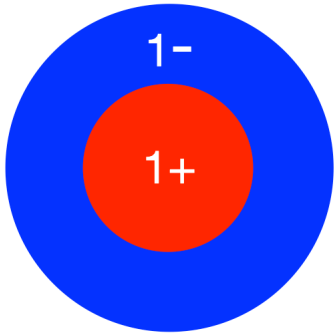
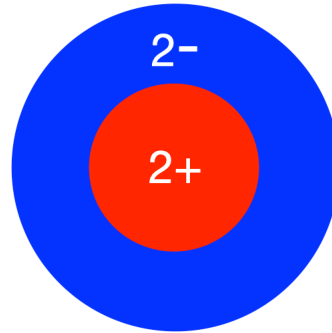


Atomic Charge Model



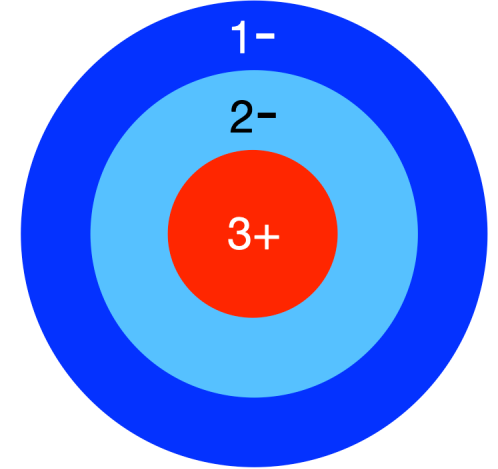
Nucleus Core electrons Valence electrons

Atomic Charge Model



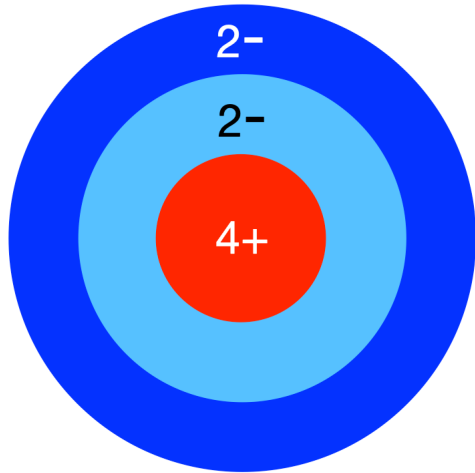
Nucleus Core electrons Valence electrons

Atomic Charge Model



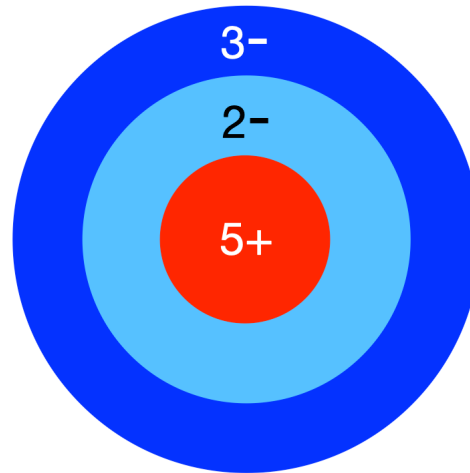
Nucleus Core electrons Valence electrons

Atomic Charge Model



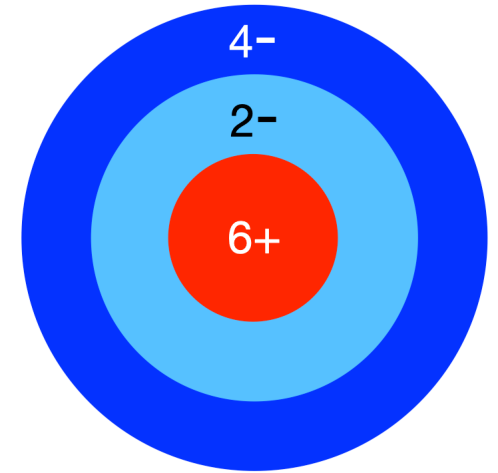
Nucleus Core electrons Valence electrons

Atomic Charge Model



Nucleus Core electrons Valence electrons

Atomic Charge Model



Nucleus Core electrons Valence electrons

## Properties



Discovery: **1817**

Appearance: **Silvery-white**

State at 20°C: **Solid**

Atomic radii: **167 pm**

Melting point: **180.5 °C**

Boiling point: **1342 °C**

Abundance in Universe: **.0000006%**

Abundance in Humans: **.000003%**

## Properties



Discovery: **1895**

Appearance: **Colorless**

State at 20°C: **Gas**

Atomic radii: **31 pm**

Melting point: **N/A °C**

Boiling point: **-269 °C**

Abundance in Universe: **23%**

Abundance in Humans: **N/A**

## Properties



Discovery: **1766**

Appearance: **Colorless**

State at 20°C: **Gas**

Atomic radii: **53 pm**

Melting point: **-259.1 °C**

Boiling point: **-252.9 °C**

Abundance in Universe: **75%**

Abundance in Humans: **10%**

## Properties



Discovery: **3750 BCE**

Appearance: **Black or clear**

State at 20°C: **Solid**

Atomic radii: **67 pm**

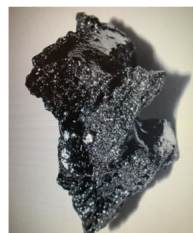
Melting point: **3642 °C**

Boiling point: **3642 °C**

Abundance in Universe: **.5%**

Abundance in Humans: **23%**

## Properties



Discovery: **1808**

Appearance: **Black-brown**

State at 20°C: **Solid**

Atomic radii: **87 pm**

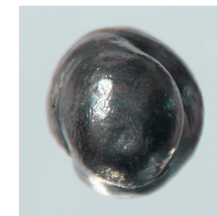
Melting point: **2075 °C**

Boiling point: **4000 °C**

Abundance in Universe: **.0000001%**

Abundance in Humans: **.00007%**

## Properties



Discovery: **1797**

Appearance: **White-gray metallic**

State at 20°C: **Solid**

Atomic radii: **112 pm**

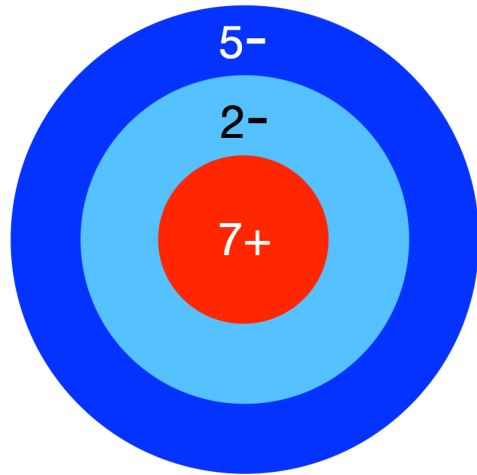
Melting point: **1287 °C**

Boiling point: **2470 °C**

Abundance in Universe: **.0000001%**

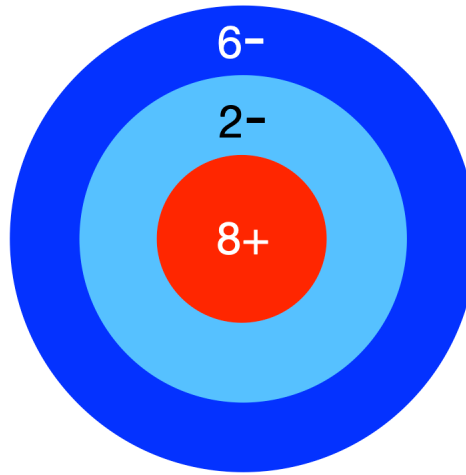
Abundance in Humans: **.00000004%**

Atomic Charge Model



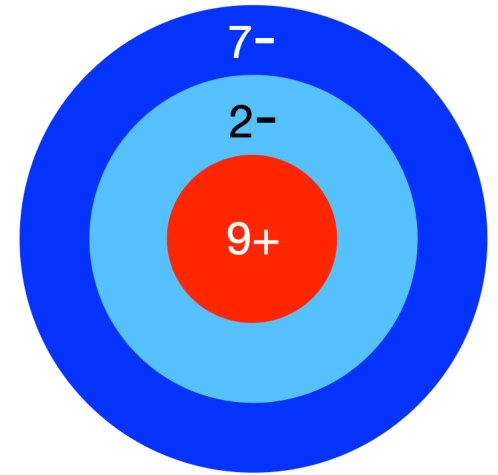
■ Nucleus ■ Core electrons ■ Valence electrons

Atomic Charge Model



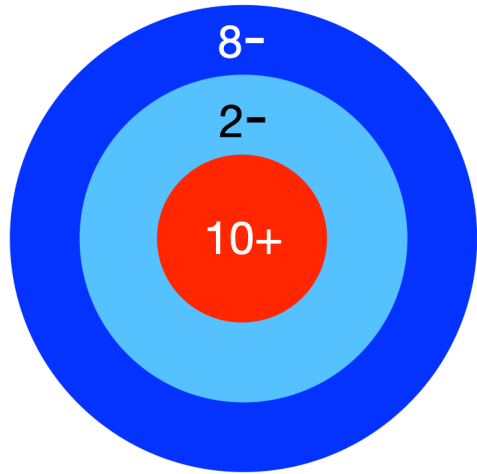
■ Nucleus ■ Core electrons ■ Valence electrons

Atomic Charge Model



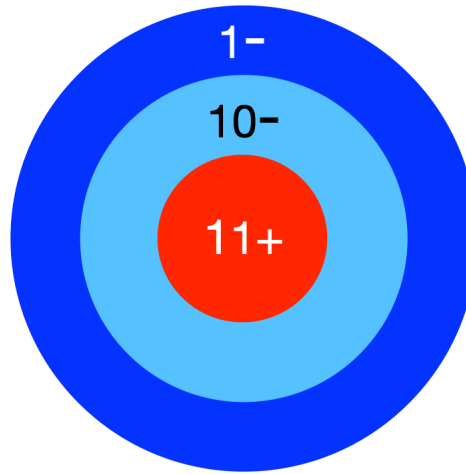
■ Nucleus ■ Core electrons ■ Valence electrons

Atomic Charge Model



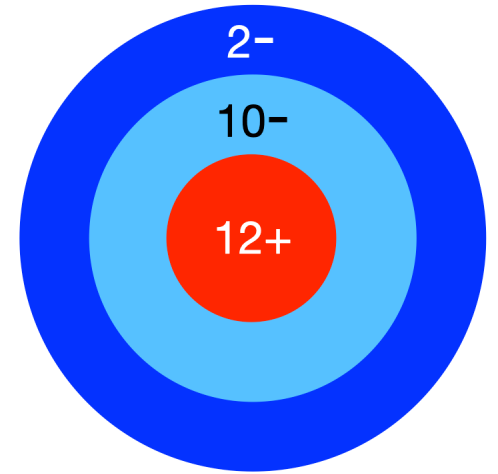
■ Nucleus ■ Core electrons ■ Valence electrons

Atomic Charge Model



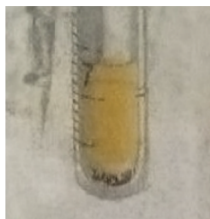
■ Nucleus ■ Core electrons ■ Valence electrons

Atomic Charge Model



■ Nucleus ■ Core electrons ■ Valence electrons

## Properties



Discovery: **1886**

Appearance: **Pale yellow**

State at 20°C: **Gas**

Atomic radii: **42 pm**

Melting point: **-220 °C**

Boiling point: **-188.1 °C**

Abundance in Universe: **.00004%**

Abundance in Humans: **.004%**

## Properties



Discovery: **1774**

Appearance: **Colorless**

State at 20°C: **Gas**

Atomic radii: **48 pm**

Melting point: **-218 °C**

Boiling point: **-183 °C**

Abundance in Universe: **1%**

Abundance in Humans: **61%**

## Properties



Discovery: **1772**

Appearance: **Colorless**

State at 20°C: **Gas**

Atomic radii: **56 pm**

Melting point: **-210.1 °C**

Boiling point: **-195.8 °C**

Abundance in Universe: **.1%**

Abundance in Humans: **2.6%**

## Properties



Discovery: **1755**

Appearance: **Shiny gray**

State at 20°C: **Solid**

Atomic radii: **145 pm**

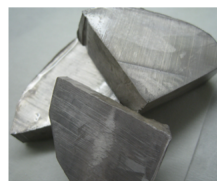
Melting point: **650 °C**

Boiling point: **1090 °C**

Abundance in Universe: **.06%**

Abundance in Humans: **.027%**

## Properties



Discovery: **1807**

Appearance: **Silvery-white metallic**

State at 20°C: **Solid**

Atomic radii: **190 pm**

Melting point: **97.7 °C**

Boiling point: **882.9 °C**

Abundance in Universe: **.002%**

Abundance in Humans: **.14%**

## Properties



Discovery: **1898**

Appearance: **Colorless**

State at 20°C: **Gas**

Atomic radii: **38 pm**

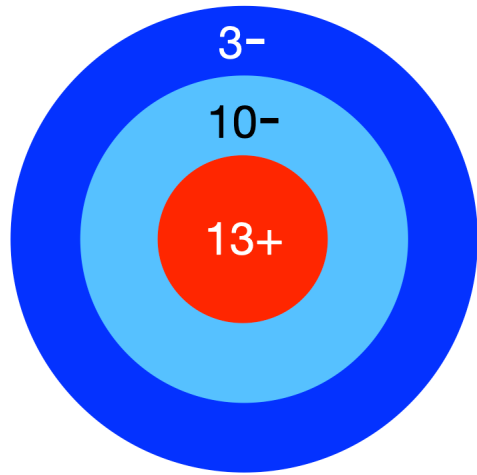
Melting point: **-248.6 °C**

Boiling point: **-246.1 °C**

Abundance in Universe: **.13%**

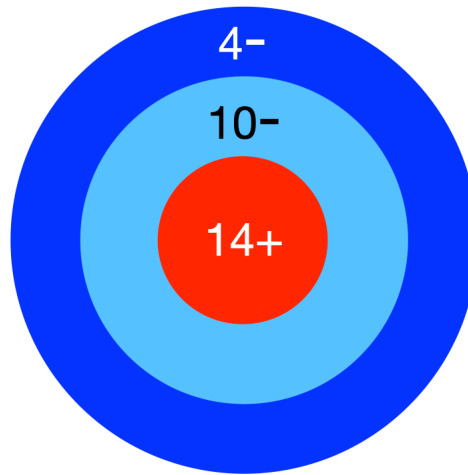
Abundance in Humans: **N/A**

Atomic Charge Model



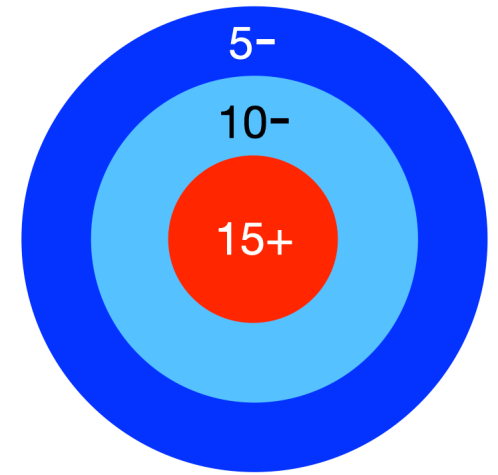
■ Nucleus   ■ Core electrons   ■ Valence electrons

Atomic Charge Model



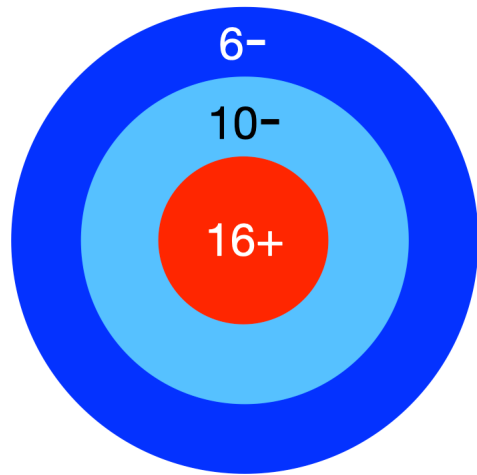
■ Nucleus   ■ Core electrons   ■ Valence electrons

Atomic Charge Model



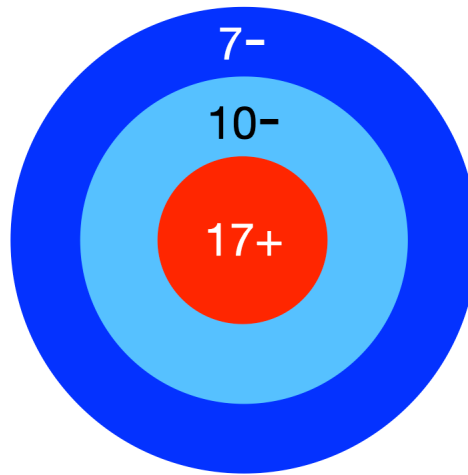
■ Nucleus   ■ Core electrons   ■ Valence electrons

Atomic Charge Model



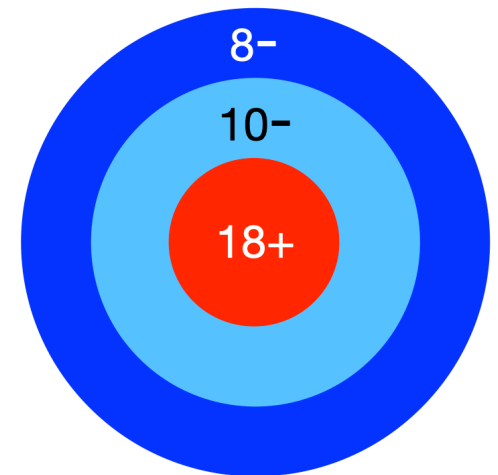
■ Nucleus   ■ Core electrons   ■ Valence electrons

Atomic Charge Model



■ Nucleus   ■ Core electrons   ■ Valence electrons

Atomic Charge Model



■ Nucleus   ■ Core electrons   ■ Valence electrons

## Properties



Discovery: **1669**

Appearance: **White or red**

State at 20°C: **Solid**

Atomic radii: **98 pm**

Melting point: **44.1 °C**

Boiling point: **280.5 °C**

Abundance in Universe: **.0007%**

Abundance in Humans: **1.1%**

## Properties



Discovery: **1824**

Appearance: **Reflective**

State at 20°C: **Solid**

Atomic radii: **111 pm**

Melting point: **1414 °C**

Boiling point: **2900 °C**

Abundance in Universe: **.07%**

Abundance in Humans: **.026%**

## Properties



Discovery: **1825**

Appearance: **Silvery-white metallic**

State at 20°C: **Solid**

Atomic radii: **118 pm**

Melting point: **660.3 °C**

Boiling point: **2519 °C**

Abundance in Universe: **.005%**

Abundance in Humans: **.00009%**

## Properties



Discovery: **1894**

Appearance: **Colorless**

State at 20°C: **Gas**

Atomic radii: **71 pm**

Melting point: **-189 °C**

Boiling point: **-186 °C**

Abundance in Universe: **.02%**

Abundance in Humans: **N/A**

## Properties



Discovery: **1774**

Appearance: **Pale yellow-green**

State at 20°C: **Gas**

Atomic radii: **79 pm**

Melting point: **-101.5 °C**

Boiling point: **-34.0 °C**

Abundance in Universe: **.0001%**

Abundance in Humans: **.12%**

## Properties



Discovery: **500 BCE**

Appearance: **Lemon yellow**

State at 20°C: **Solid**

Atomic radii: **88 pm**

Melting point: **115.2 °C**

Boiling point: **444.7 °C**

Abundance in Universe: **.05%**

Abundance in Humans: **.20%**