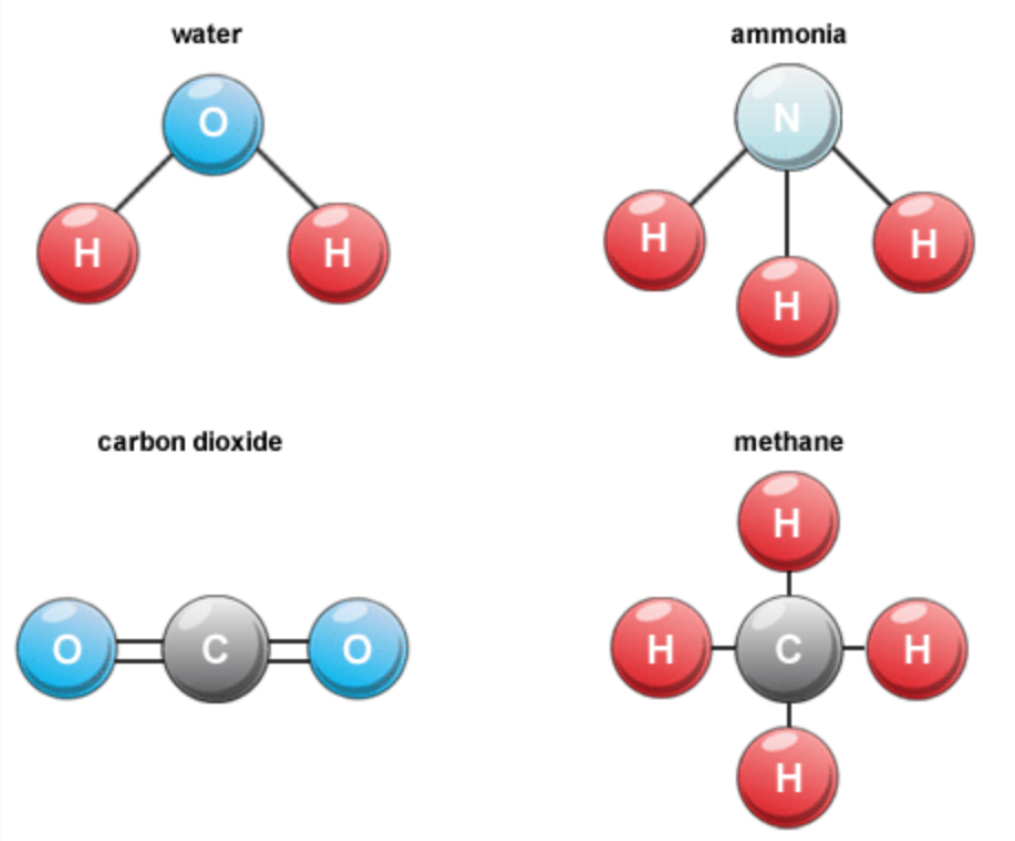


Ionic Compounds - Made up of cation and anion

Ionic Bonds - Hold the cations and anions together; purely electrostatic interaction

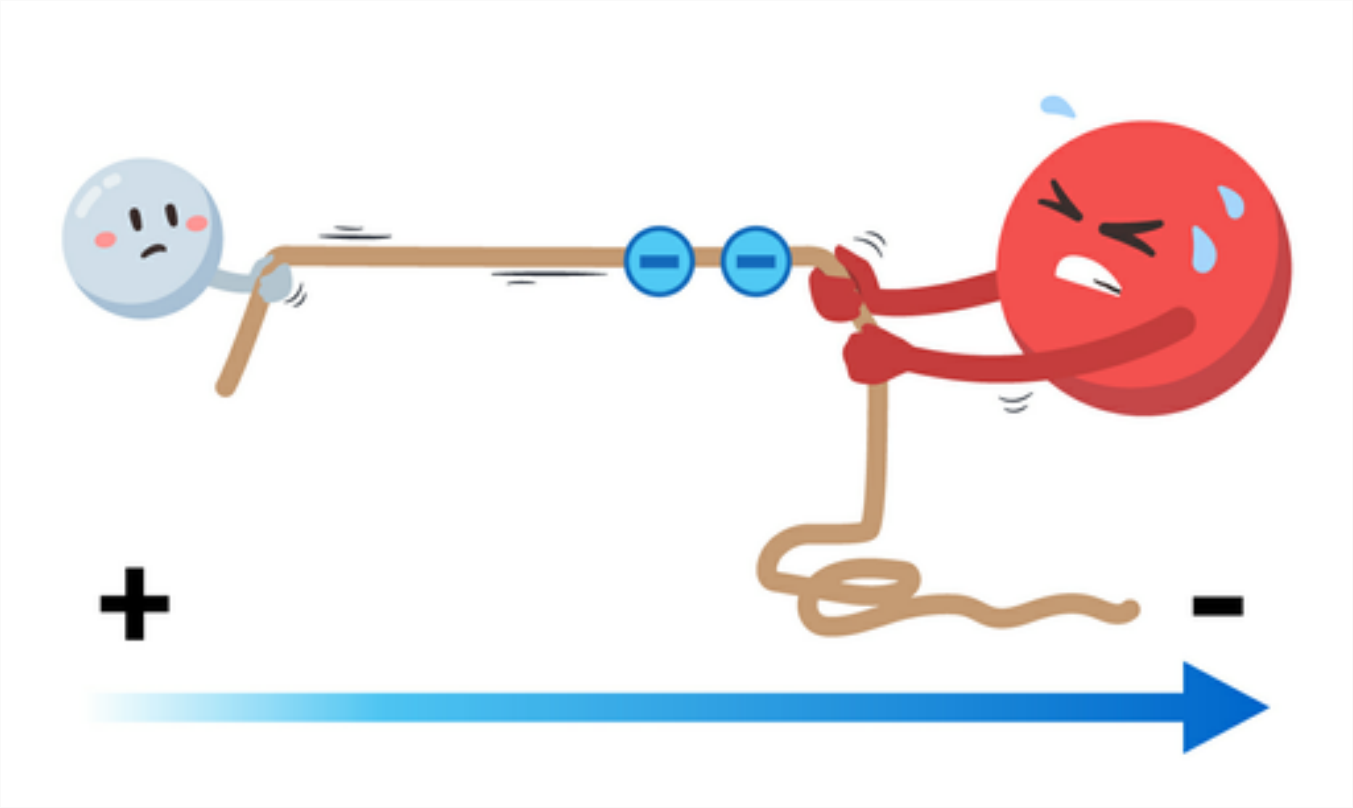
Q: For ionic bond, are the electrons shared between the cation and anion?

Covalent Bonds



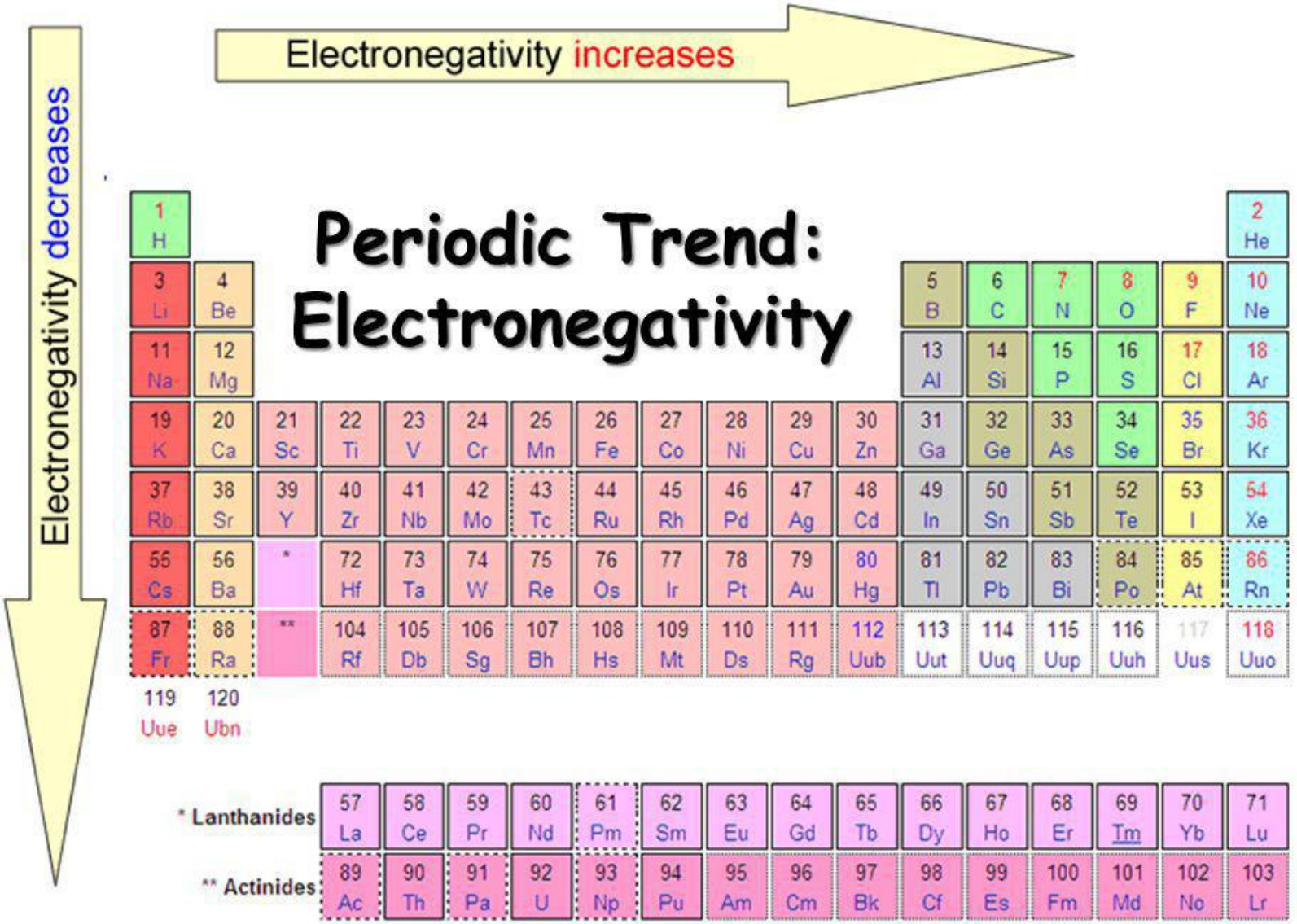
- Electrons are shared between atoms to achieve the octet rule
- *Note:* Octet rule can be broken for atoms after the 3rd row e.g. P, S, Cl, etc.

Electronegativity: Tug-of-War



- Sharing of electrons can lead to unequal pull (electronegativity)

Electronegativity Trends



Practice: Polarity

Which of the following is the most polar bond?

C–C; C–H; N–H; O–H; F–H; Se–H

Outline

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