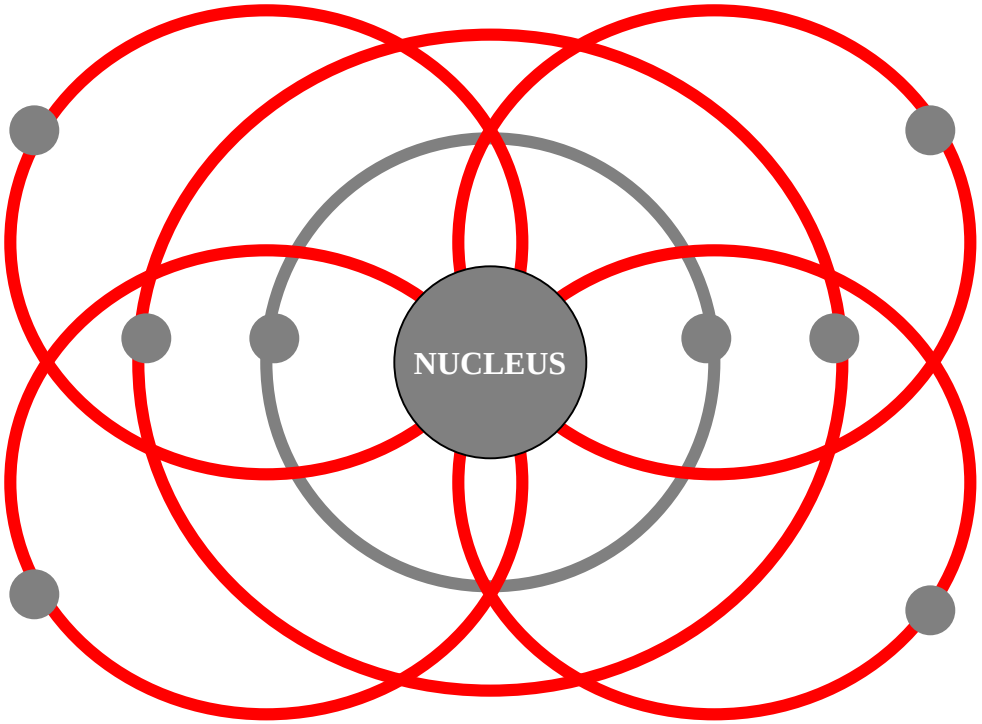
2ND ENERGY SHELL = 4 ORBITALS



= 1ST EGY SHELL

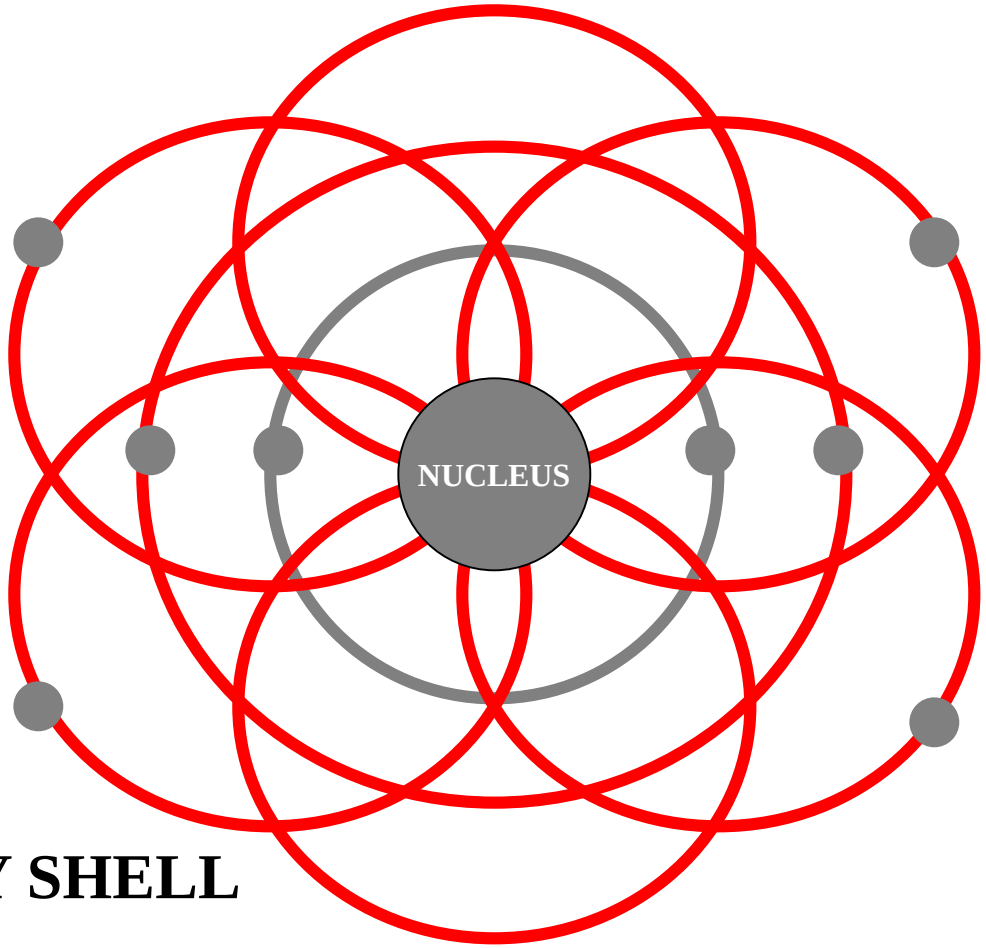
= 2ND EGY SHELL

= E-

TYPICAL ATOM

E-

2^{ND} ENERGY SHELL = 4 ORBITALS



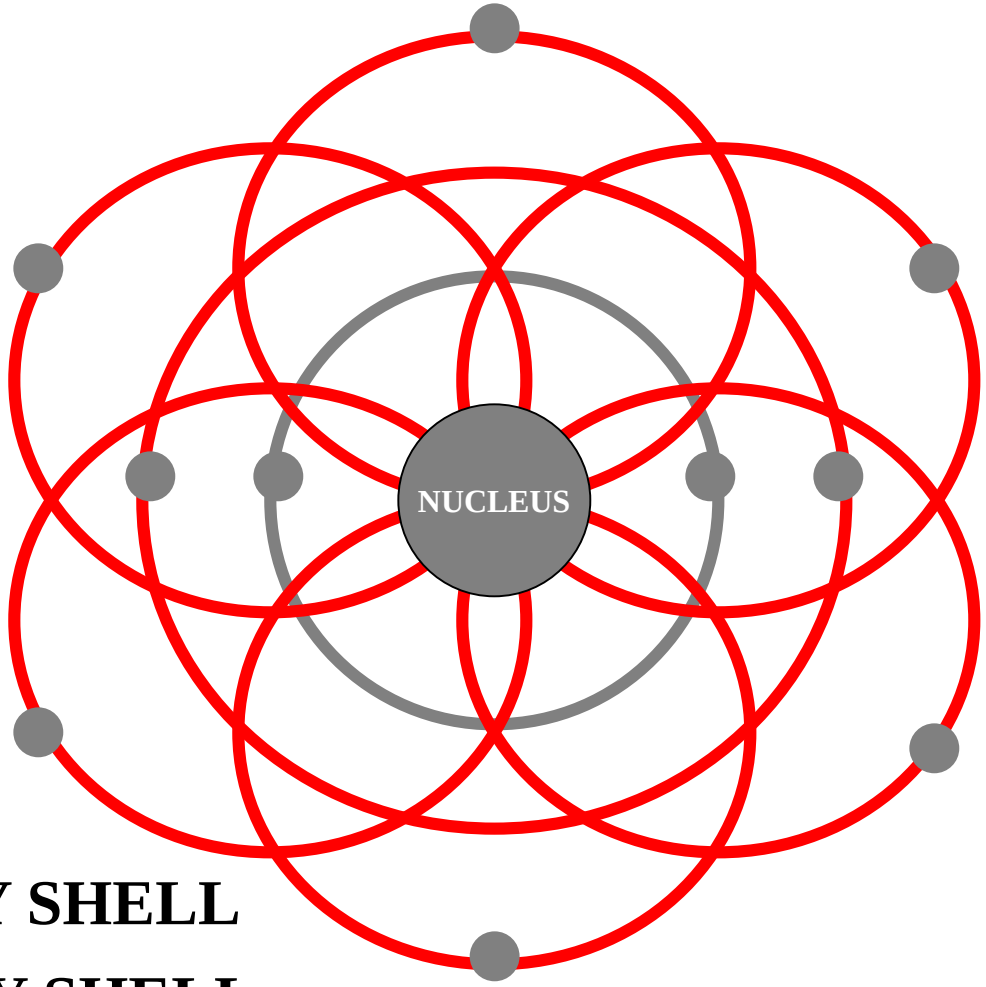
= 1ST EGY SHELL

= 2ND EGY SHELL

= E-

TYPICAL ATOM

2^{ND} ENERGY SHELL = 4 ORBITALS



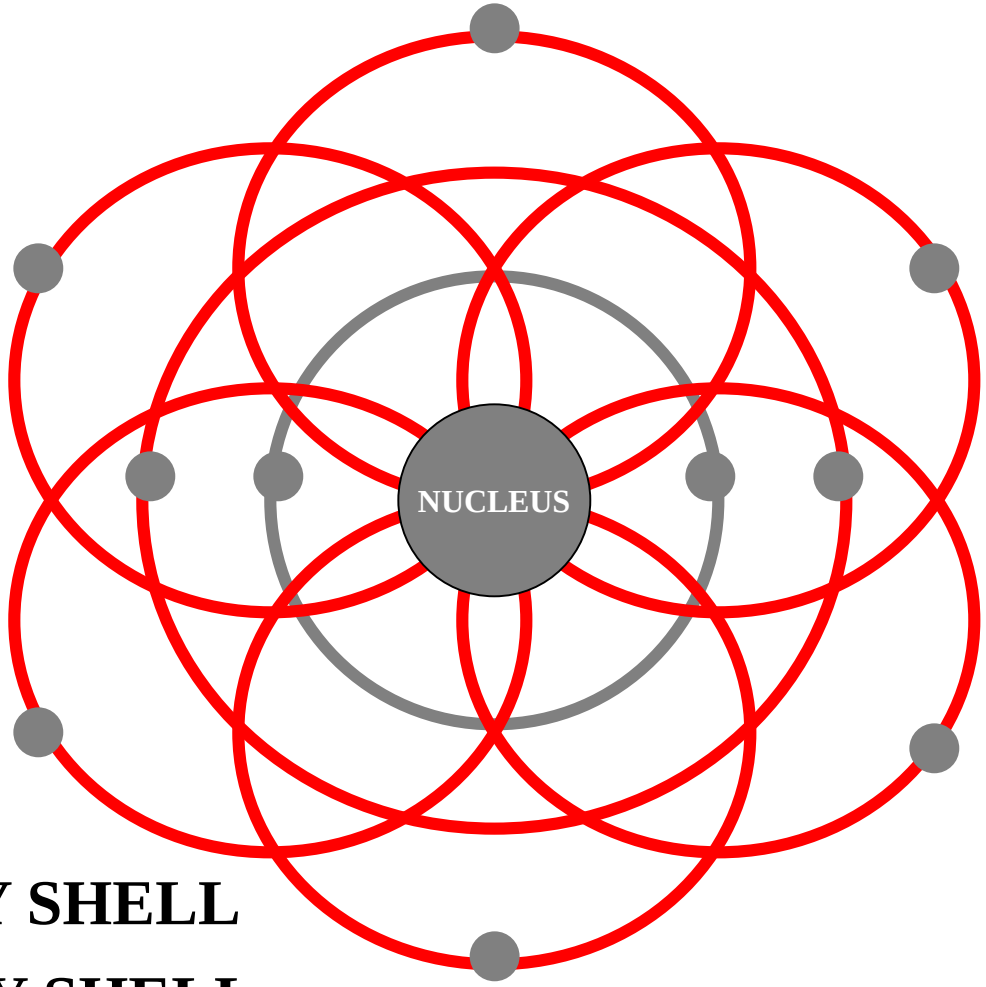
= 1ST EGY SHELL

= 2ND EGY SHELL

= E-

TYPICAL ATOM

2^{ND} ENERGY SHELL = 4 ORBITALS



= 1ST EGY SHELL

= 2ND EGY SHELL

= E-

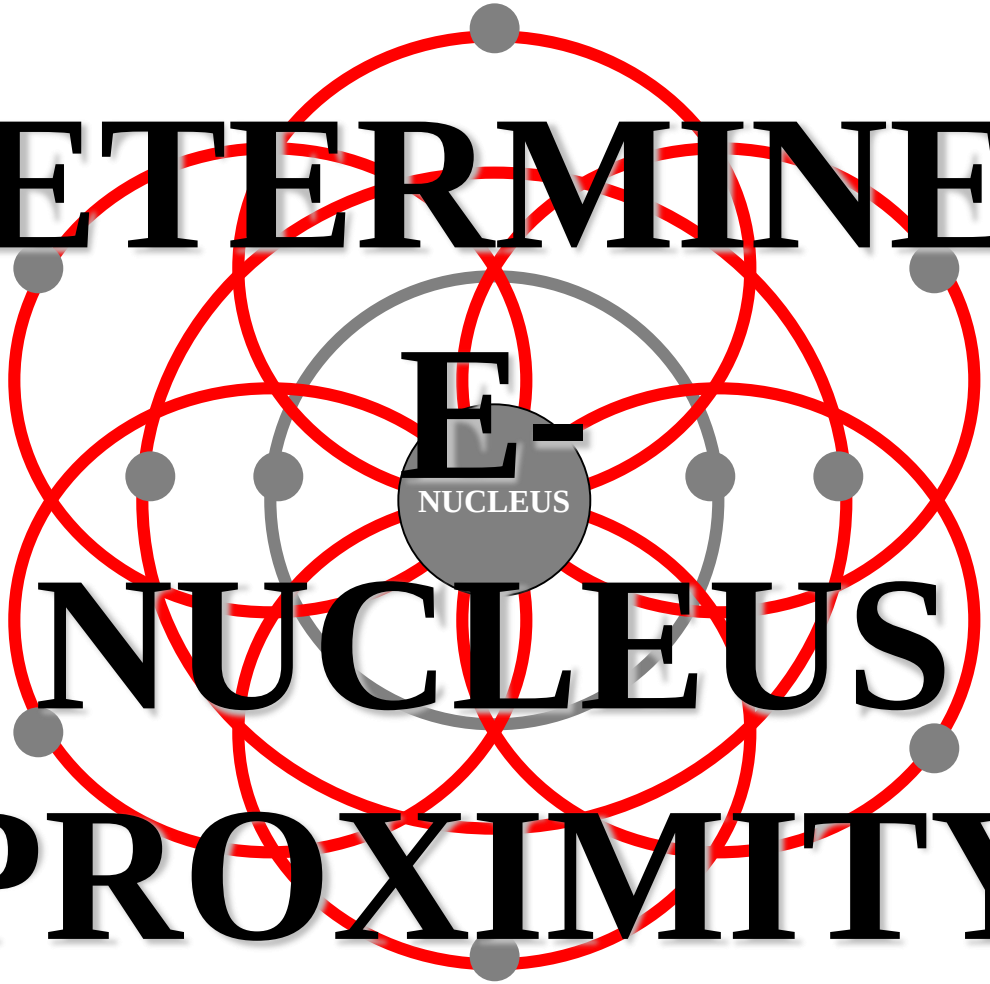
2^{ND} E.S. = 8 E- TOTAL

E

ELECTRON BOND POTENTIAL

ELECTRON BOND POTENTIAL

E- BOND POTENTIAL



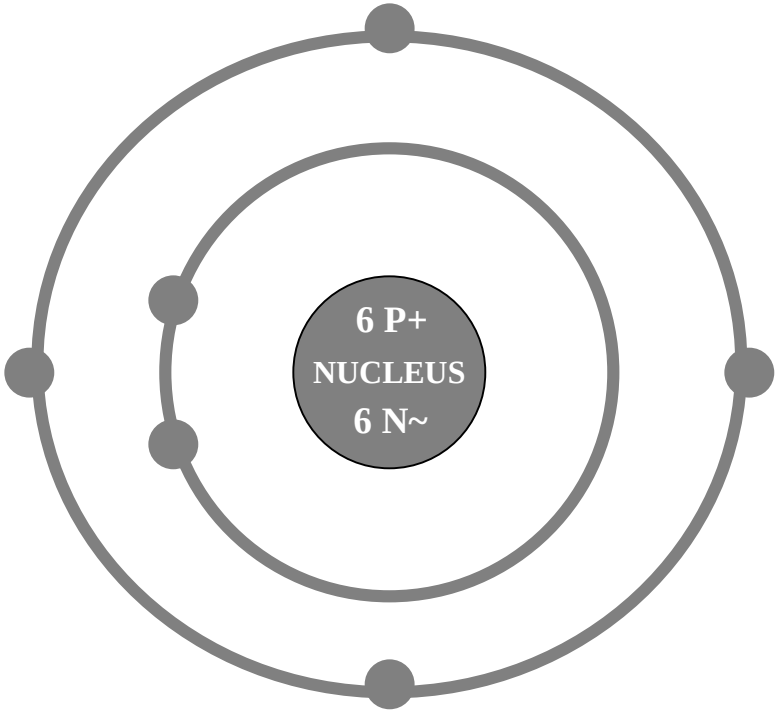
DETERMINED

E- NUCLEUS PROXIMITY

E- BOND POTENTIAL

E-

E- BOND POTENTIAL

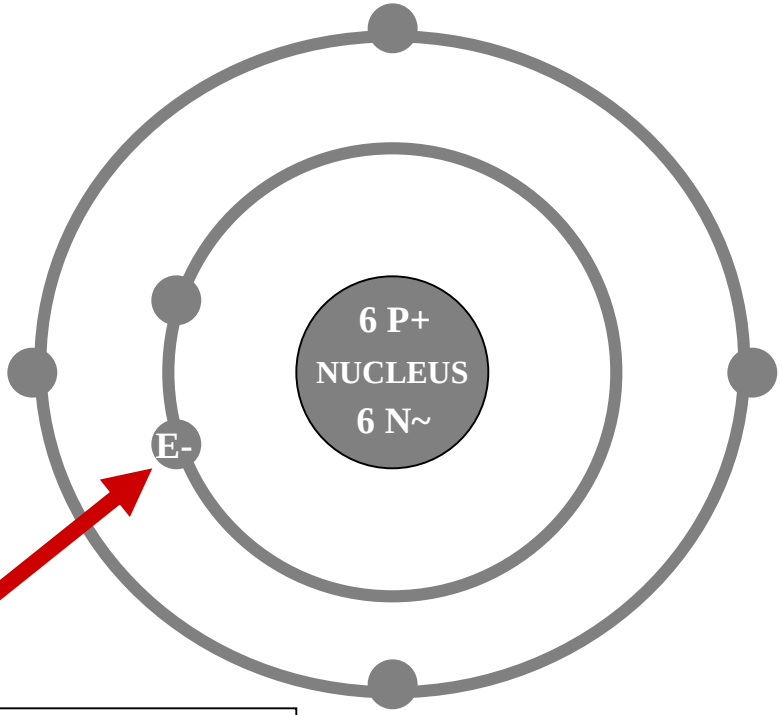


= E-

CARBON ATOM

C

E- BOND POTENTIAL



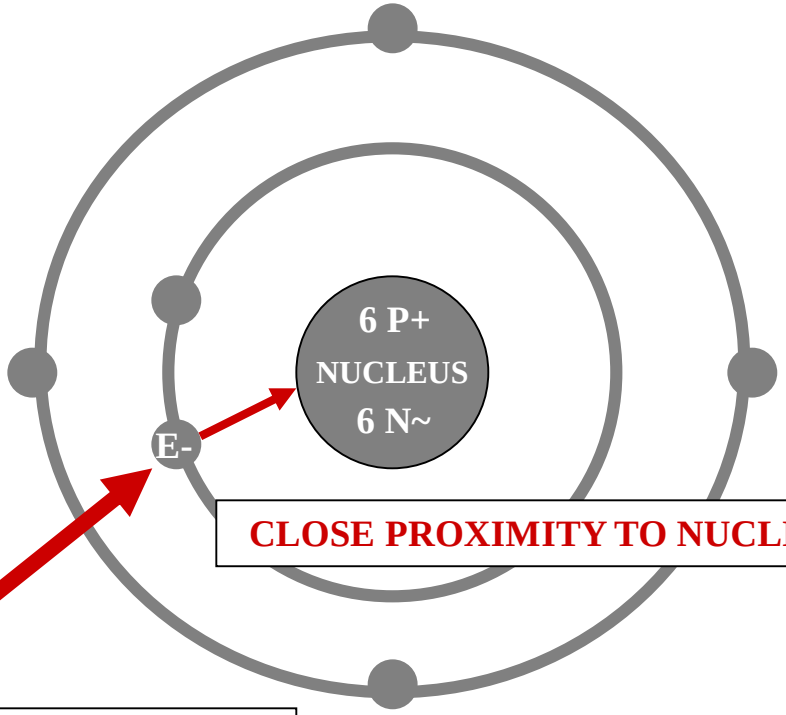
E- W/ INNER PROXIMITY

= E-

CARBON ATOM

G

E- BOND POTENTIAL



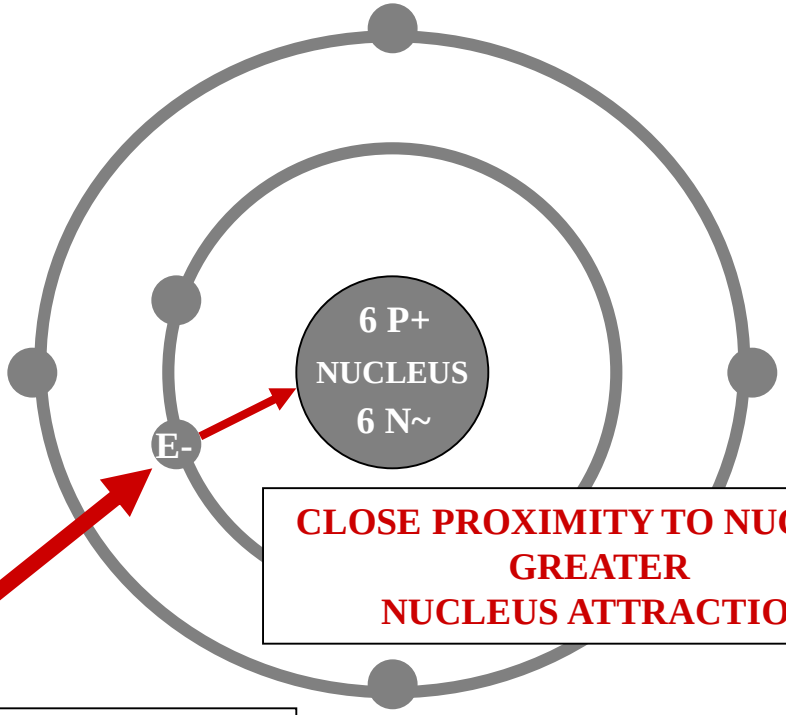
CLOSE PROXIMITY TO NUCLEUS

E- W/ INNER PROXIMITY

= E-

CARBON ATOM

E- BOND POTENTIAL



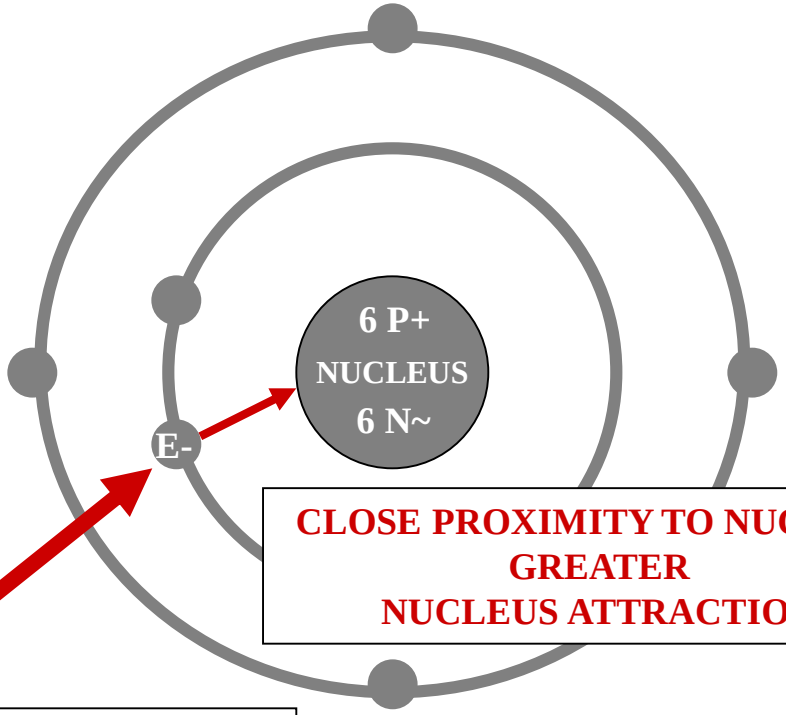
CLOSE PROXIMITY TO NUCLEUS
GREATER
NUCLEUS ATTRACTION

E- W/ INNER PROXIMITY

= E-

CARBON ATOM

E- BOND POTENTIAL



CLOSE PROXIMITY TO NUCLEUS
GREATER
NUCLEUS ATTRACTION

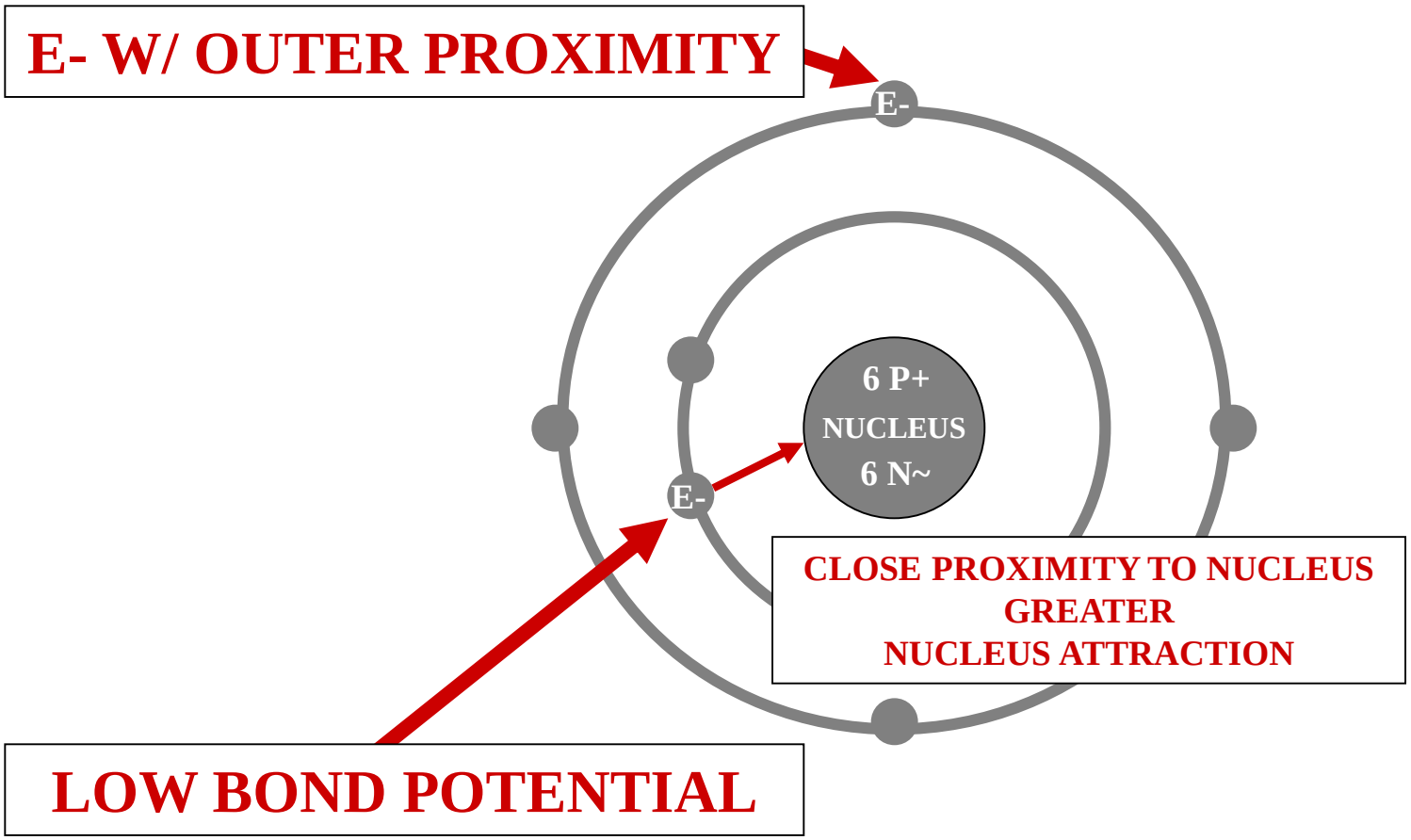
LOW BOND POTENTIAL

= E-

CARBON ATOM

D

E- BOND POTENTIAL



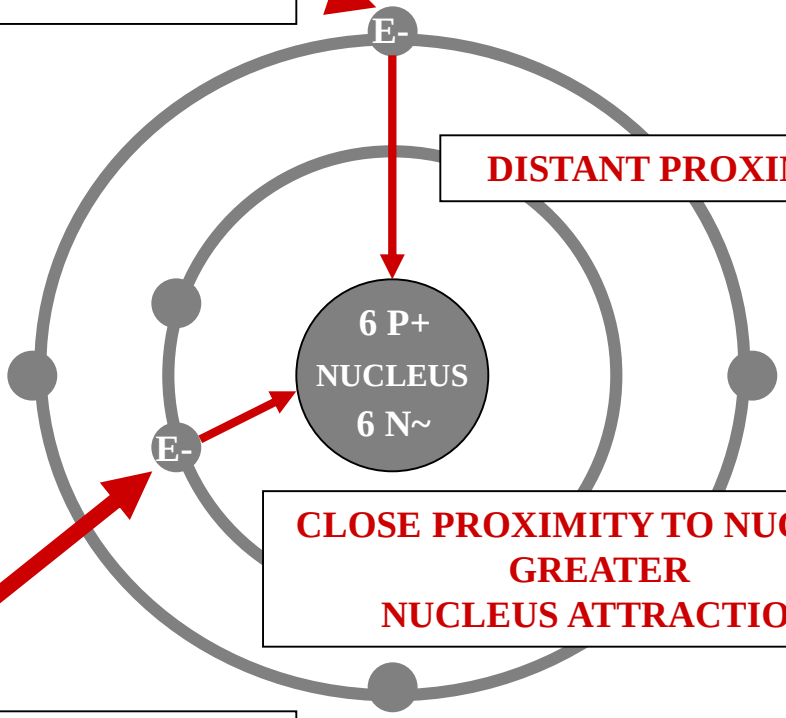
= E-

CARBON ATOM

L

E- BOND POTENTIAL

E- W/ OUTER PROXIMITY



DISTANT PROXIMITY TO NUCLEUS

CLOSE PROXIMITY TO NUCLEUS
GREATER
NUCLEUS ATTRACTION

LOW BOND POTENTIAL

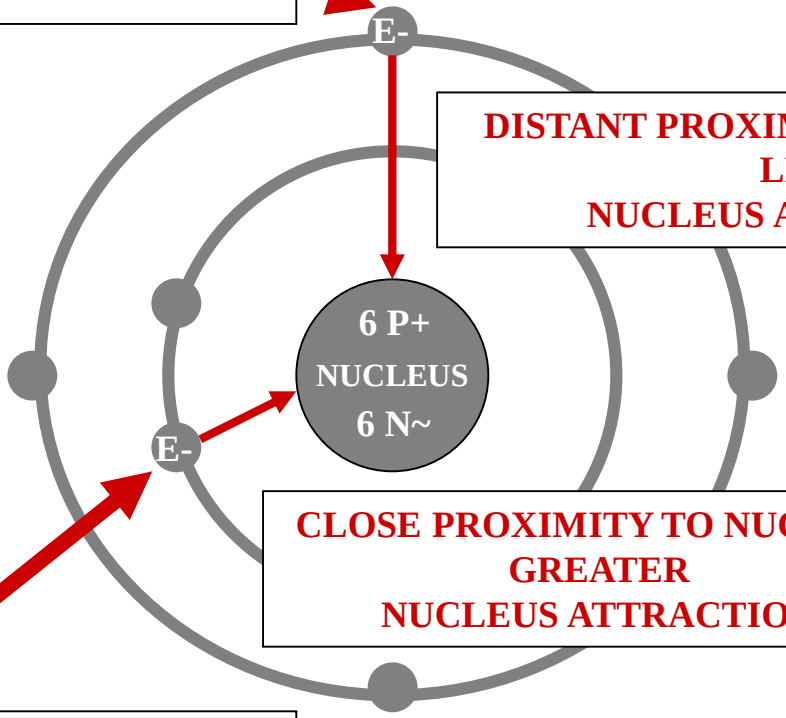
= E-

CARBON ATOM

H

E- BOND POTENTIAL

E- W/ OUTER PROXIMITY



DISTANT PROXIMITY TO NUCLEUS
LESS
NUCLEUS ATTRACTION

CLOSE PROXIMITY TO NUCLEUS
GREATER
NUCLEUS ATTRACTION

LOW BOND POTENTIAL

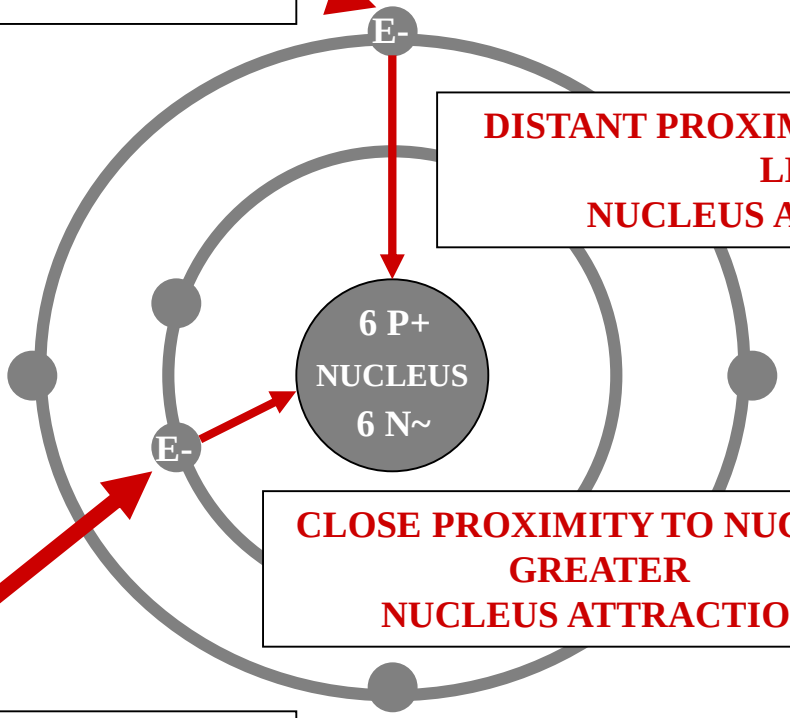
= E-

CARBON ATOM

F

E- BOND POTENTIAL

HIGH BOND POTENTIAL



DISTANT PROXIMITY TO NUCLEUS
LESS
NUCLEUS ATTRACTION

CLOSE PROXIMITY TO NUCLEUS
GREATER
NUCLEUS ATTRACTION

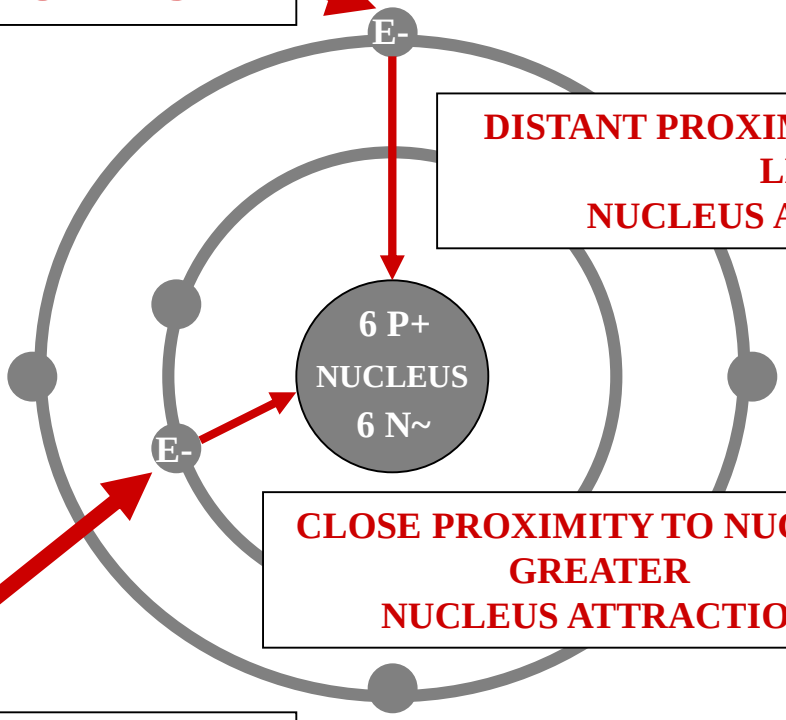
LOW BOND POTENTIAL

● = E-

CARBON ATOM

E- BOND POTENTIAL

FORM CHEM BONDS



DISTANT PROXIMITY TO NUCLEUS
LESS
NUCLEUS ATTRACTION

CLOSE PROXIMITY TO NUCLEUS
GREATER
NUCLEUS ATTRACTION

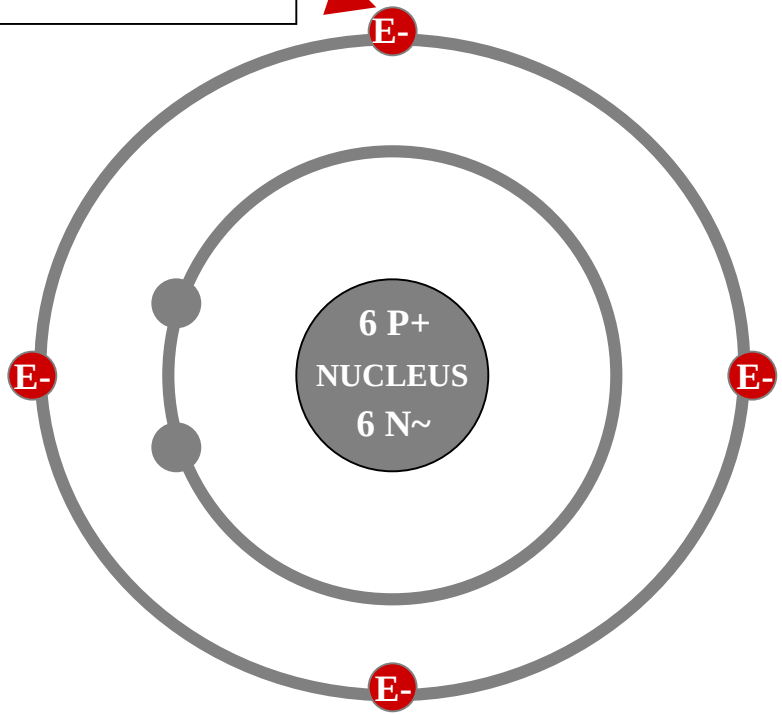
LOW BOND POTENTIAL

● = E-

CARBON ATOM

VALENCE ELECTRONS

VALENCE ELECTRONS



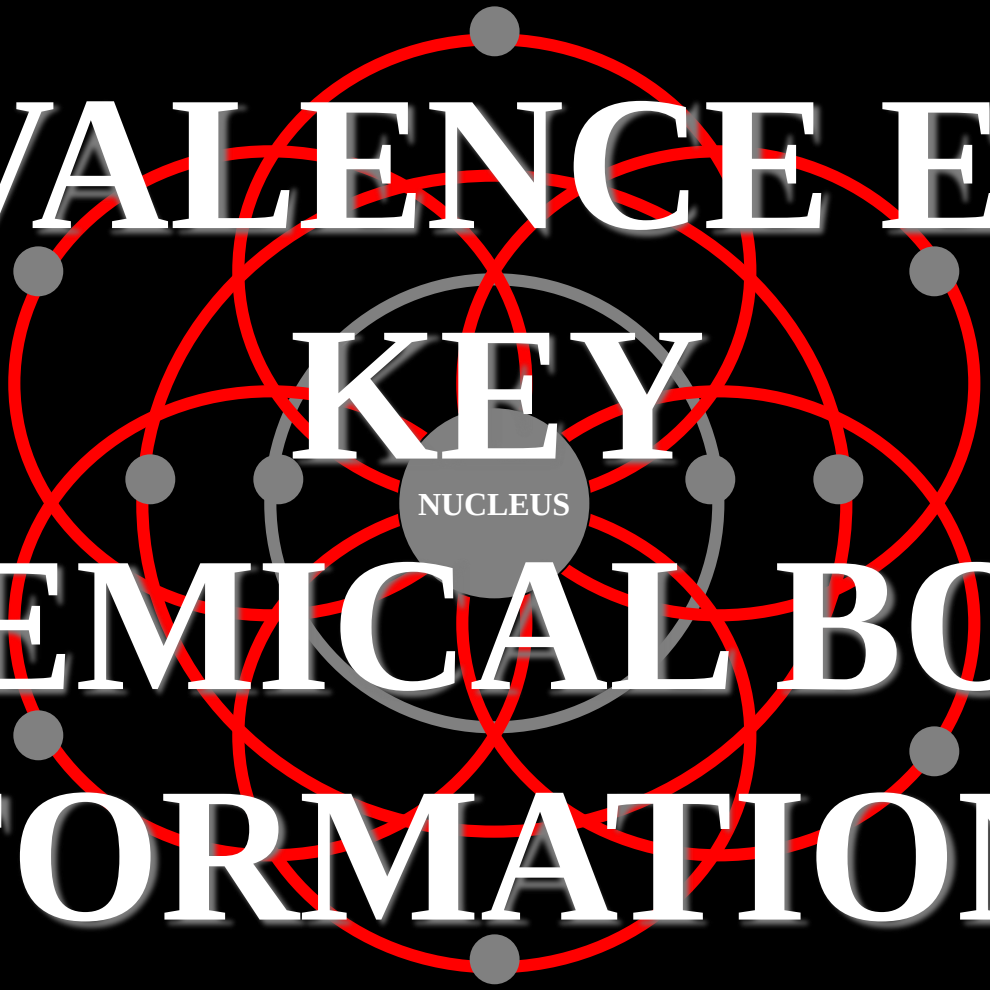
= E-

CARBON ATOM

CHEMICAL BONDS

VALENCE E-

KEY



CHEMICAL BOND FORMATION

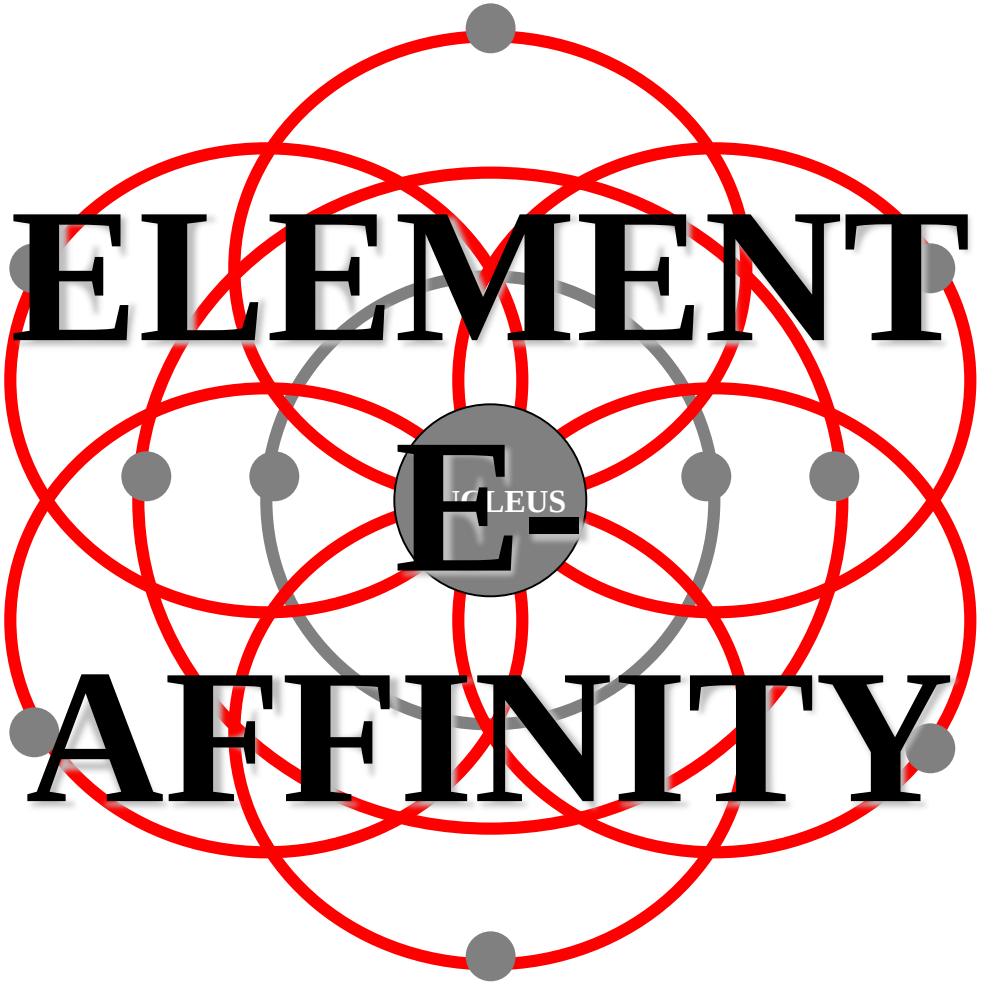
CHEMICAL BONDS

E

VALENCE E-
ELECTRO-NEGATIVITY

ELECTRO-NEGATIVITY

ELECTRO-NEGATIVITY



ELECTRO-NEGATIVITY

D

ELECTRO-NEGATIVITY VALUES

ATOM: CARBON

ATOM: OXYGEN

DIFFERENT ELEMENTS

D

ELECTRO-NEGATIVITY VALUES

ATOM: CARBON
Symbol: C
Atomic Number: 6
Atomic Mass: 12.0107 amu
Melting Point: 3500.0 °C (3773.15 °K, 6332.0 °F)
Boiling Point: 4827.0 °C (5100.15 °K, 8720.6 °F)
Number of Protons/Electrons: 6
Number of Neutrons: 6
Electro-Negativity: 2.5
Classification: Non-metal
Crystal Structure: Hexagonal
Density @ 293 K: 2.62 g/cm3
Color: May be black

ATOM: OXYGEN
Symbol: O
Atomic Number: 8
Atomic Mass: 15.9994 amu
Melting Point: -218.4 °C (54.750008 °K, -361.12 °F)
Boiling Point: -183.0 °C (90.15 °K, -297.4 °F)
Number of Protons/Electrons: 8
Number of Neutrons: 8
Electro-Negativity: 3.5
Classification: Non-metal
Crystal Structure: Cubic
Density @ 293 K: 1.429 g/cm3
Color: colorless

DIFFERENT ELEMENTS
DIFFERENT ELEMENTAL PROPERTIES

ELECTRO-NEGATIVITY VALUES

ATOM: CARBON
Symbol: C
Atomic Number: 6
Atomic Mass: 12.0107 amu
Melting Point: 3500.0 °C (3773.15 °K, 6332.0 °F)
Boiling Point: 4827.0 °C (5100.15 °K, 8720.6 °F)
Number of Protons/Electrons: 6
Number of Neutrons: 6
Electro-Negativity: 2.5
Classification: Non-metal
Crystal Structure: Hexagonal
Density @ 293 K: 2.62 g/cm3
Color: May be black

ATOM: OXYGEN
Symbol: O
Atomic Number: 8
Atomic Mass: 15.9994 amu
Melting Point: -218.4 °C (54.750008 °K, -361.12 °F)
Boiling Point: -183.0 °C (90.15 °K, -297.4 °F)
Number of Protons/Electrons: 8
Number of Neutrons: 8
Electro-Negativity: 3.5
Classification: Non-metal
Crystal Structure: Cubic
Density @ 293 K: 1.429 g/cm3
Color: colorless

DIFFERENT ELEMENTS DIFFERENT ELECTRO-NEGATIVITY VALUES

PERIODIC TABLE

ELECTRO-NEGATIVITY VALUES

HIGHER E-N VALUE

H 2.1																He
Li 1.0	Be 1.5											B 2.0	C 2.5	N 3.0	O 3.5	F 4.0	Ne
Na 0.9	Mg 1.2											Al 1.5	Si 1.8	P 2.1	S 2.5	Cl 3.0	Ar
K 0.8	Ca 1.0	Sc 1.3	Ti 1.5	V 1.6	Cr 1.6	Mn 1.5	Fe 1.8	Co 1.8	Ni 1.8	Cu 1.9	Zn 1.6	Ga 1.6	Ge 1.8	As 2.0	Se 2.4	Br 2.8	Kr 3.0
Rb 0.8	Sr 1.0	Y 1.2	Zr 1.4	Nb 1.6	Mo 1.8	Tc 1.9	Ru 2.2	Rh 2.2	Pd 2.2	Ag 1.9	Cd 1.7	In 1.7	Sn 1.8	Sb 1.9	Te 2.1	I 2.5	Xe 2.6
Cs 0.7	Ba 0.9	La 1.1	Hf 1.3	Ta 1.5	W 1.7	Re 1.9	Os 2.2	Ir 2.2	Pt 2.2	Au 2.4	Hg 1.9	Ti 1.8	Pb 1.8	Bi 1.9	Po 2.0	At 2.2	Rn 2.4
Fr 0.7	Ra 0.7	Ac 1.1	Unq	Unp	Unh	Uns	Uno	Une									

Ce 1.1	Pr 1.1	Nd 1.1	Pm 1.1	Sm 1.1	Eu 1.1	Gd 1.1	Tb 1.1	Dy 1.1	Ho 1.1	Er 1.1	Tm 1.1	Yb 1.1	Lu 1.2
Th 1.3	Pa 1.5	U 1.7	Np 1.3	Pu 1.3	Am 1.3	Cm 1.3	Bk 1.3	Cf 1.3	Es 1.3	Fm 1.3	Md 1.3	No 1.3	Lr

PERIODIC TABLE

ELECTRO-NEGATIVITY VALUES

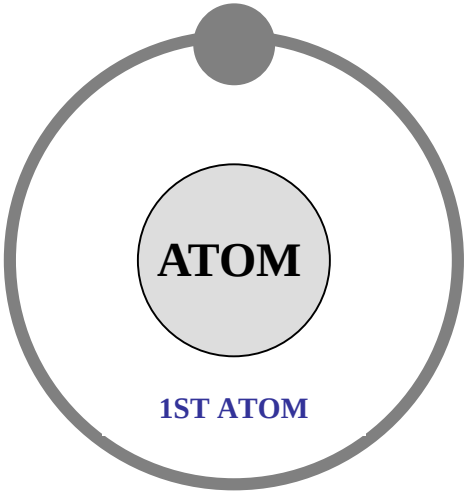
HIGHER E-N VALUE THE GREATER THE E- AFFINITY

H 2.1																He
Li 1.0	Be 1.5											B 2.0	C 2.5	N 3.0	O 3.5	F 4.0	Ne
Na 0.9	Mg 1.2											Al 1.5	Si 1.8	P 2.1	S 2.5	Cl 3.0	Ar
K 0.8	Ca 1.0	Sc 1.3	Ti 1.5	V 1.6	Cr 1.6	Mn 1.5	Fe 1.8	Co 1.8	Ni 1.8	Cu 1.9	Zn 1.6	Ga 1.6	Ge 1.8	As 2.0	Se 2.4	Br 2.8	Kr 3.0
Rb 0.8	Sr 1.0	Y 1.2	Zr 1.4	Nb 1.6	Mo 1.8	Tc 1.9	Ru 2.2	Rh 2.2	Pd 2.2	Ag 1.9	Cd 1.7	In 1.7	Sn 1.8	Sb 1.9	Te 2.1	I 2.5	Xe 2.6
Cs 0.7	Ba 0.9	La 1.1	Hf 1.3	Ta 1.5	W 1.7	Re 1.9	Os 2.2	Ir 2.2	Pt 2.2	Au 2.4	Hg 1.9	Ti 1.8	Pb 1.8	Bi 1.9	Po 2.0	At 2.2	Rn 2.4
Fr 0.7	Ra 0.7	Ac 1.1	Unq	Unp	Unh	Uns	Uno	Une									

Ce 1.1	Pr 1.1	Nd 1.1	Pm 1.1	Sm 1.1	Eu 1.1	Gd 1.1	Tb 1.1	Dy 1.1	Ho 1.1	Er 1.1	Tm 1.1	Yb 1.1	Lu 1.2
Th 1.3	Pa 1.5	U 1.7	Np 1.3	Pu 1.3	Am 1.3	Cm 1.3	Bk 1.3	Cf 1.3	Es 1.3	Fm 1.3	Md 1.3	No 1.3	Lr

ELECTRO-NEGATIVITY APPILED

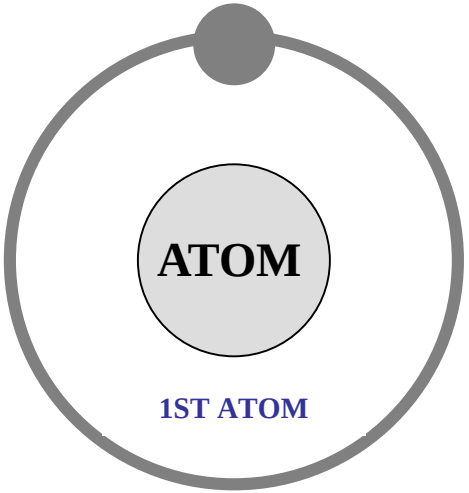
ELECTRO-NEGATIVITY VALUES



= E-

CHEMICAL BOND

ELECTRO-NEGATIVITY VALUES

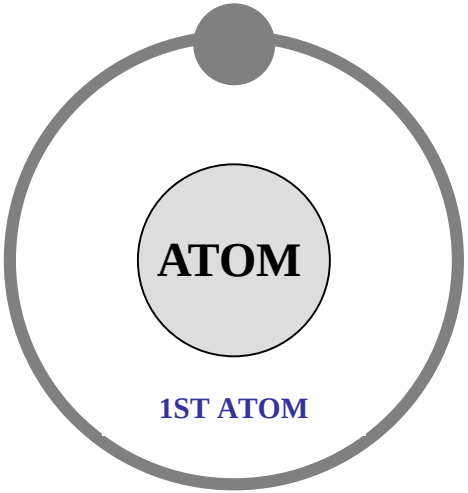


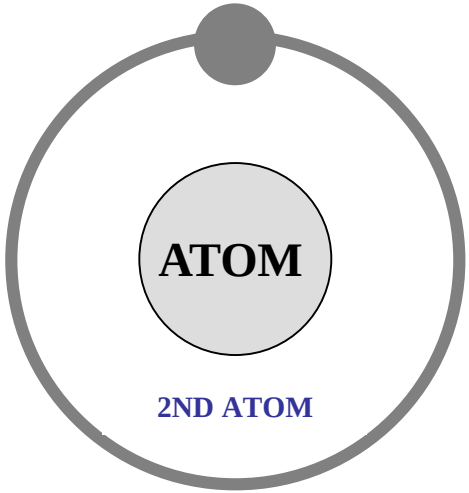
LOW E- NEG VALUE

= E-

CHEMICAL BOND

ELECTRO-NEGATIVITY VALUES





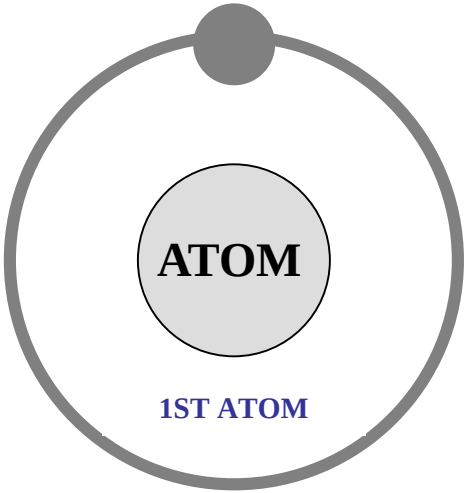
LOW E- NEG VALUE

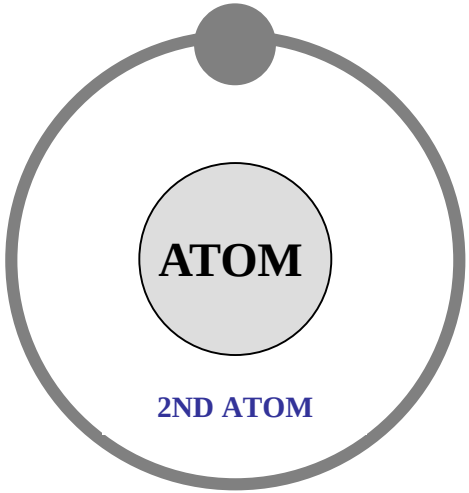
= E-

CHEMICAL BOND

B

ELECTRO-NEGATIVITY VALUES





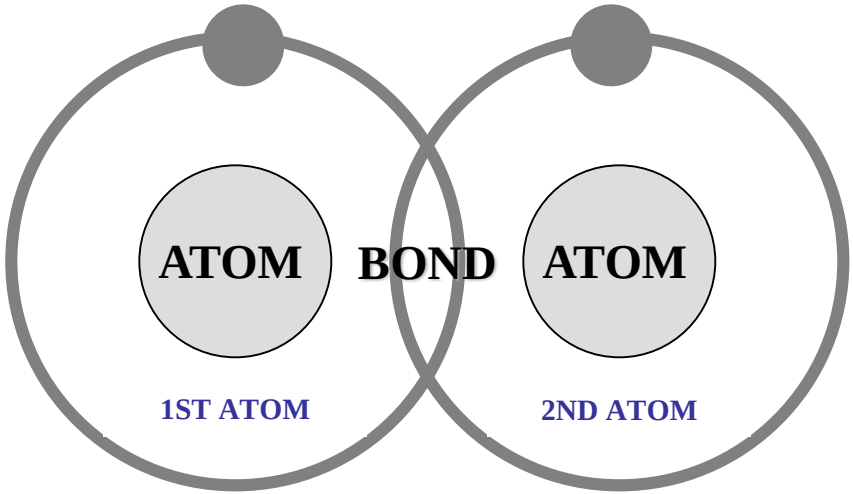
LOW E- NEG VALUE

HIGH E- NEG VALUE

= E-

CHEMICAL BOND

ELECTRO-NEGATIVITY VALUES

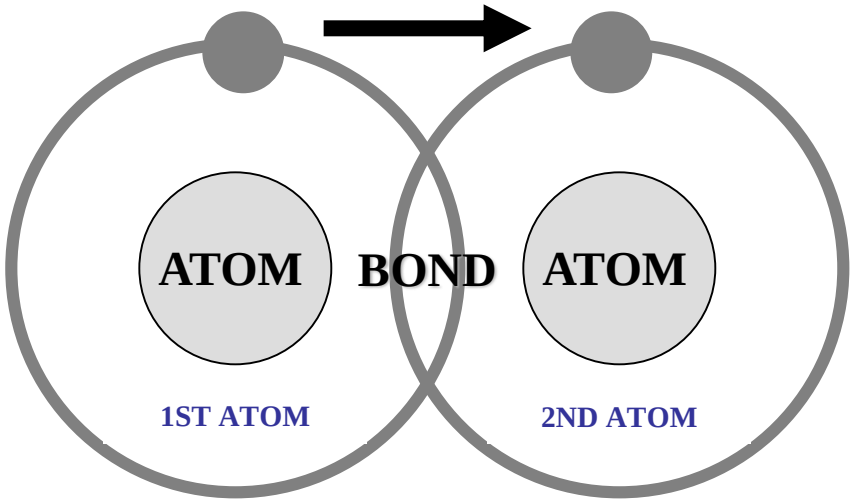


LOW E- NEG VALUE	HIGH E- NEG VALUE

= E-

CHEMICAL BOND

ELECTRO-NEGATIVITY VALUES

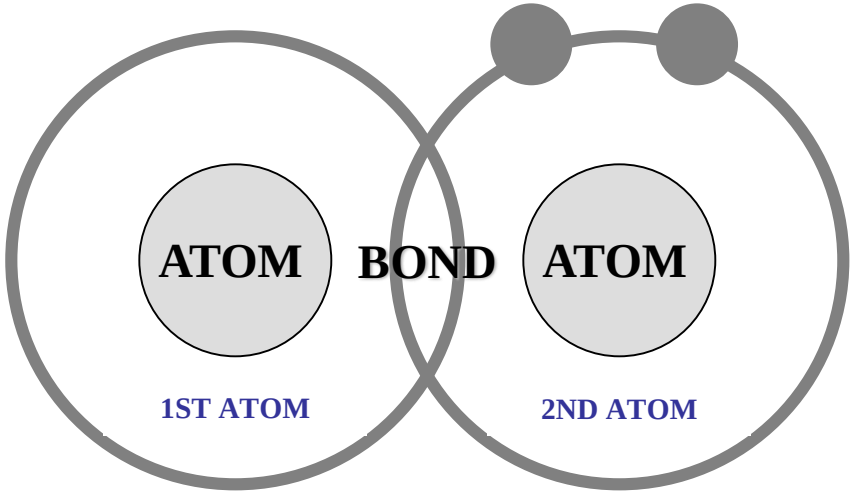


LOW E- NEG VALUE	HIGH E- NEG VALUE

= E-

CHEMICAL BOND

ELECTRO-NEGATIVITY VALUES



LOW E- NEG VALUE	HIGH E- NEG VALUE

= E-

CHEMICAL BOND

CHEMICAL BONDS

E- MOVE FROM ATOMS W/ LOW E- NEG → ATOMS W/ HIGH E- NEG

CHEMICAL BONDS

CHEMICAL BONDS

ELECTRO NEGATIVITY KEY CHEMICAL BOND FORMATION

CHEMICAL BONDS

CHEMICAL BOND TYPES

CHEMICAL BOND TYPES

COVALENT BONDS

CHEMICAL BOND TYPES

CHEMICAL BOND TYPES

COVALENT BONDS

IONIC BONDS

CHEMICAL BOND TYPES

CHEMICAL BOND TYPES

COVALENT BONDS
IONIC BONDS
HYDROGEN BONDS

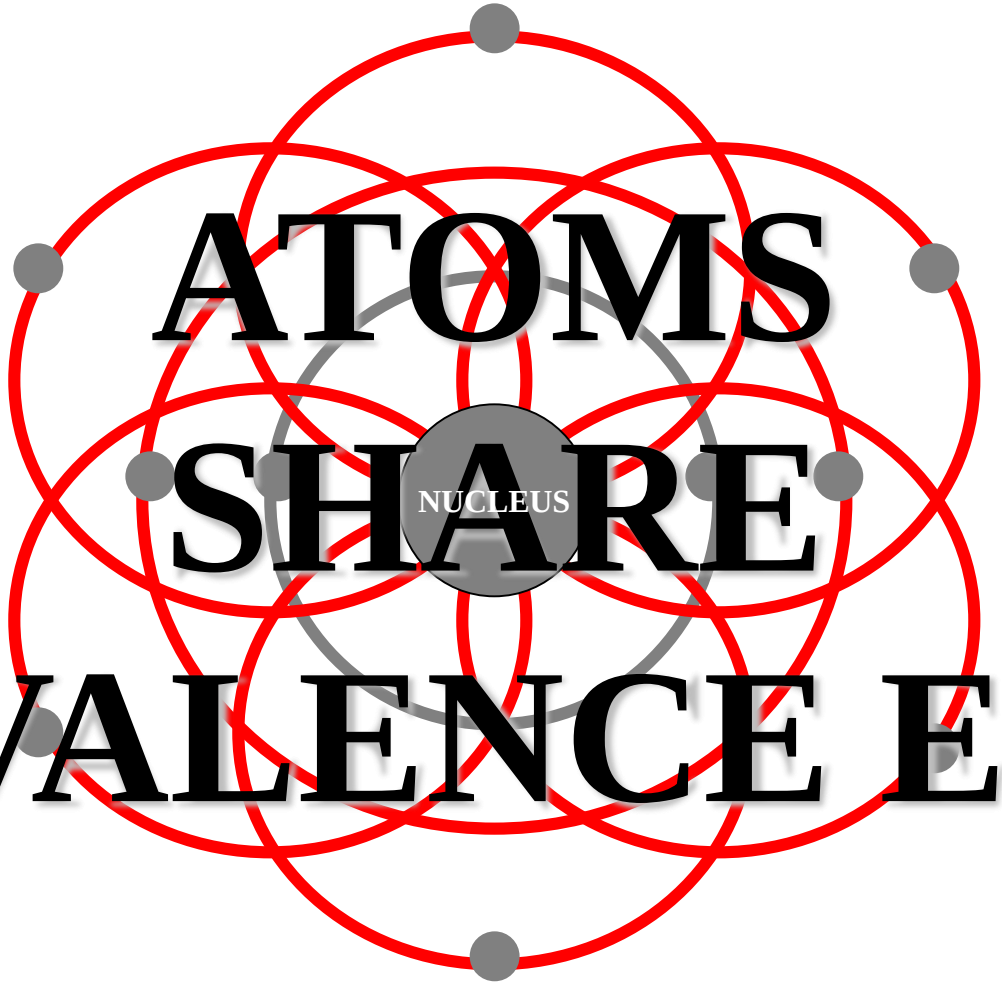
CHEMICAL BOND TYPES

C

COVALENT BONDS

COVALENT BONDS

COVALENT BONDS



ATOMS SHARE VALENCE E-

COVALENT BONDS

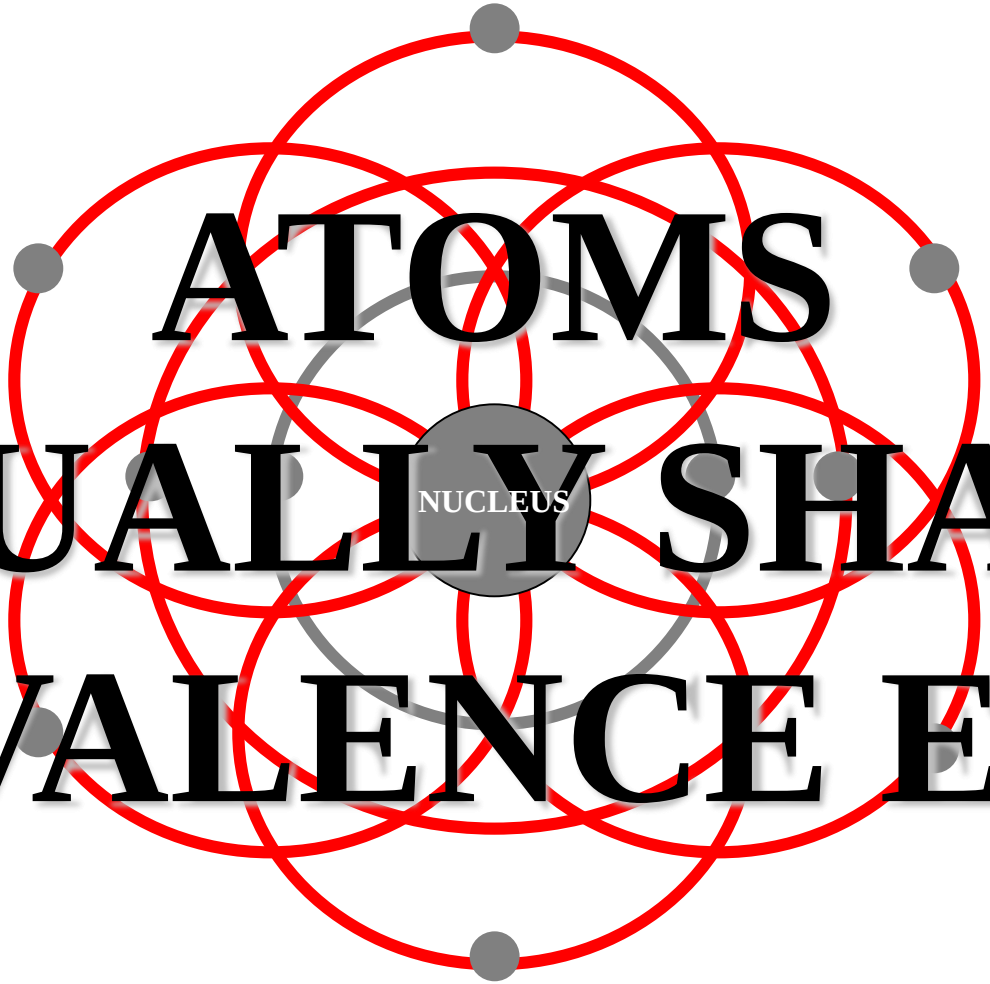
NON-POLAR COVALENT BONDS & POLAR COVALENT BONDS

NON-POLAR COVALENT BOND

NON-POLAR COVALENT BOND

EG

NON-POLAR COVALENT BOND



ATOMS EQUALLY SHARE VALENCE E-

NON-POLAR COVALENT BOND

NON-POLAR COVALENT BOND EXAMPLE

HYDROGEN MOLECULE

B

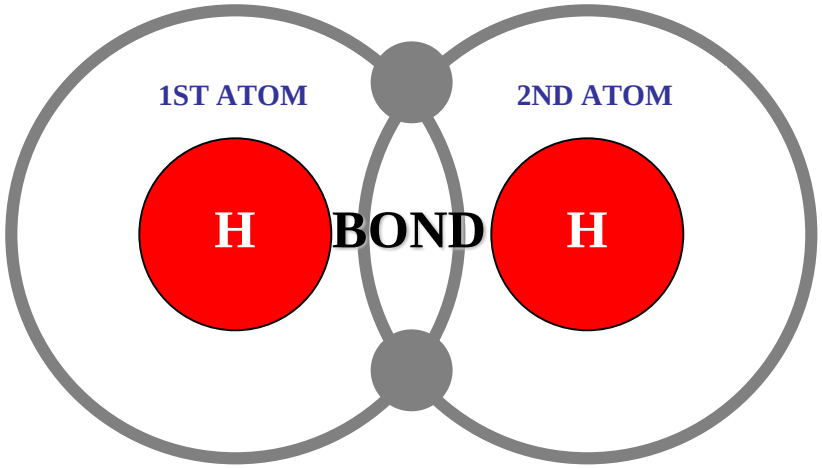
NON-POLAR COVALENT BOND

HYDROGEN ATOMS

= E-

NON-POLAR COVALENT BOND

HYDROGEN ATOMS

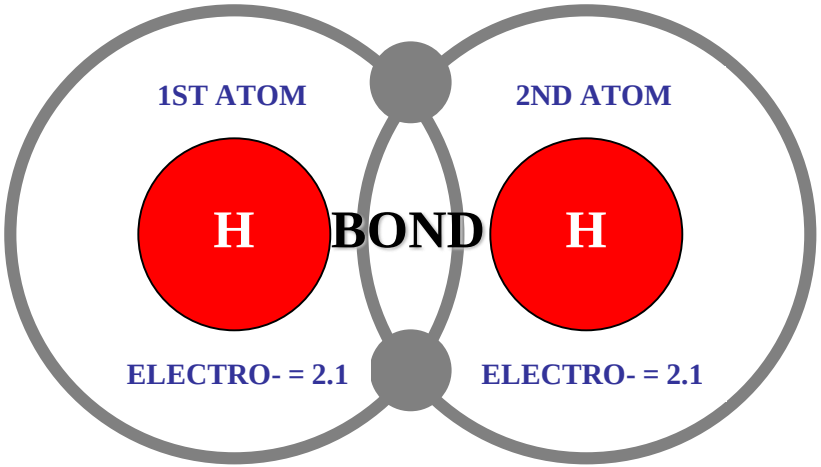


= E-

HYDROGEN MOLECULE

NON-POLAR COVALENT BOND

HYDROGEN MOLECULE

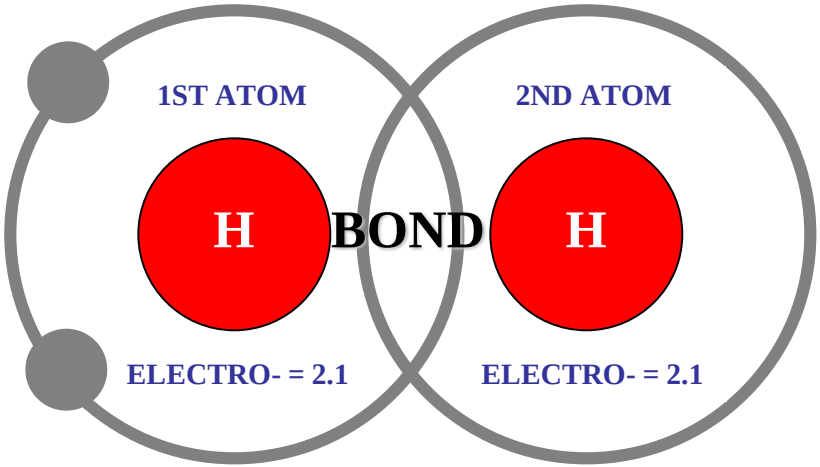


= E-

H EQUAL ELECTRO-

NON-POLAR COVALENT BOND

HYDROGEN MOLECULE

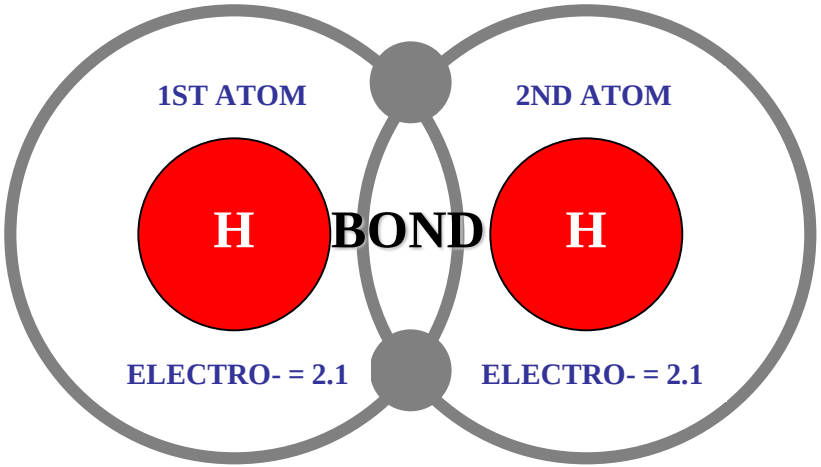


= E-

H EQUAL ELECTRO-

NON-POLAR COVALENT BOND

HYDROGEN MOLECULE

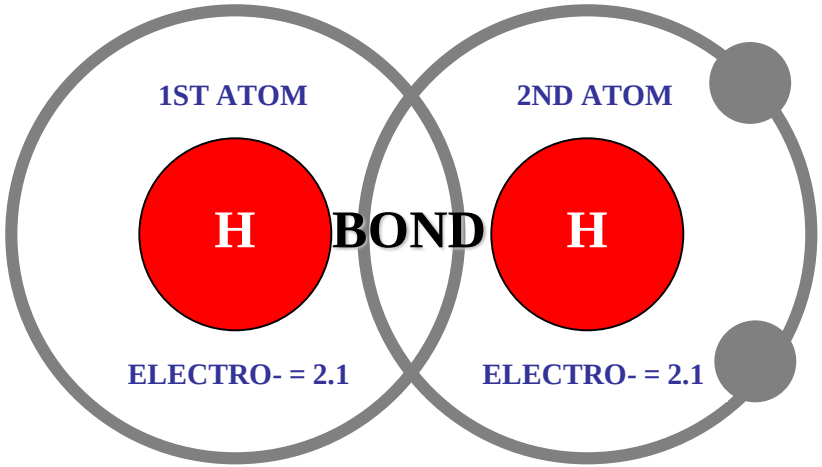


= E-

H EQUAL ELECTRO-

NON-POLAR COVALENT BOND

HYDROGEN MOLECULE

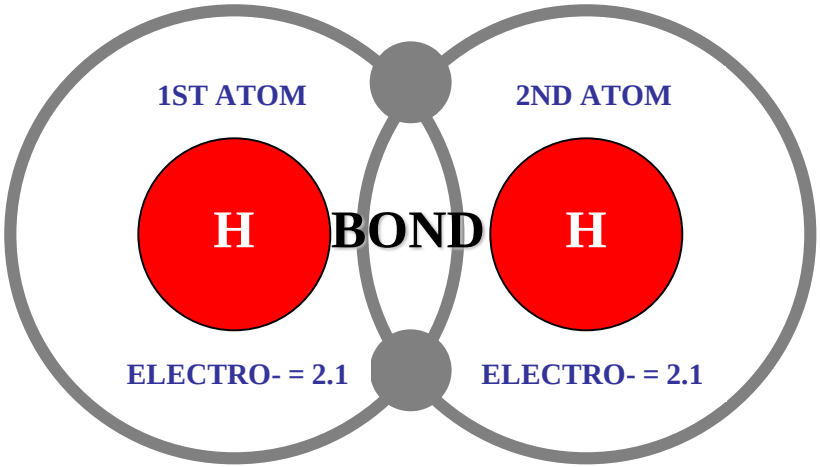


= E-

H EQUAL ELECTRO-

NON-POLAR COVALENT BOND

HYDROGEN MOLECULE

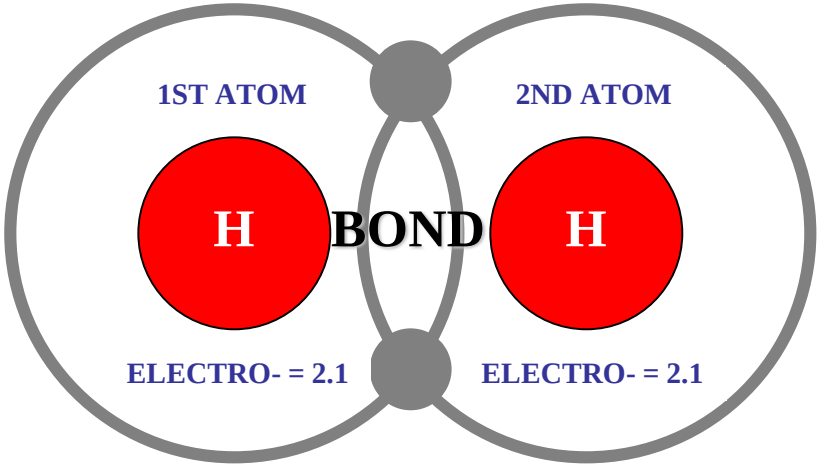


= E-

H EQUAL ELECTRO-

NON-POLAR COVALENT BOND

HYDROGEN MOLECULE



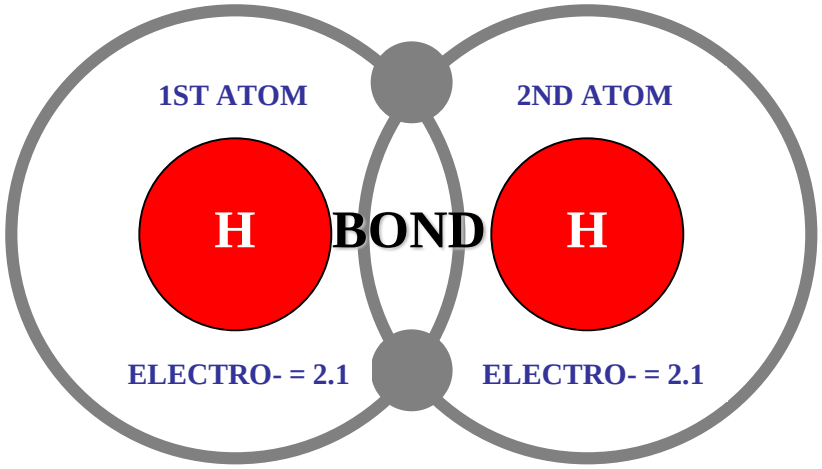
= E-

EQUAL E- SHARING: OUTCOME

NON-POLAR COVALENT BOND

HS

HYDROGEN MOLECULE

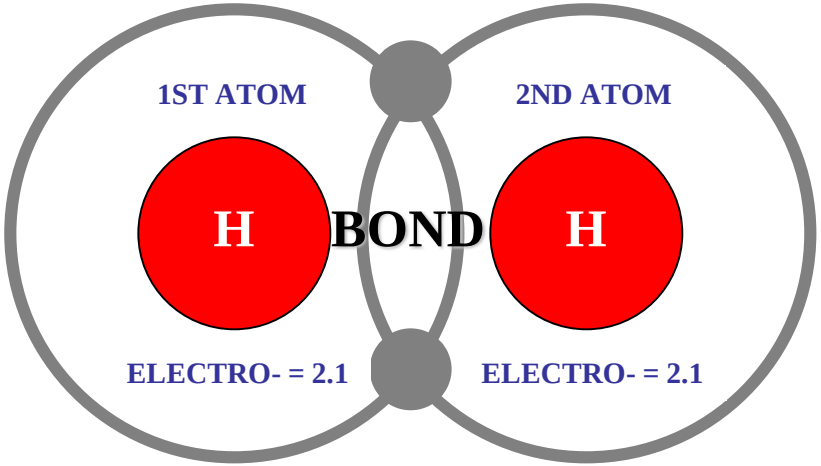


= E-

NON-POLAR COVALENT BOND

NON-POLAR COVALENT BOND

HYDROGEN MOLECULE

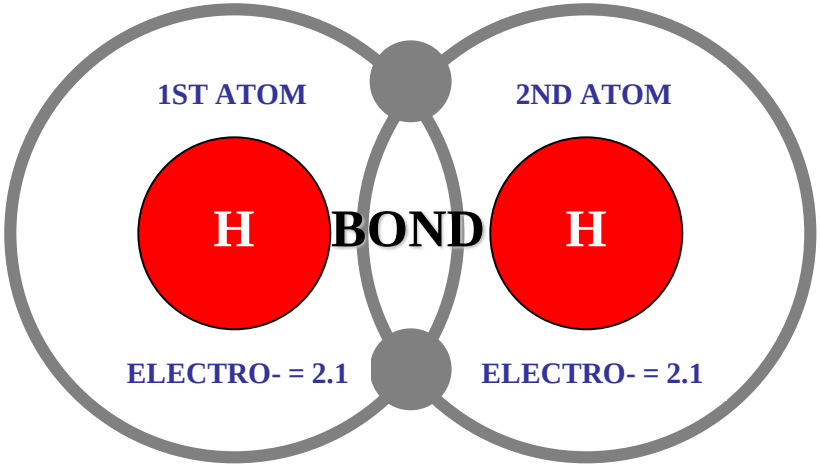


= E-

HIGH E- SHARING: OUTCOME

NON-POLAR COVALENT BOND

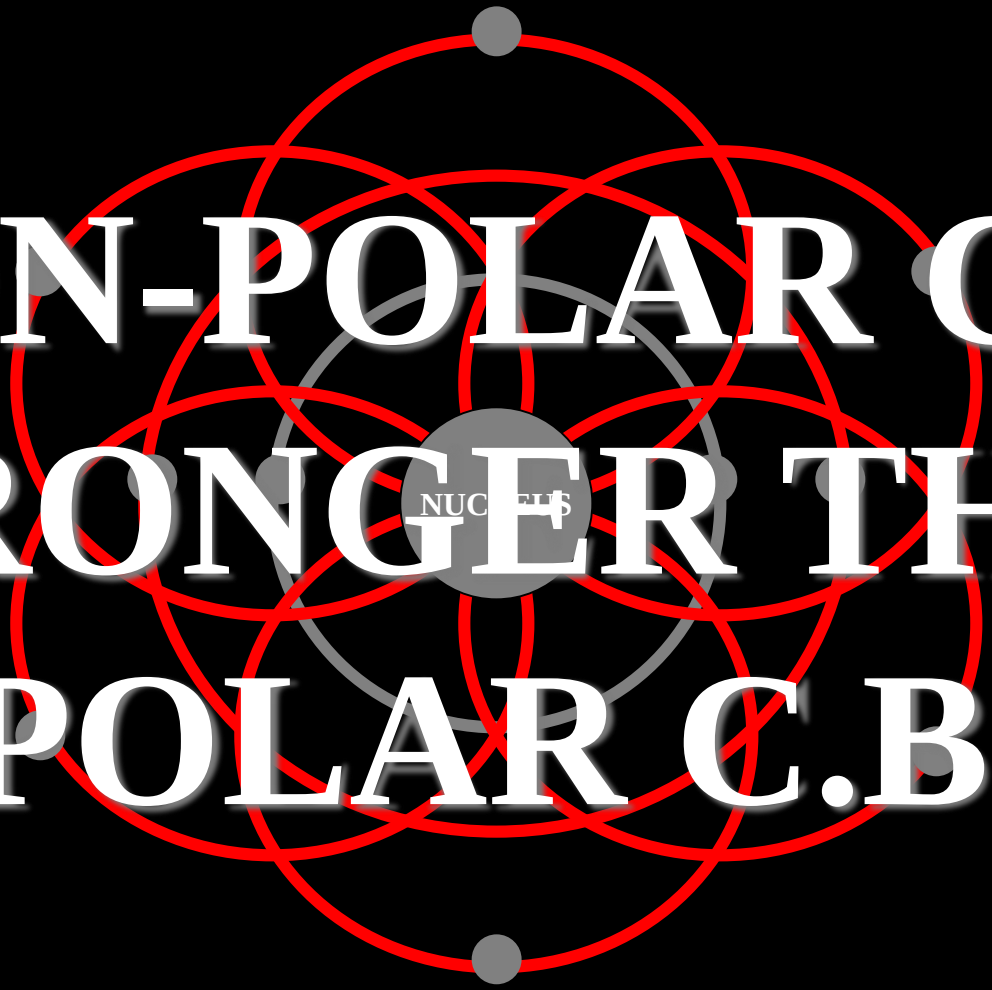
HYDROGEN MOLECULE



= E-

STRONG COVALENT BOND

CHEMICAL BONDS



NON-POLAR C.B. STRONGER THAN POLAR C.B.

CHEMICAL BONDS

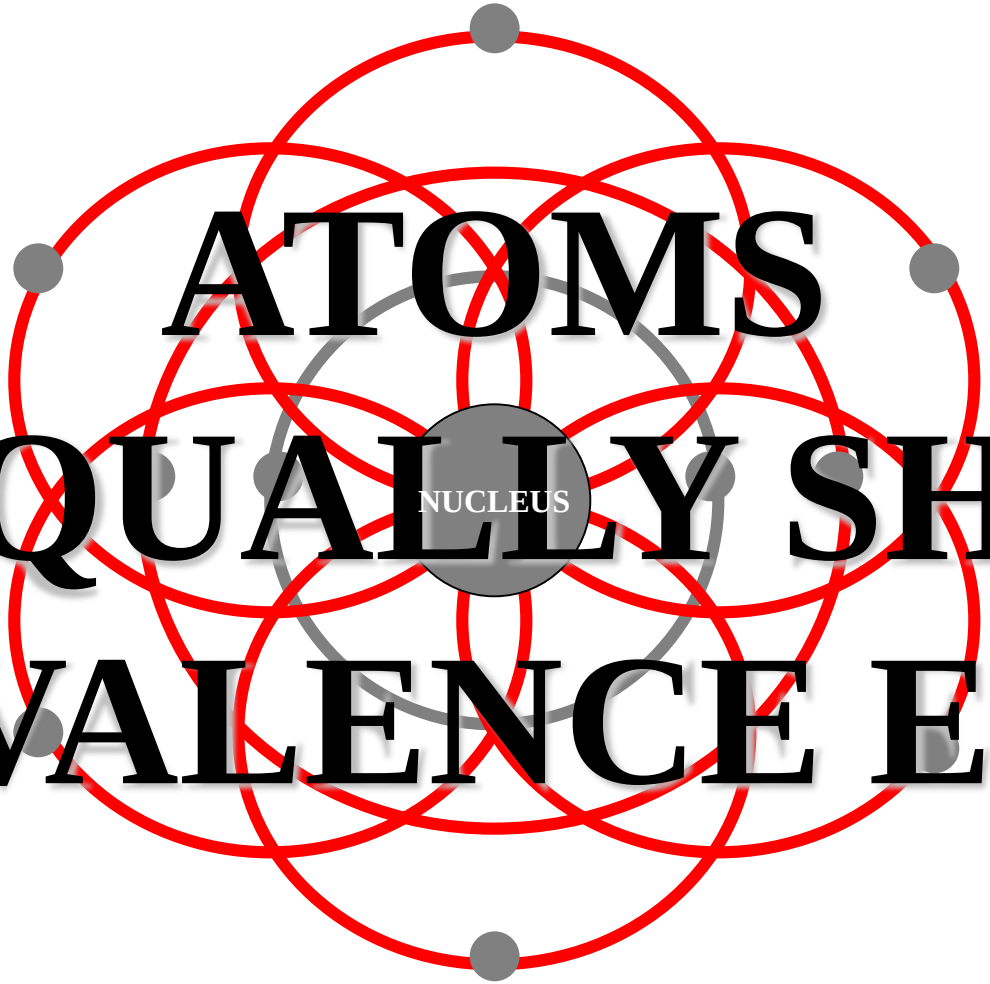
P

POLAR COVALENT BOND

POLAR COVALENT BOND

EG

POLAR COVALENT BOND



ATOMS UNEQUALLY SHARE VALENCE E-

POLAR COVALENT BOND

POLAR COVALENT BOND EXAMPLE

WATER MOLECULE

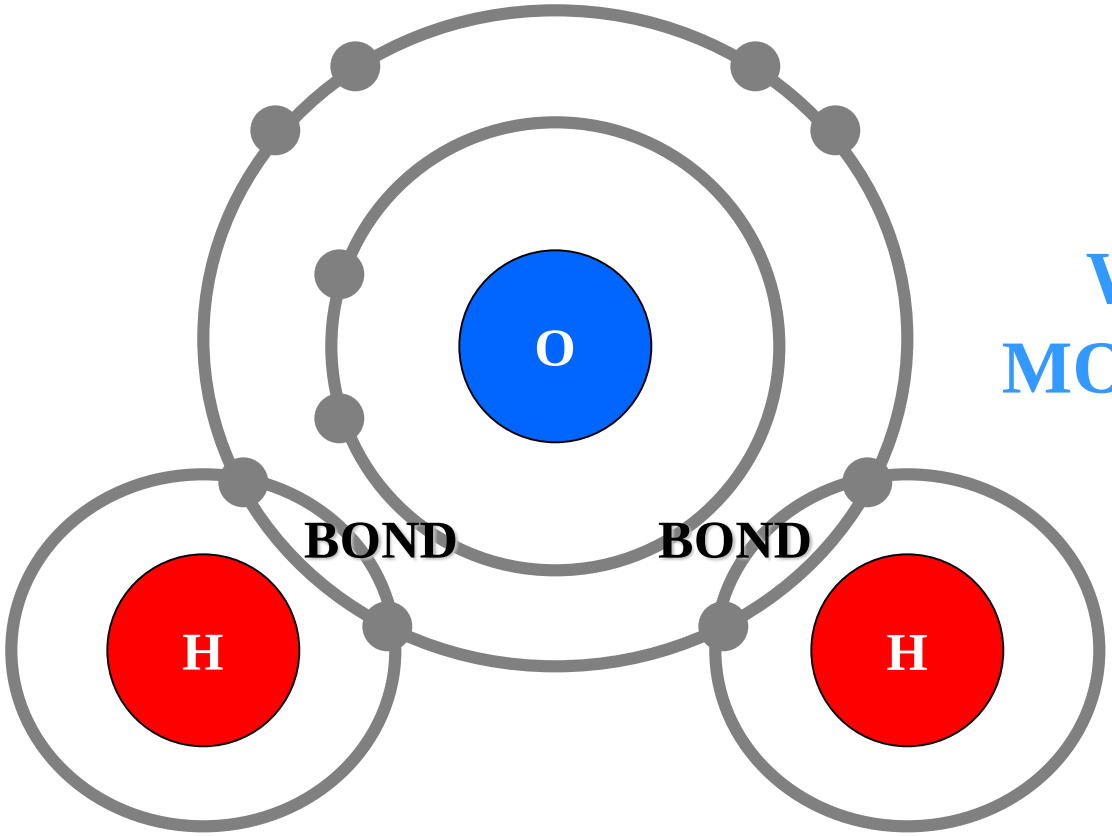
POLAR COVALENT BOND

D

E-

OXYGEN

HYDROGEN



WATER MOLECULE

= E-

DIFF ELEMENTS

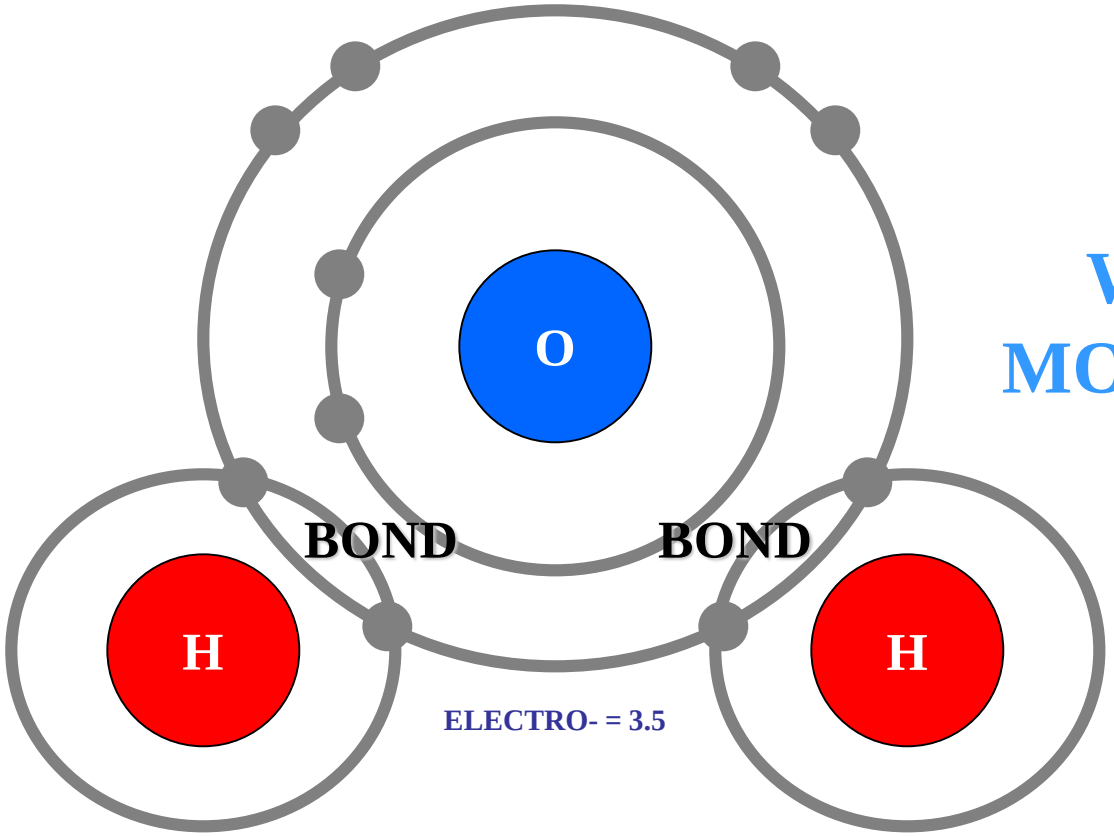
POLAR COVALENT BOND

H

<

OXYGEN
HIGHER ELECTRO-

HYDROGEN
LOWER ELECTRO-



WATER MOLECULE

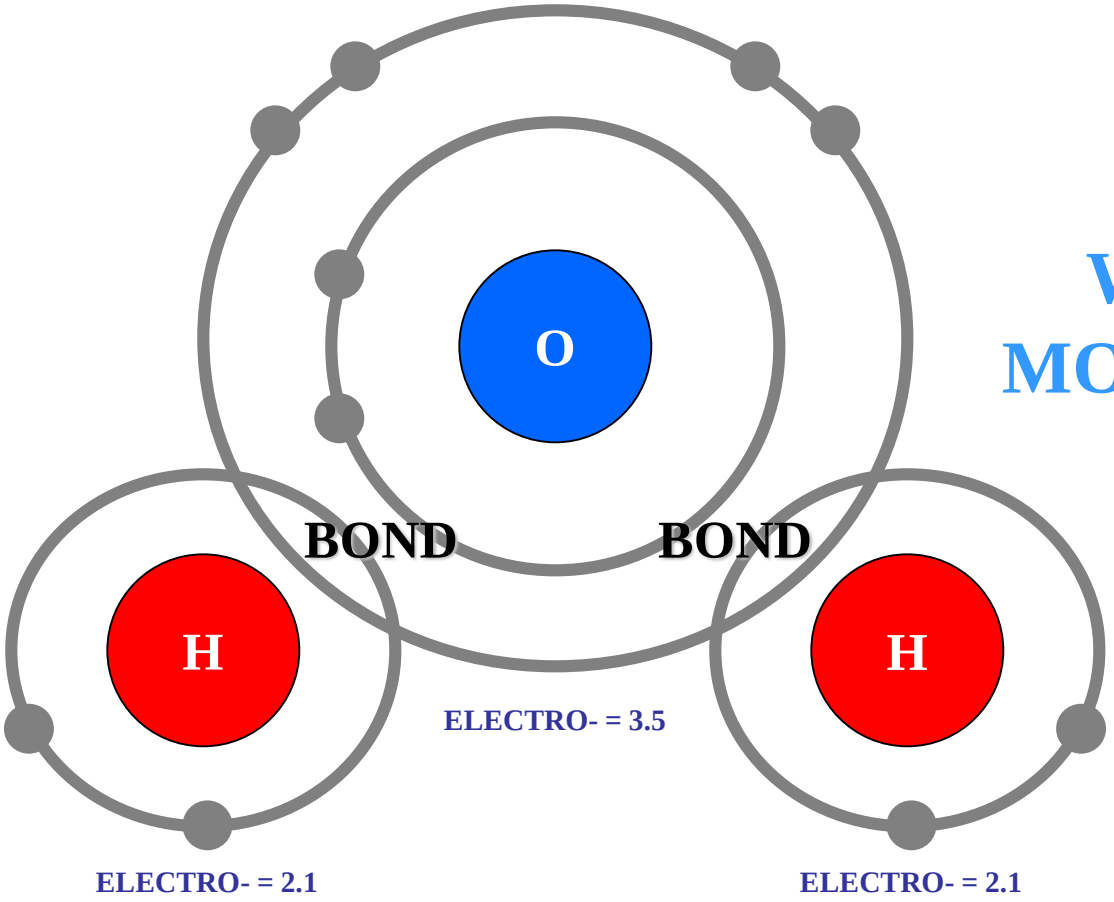
= E-

O & H DIFF ELECTRO-

POLAR COVALENT BOND

OXYGEN
HIGHER ELECTRO-

HYDROGEN
LOWER ELECTRO-



WATER MOLECULE

● = E-

O & H DIFF ELECTRO-

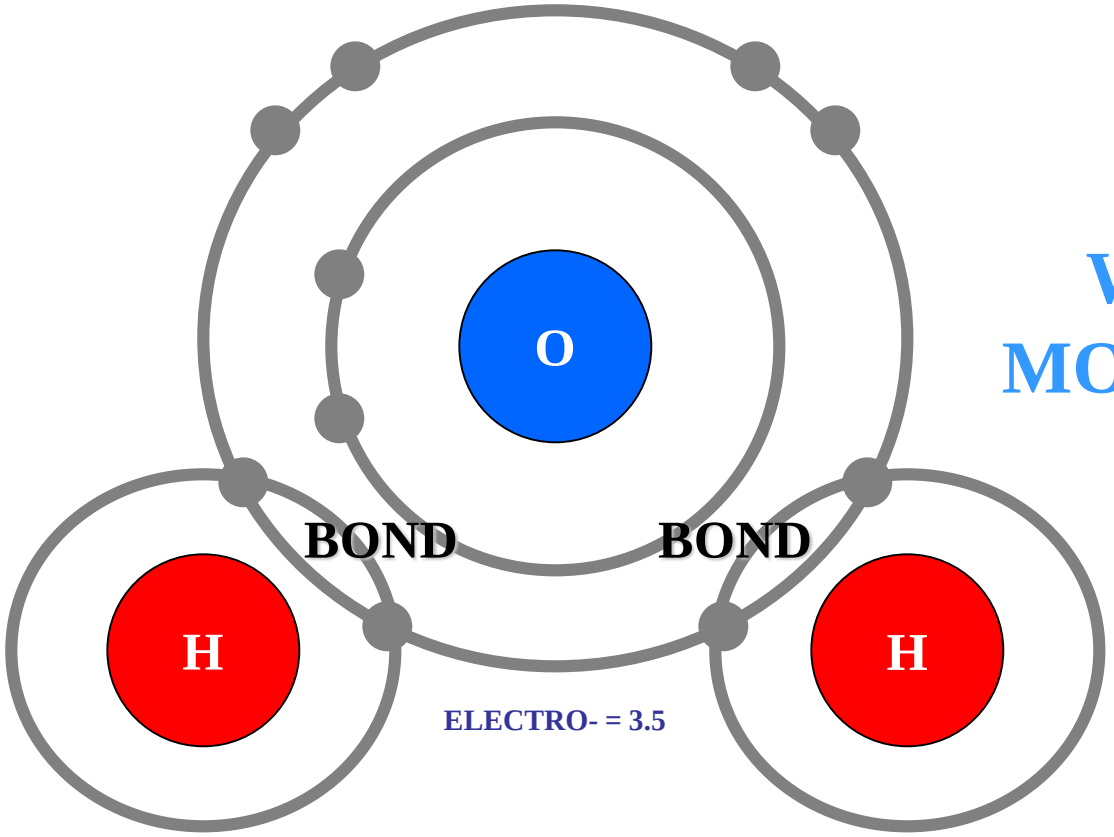
POLAR COVALENT BOND

O

>

OXYGEN
HIGHER ELECTRO-

HYDROGEN
LOWER ELECTRO-



WATER MOLECULE

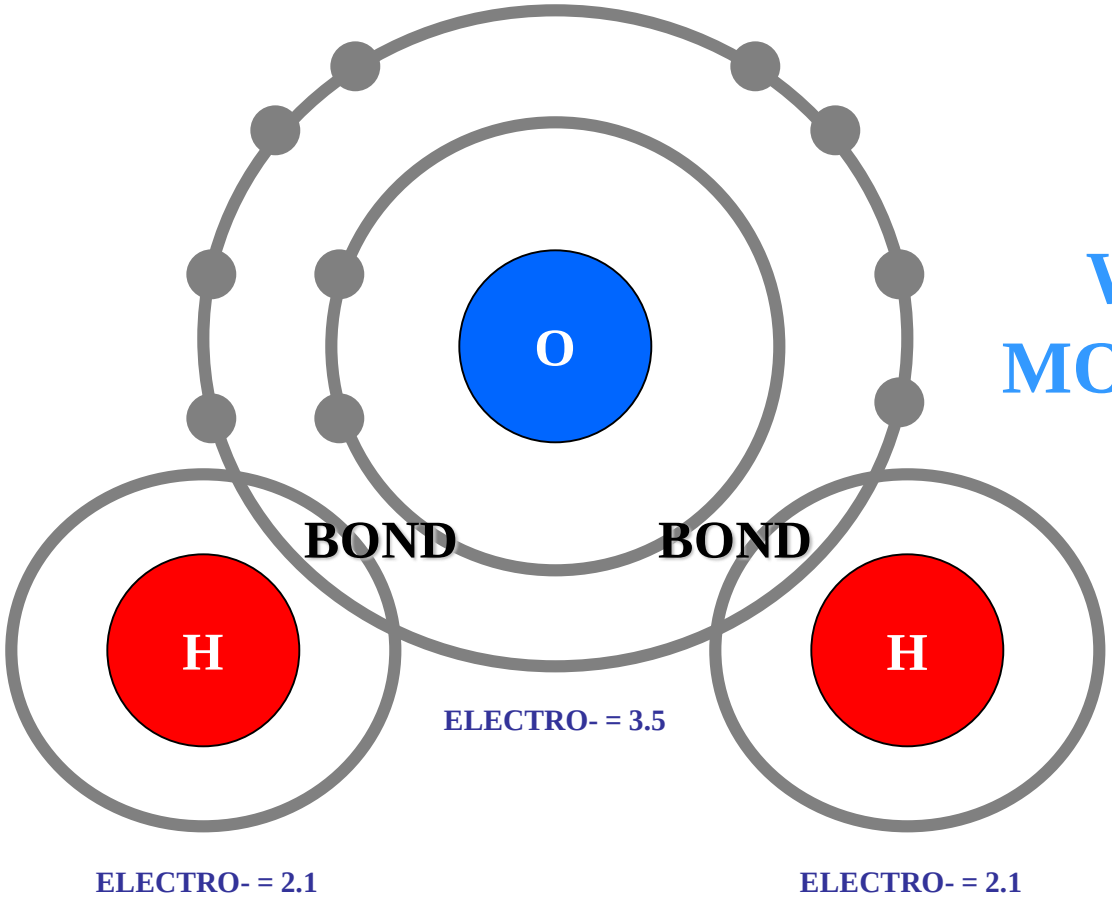
= E-

O & H DIFF ELECTRO-

POLAR COVALENT BOND

OXYGEN
HIGHER ELECTRO-

HYDROGEN
LOWER ELECTRO-



WATER MOLECULE

● = E-

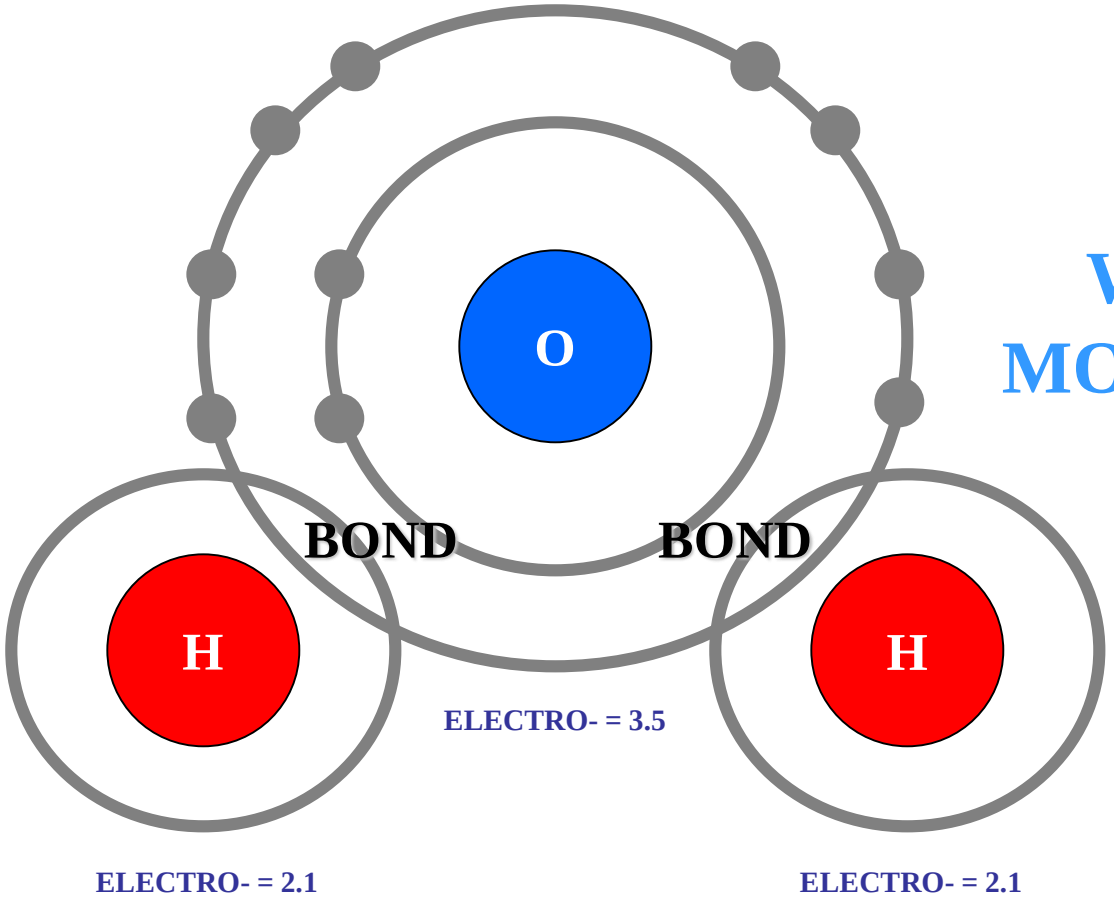
O & H DIFF ELECTRO-

POLAR COVALENT BOND

E- SPEND MORE TIME ABOUT **OXYGEN**

OXYGEN
HIGHER
ELECTRO-

HYDROGEN
LOWER
ELECTRO-



WATER MOLECULE

● = E-

O & H DIFF ELECTRO-

POLAR COVALENT BOND

?

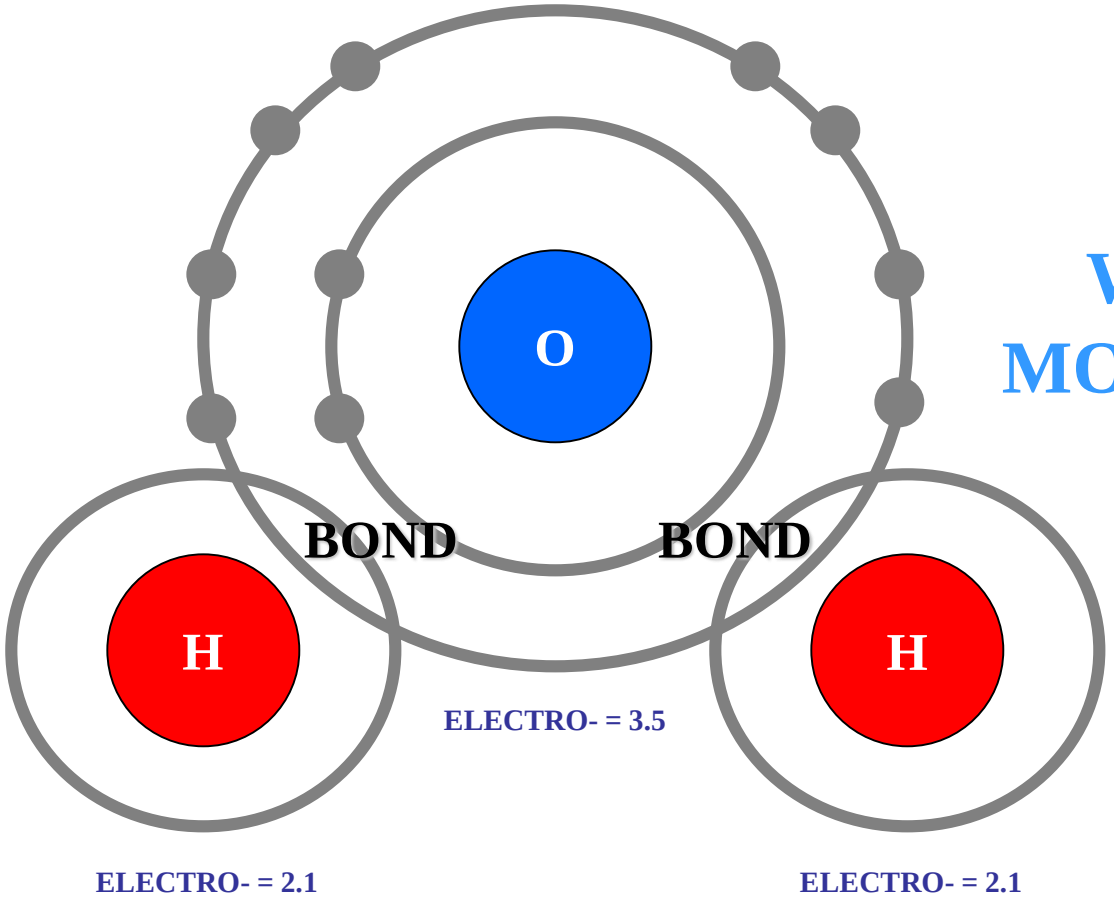
O

-

E- SPEND MORE TIME ABOUT **OXYGEN**

OXYGEN
HIGHER ELECTRO-

HYDROGEN
LOWER ELECTRO-



WATER MOLECULE

● = E-

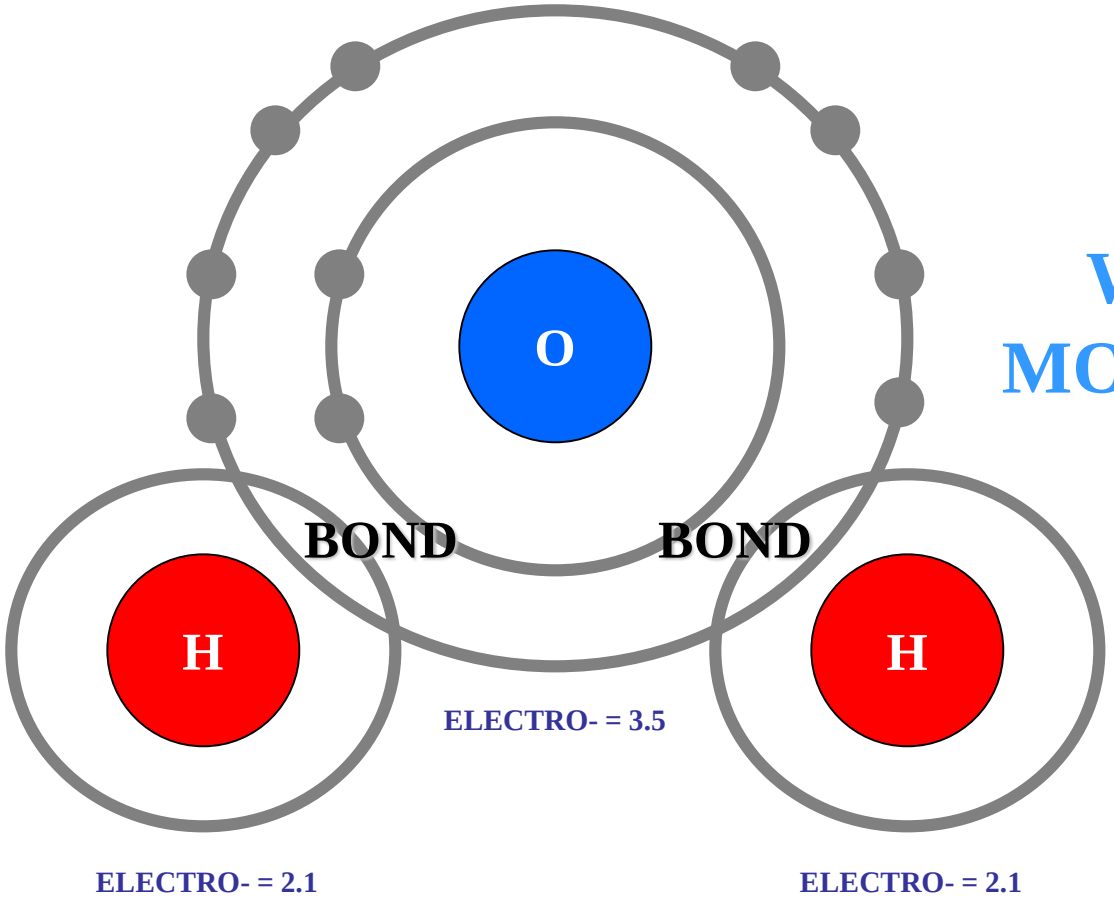
UNEQUAL E- SHARING

POLAR COVALENT BOND

? CHARGE

OXYGEN
HIGHER ELECTRO-

HYDROGEN
LOWER ELECTRO-



WATER MOLECULE

● = E-

UNEQUAL E- SHARING

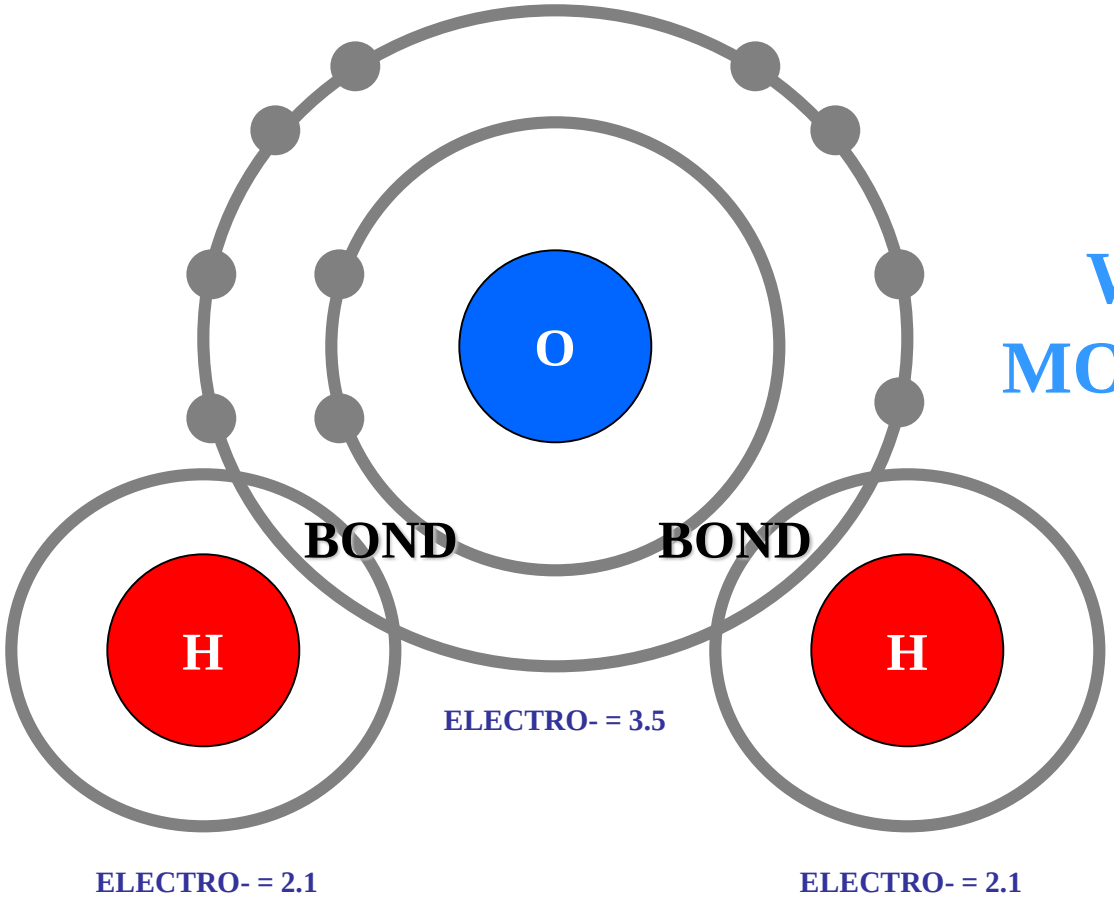
POLAR COVALENT BOND

? H +

- CHARGE

OXYGEN
HIGHER ELECTRO-

HYDROGEN
LOWER ELECTRO-



WATER MOLECULE

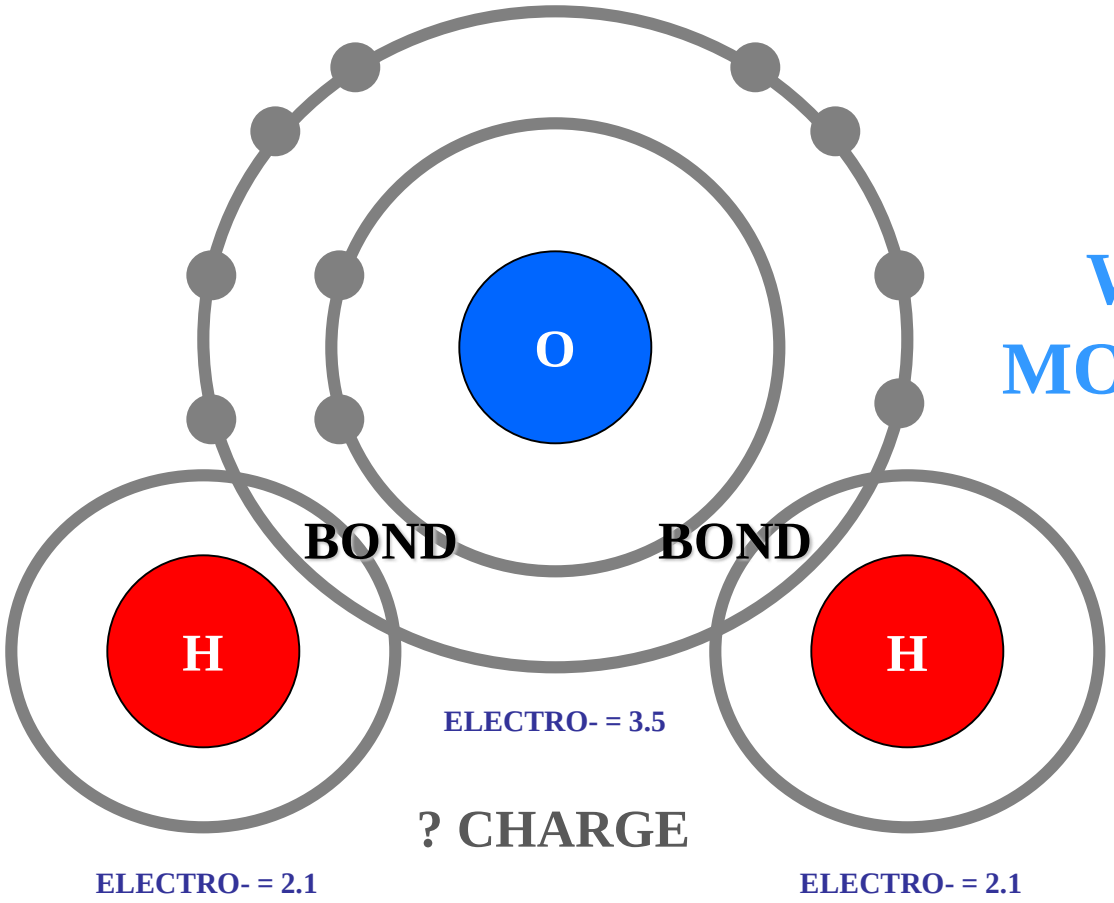
● = E-

UNEQUAL E- SHARING

POLAR COVALENT BOND

OXYGEN
HIGHER ELECTRO-

HYDROGEN
LOWER ELECTRO-



WATER MOLECULE

● = E-

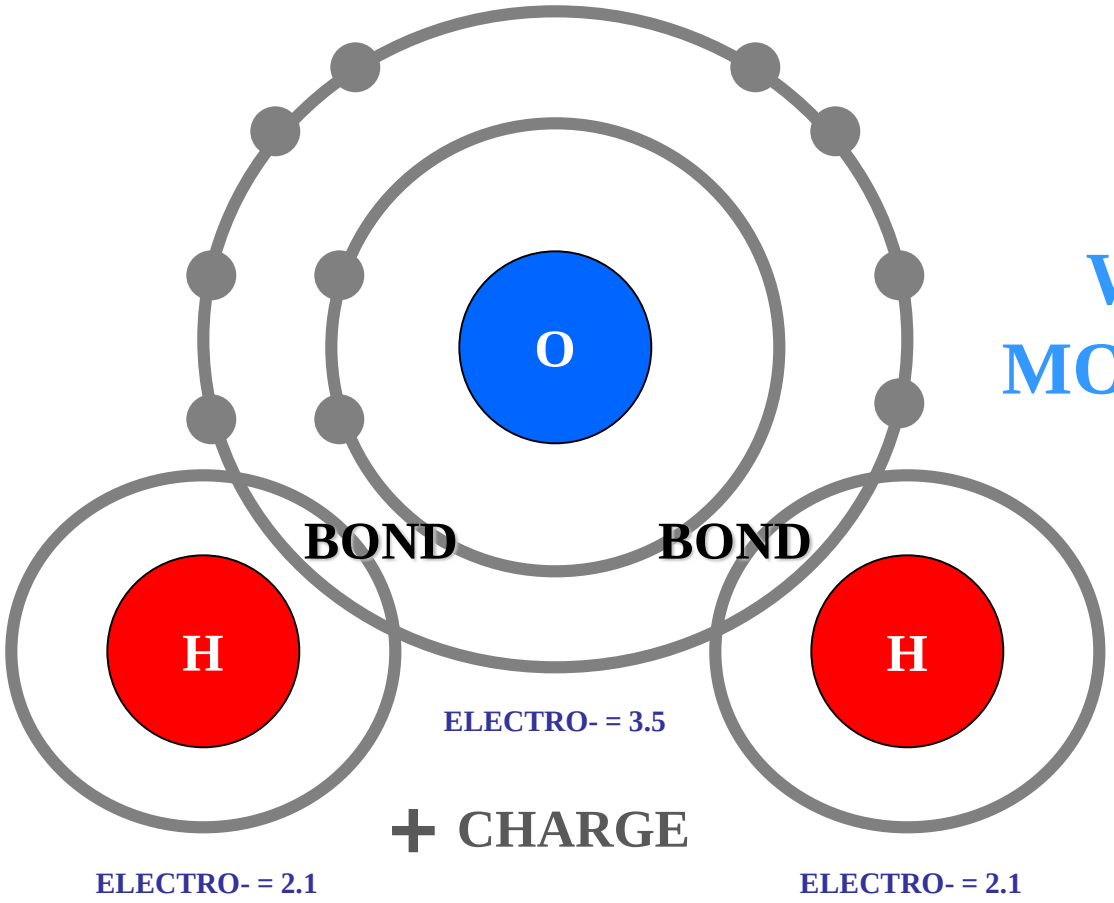
UNEQUAL E- SHARING

PCB

POLAR COVALENT BOND

OXYGEN
HIGHER ELECTRO-

HYDROGEN
LOWER ELECTRO-



WATER MOLECULE

● = E-

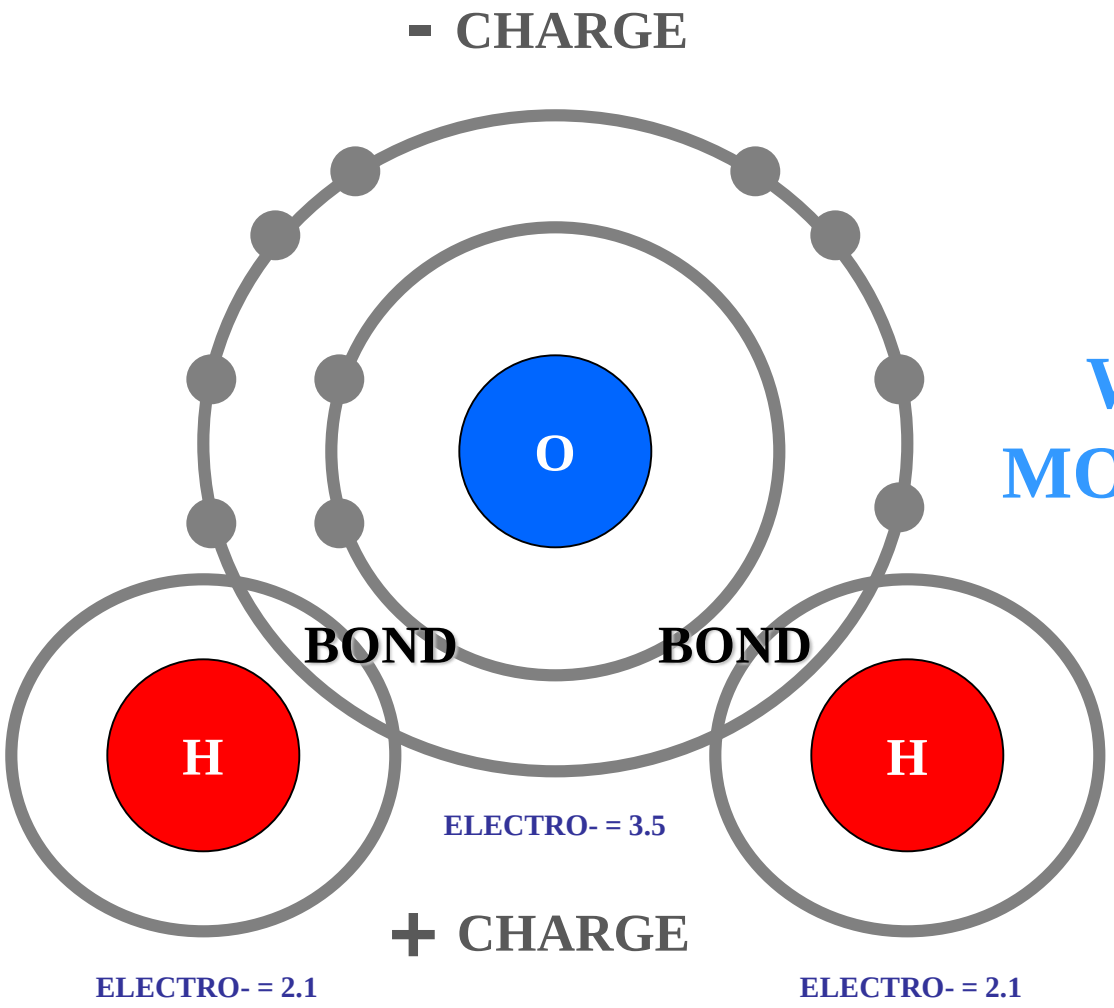
UNEQUAL E- SHARING: OUTCOME

POLAR COVALENT BOND

MS

OXYGEN
HIGHER ELECTRO-

HYDROGEN
LOWER ELECTRO-



WATER MOLECULE

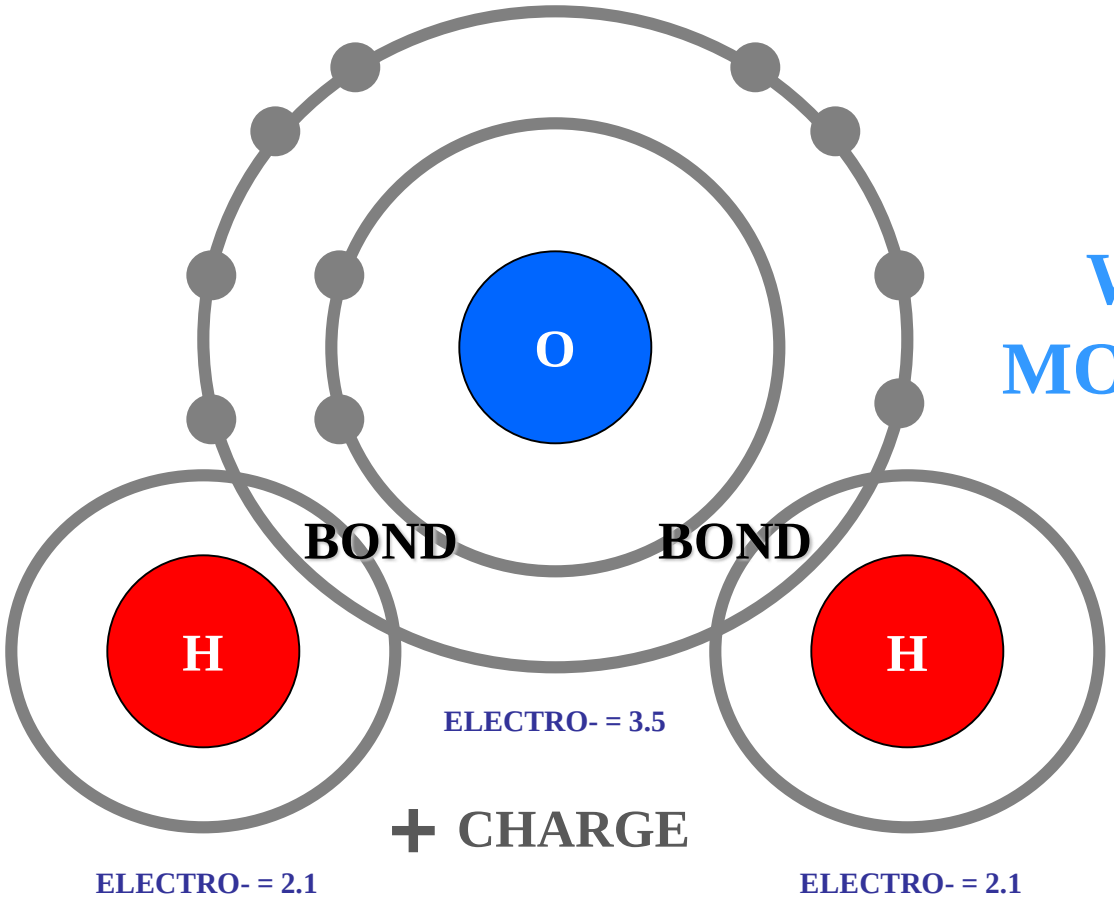
● = E-

POLAR COVALENT BOND

POLAR COVALENT BOND

OXYGEN
HIGHER ELECTRO-

HYDROGEN
LOWER ELECTRO-



WATER MOLECULE

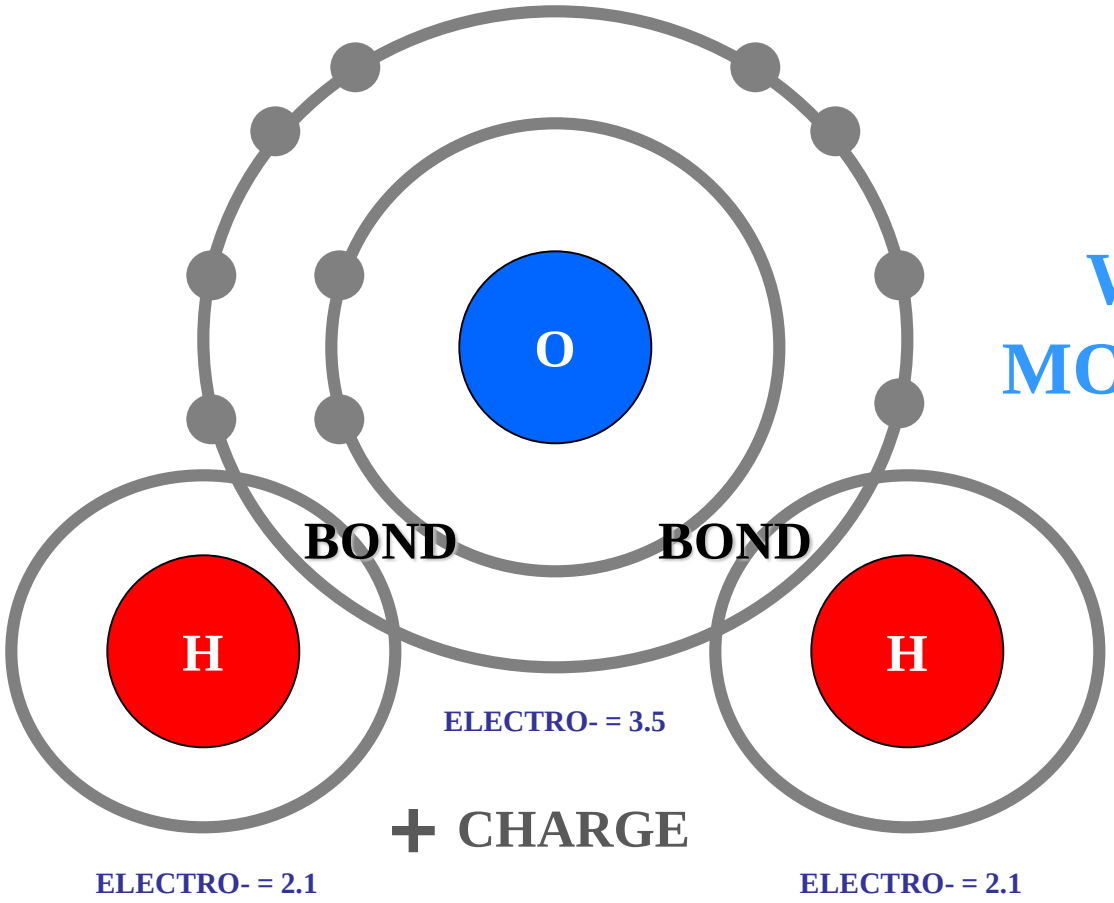
● = E-

MODERATE E- SHARING: OUTCOME

POLAR COVALENT BOND

OXYGEN
HIGHER ELECTRO-

HYDROGEN
LOWER ELECTRO-



WATER MOLECULE

● = E-

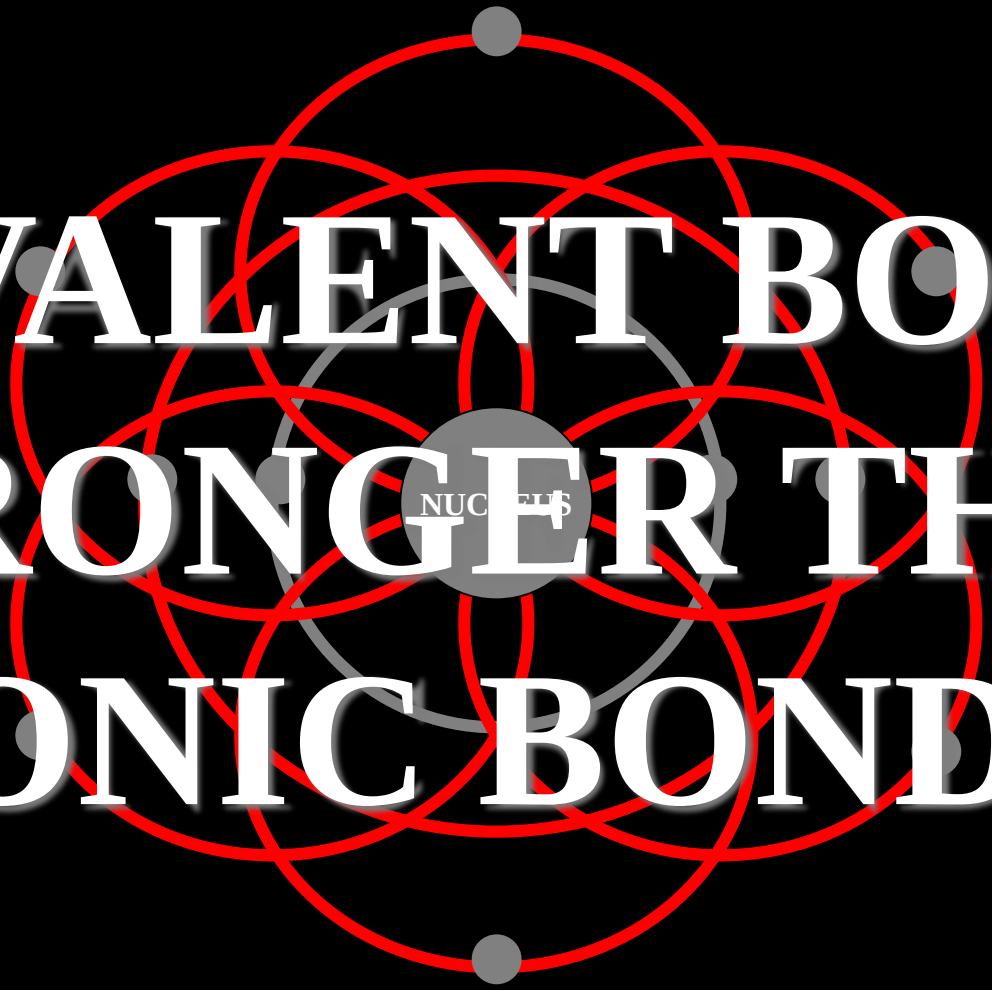
WEAK COVALENT BOND

CHEMICAL BONDS

POLAR C.B.
WEAKER THAN
NON-POLAR C.B.

CHEMICAL BONDS

CHEMICAL BONDS



COVALENT BONDS STRONGER THAN IONIC BONDS

CHEMICAL BONDS

IONIC BONDS

ION

ION

ION

CHARGED ATOM

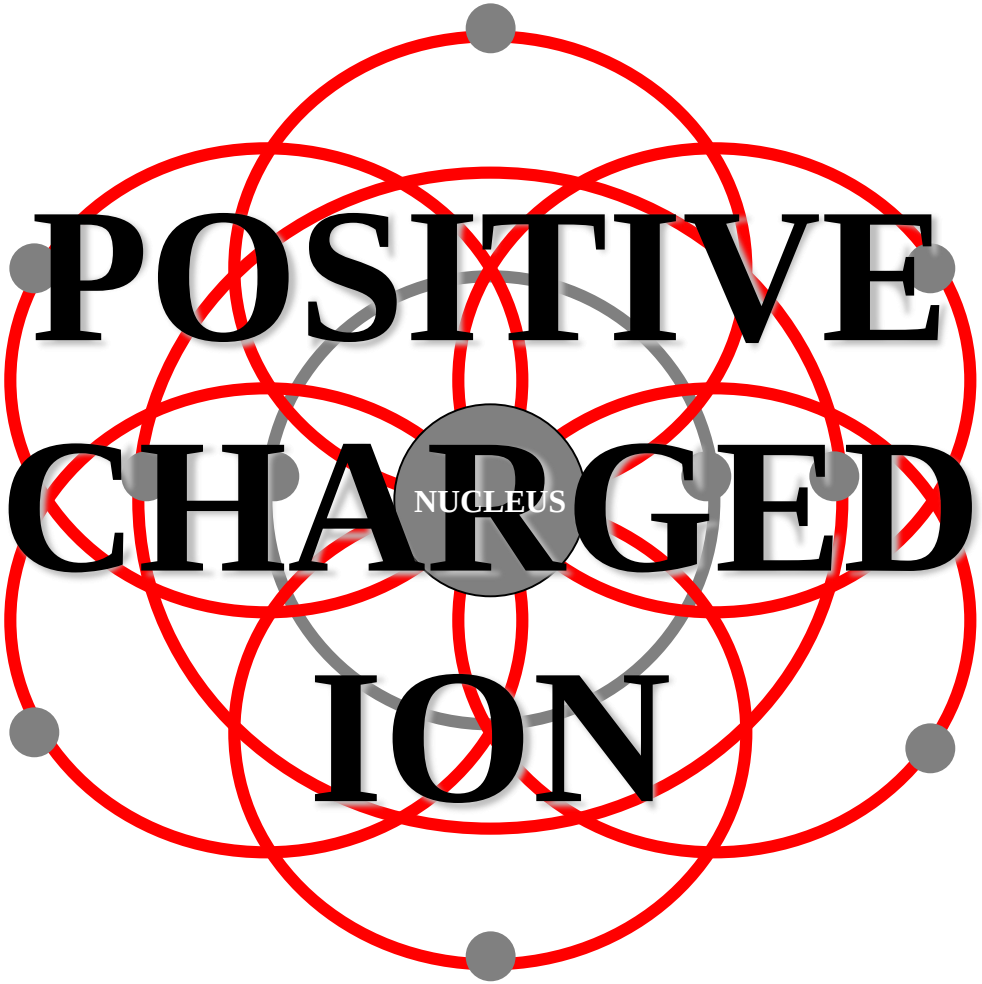
ION

C

CATION VS ANION

CATION

CATION



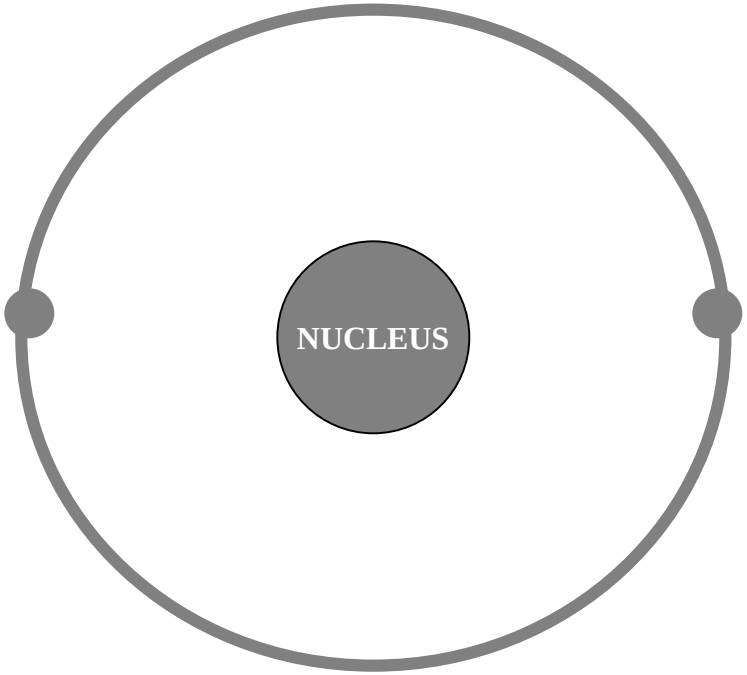
POSITIVE CHARGED ION

CATION

L

E-

ATOM



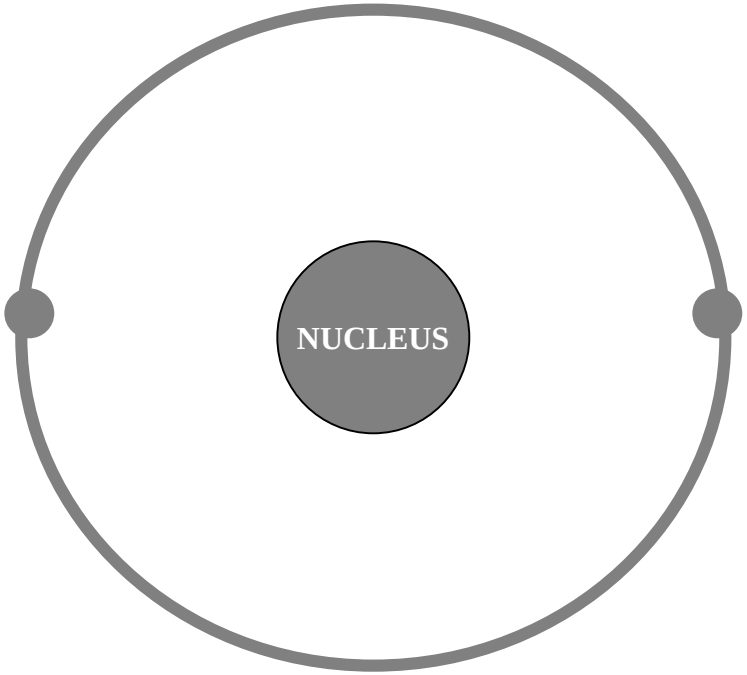
LOW ELECTRO-NEGATIVITY

= E-

E-

!

ATOM



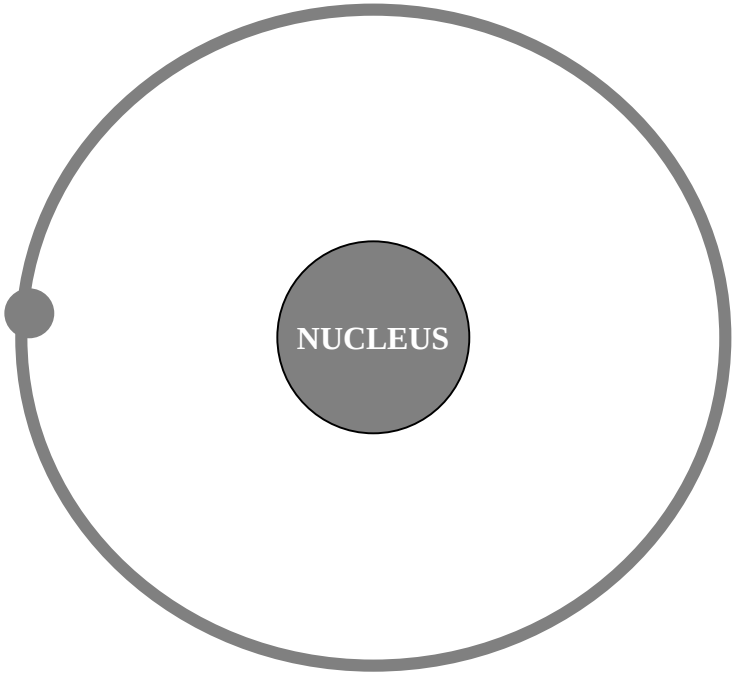
LOSES E-

BOND FORMATION

= E-

?

ATOM



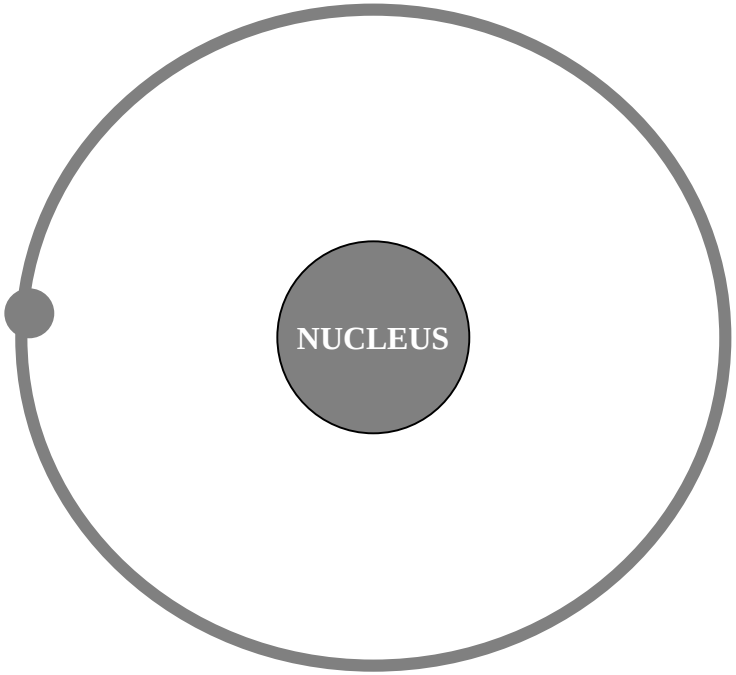
LOSES E-

BOND FORMATION

= E-

+

ATOM



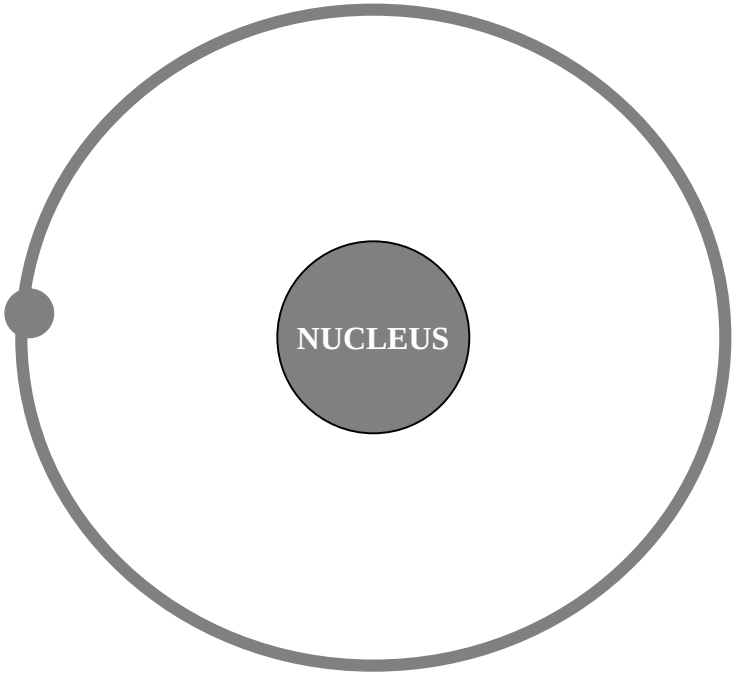
IMPARTS ? CHARGE

= E-

¿

C

ATOM

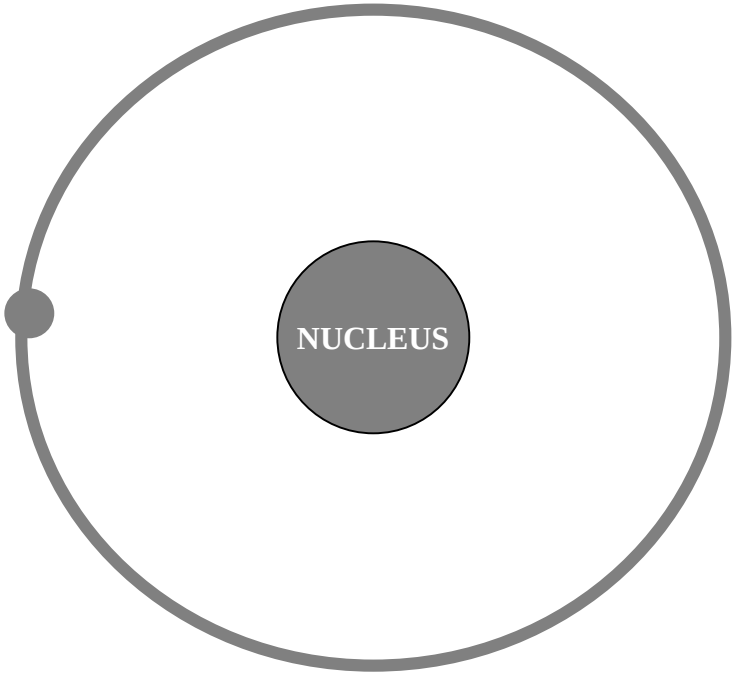


+ CHARGE

= E-

^
A

CATION

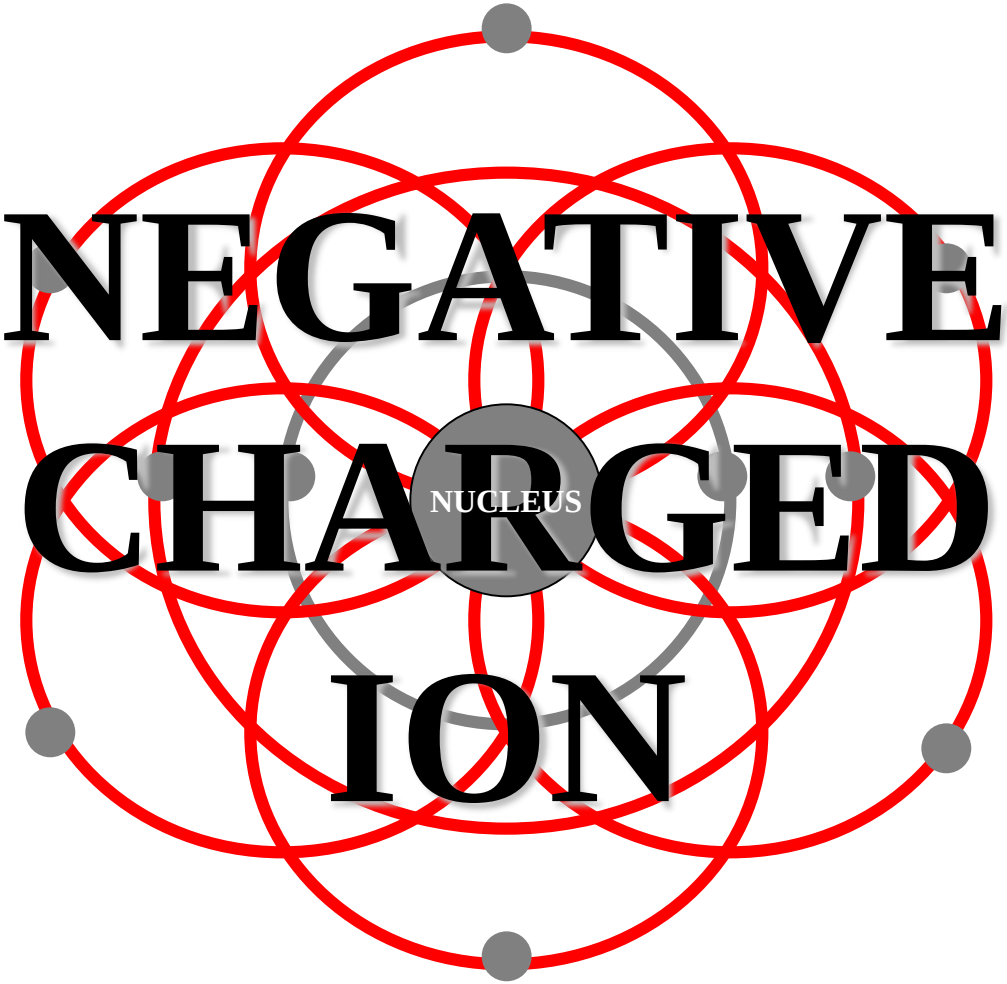


+ CHARGE

= E-

ANION

ANION



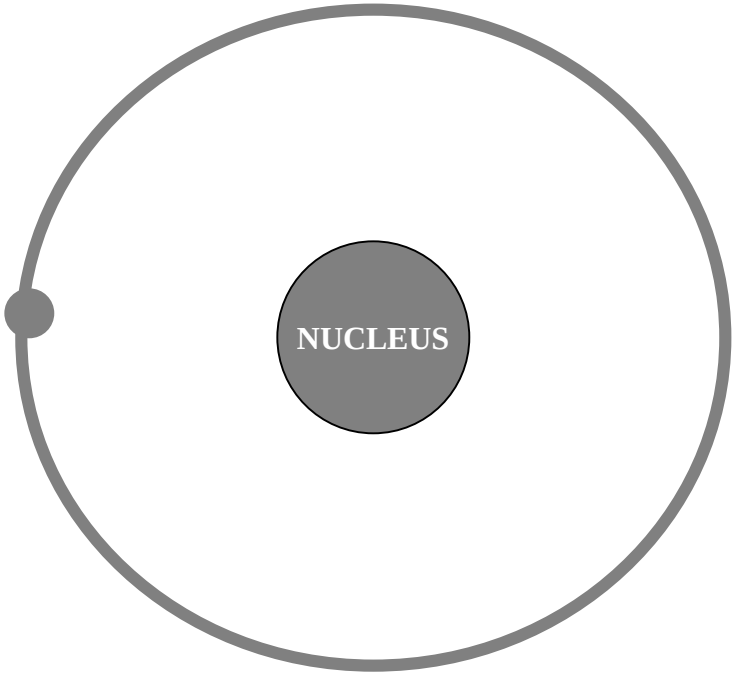
NEGATIVE CHARGED ION

ANION

G

E-

ATOM



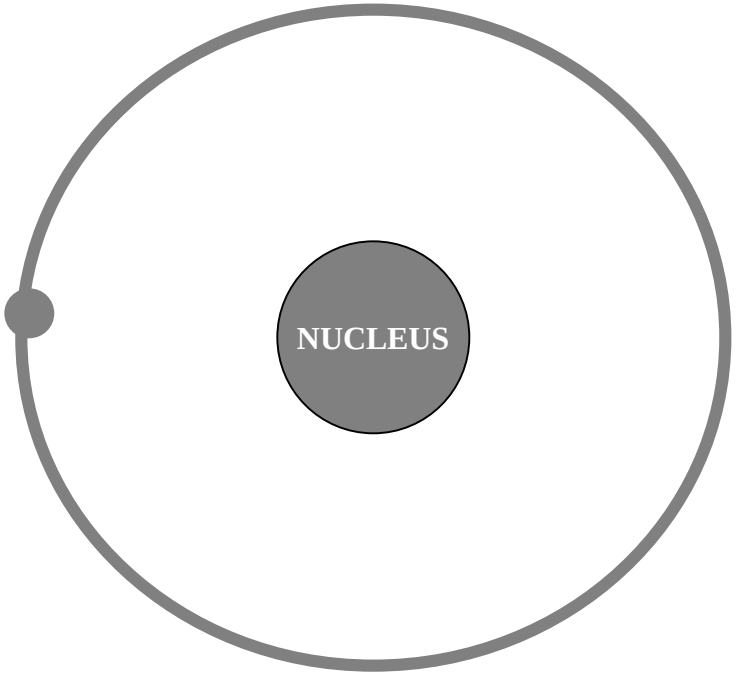
HIGH ELECTRO-NEGATIVITY

= E-

E-

!

ATOM



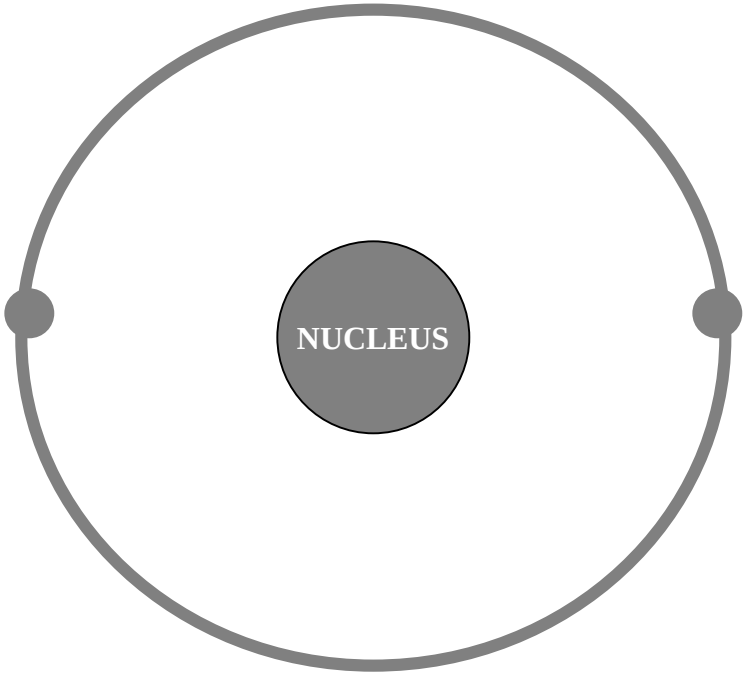
GAINS E-

BOND FORMATION

= E-

?

ATOM



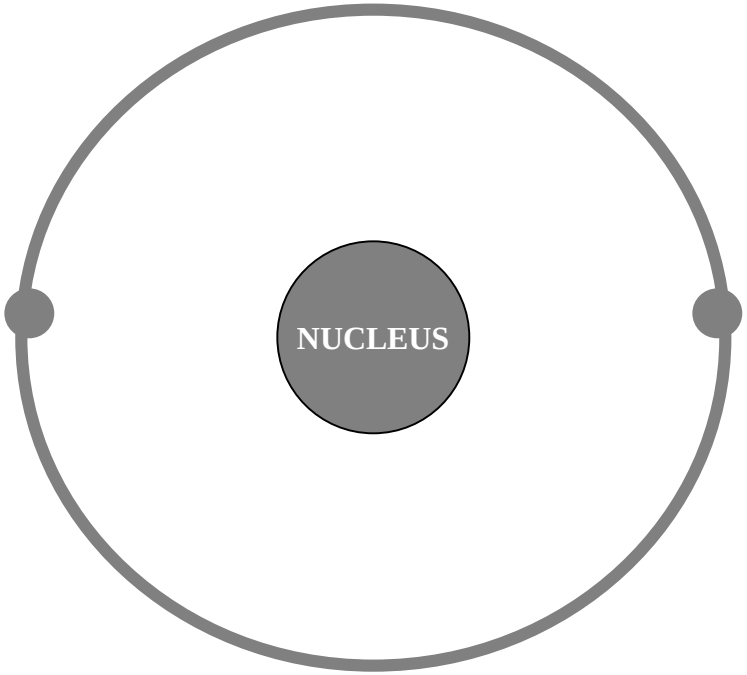
GAINS E-

BOND FORMATION

= E-

-

ATOM



IMPARTS ? CHARGE

= E-