SCH3U (Chemistry, Grade 11 University)

Strand: Matter, Chemical Trends, and Chemical Bonding

Specific Expectation B3.3

"…**explain how patterns** in the electron arrangement and forces **in atoms result in periodic trends** (e.g., in atomic radius, ionization energy, electron affinity, **electronegativity**) in the periodic table"

Learning Goal

We are learning how electronegativity affects the way atoms share bonding electrons, and how this leads to polarity in molecules such as water.

Faisal Uddin

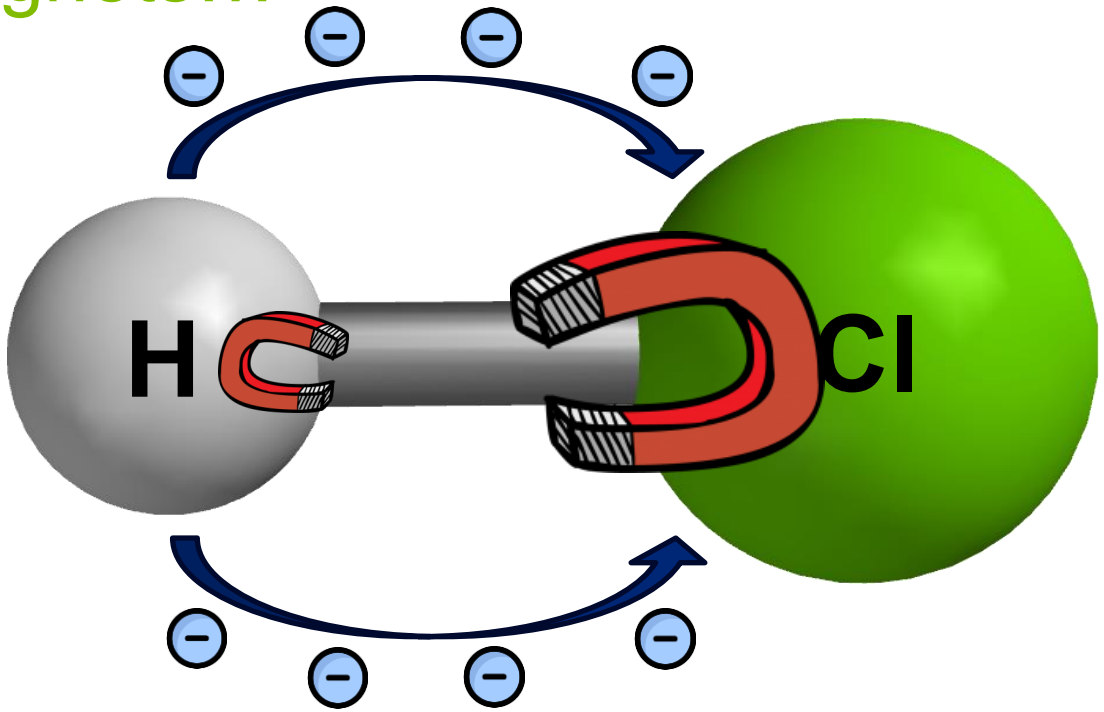
Is water sticky?

Electronegativity

Definition: A measure of the tendency of an atom to attract a bonding pair of electrons to its nucleus in a covalent bond

- Greater tendency to attract electrons = Greater electronegativity

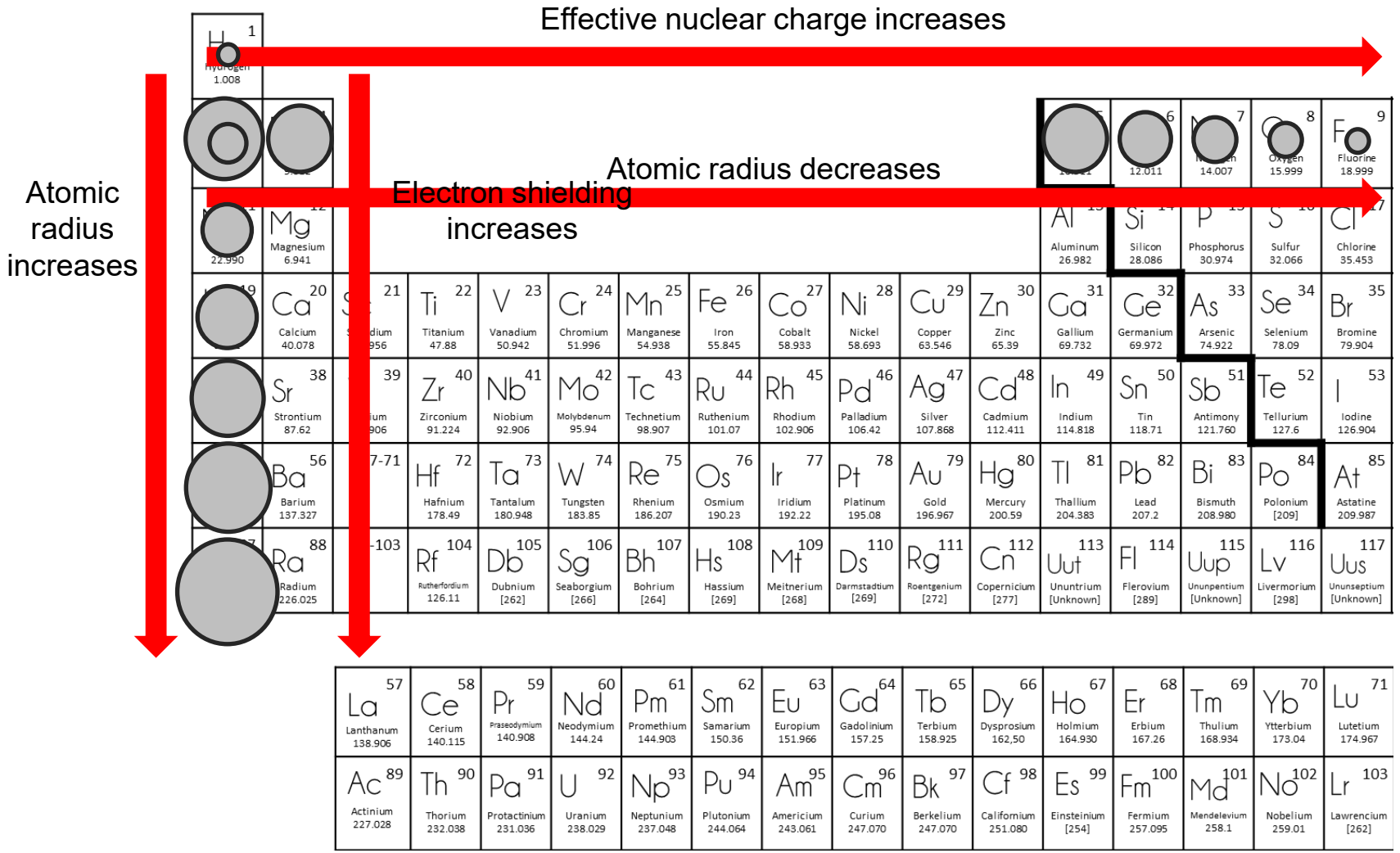
Think Magnets…



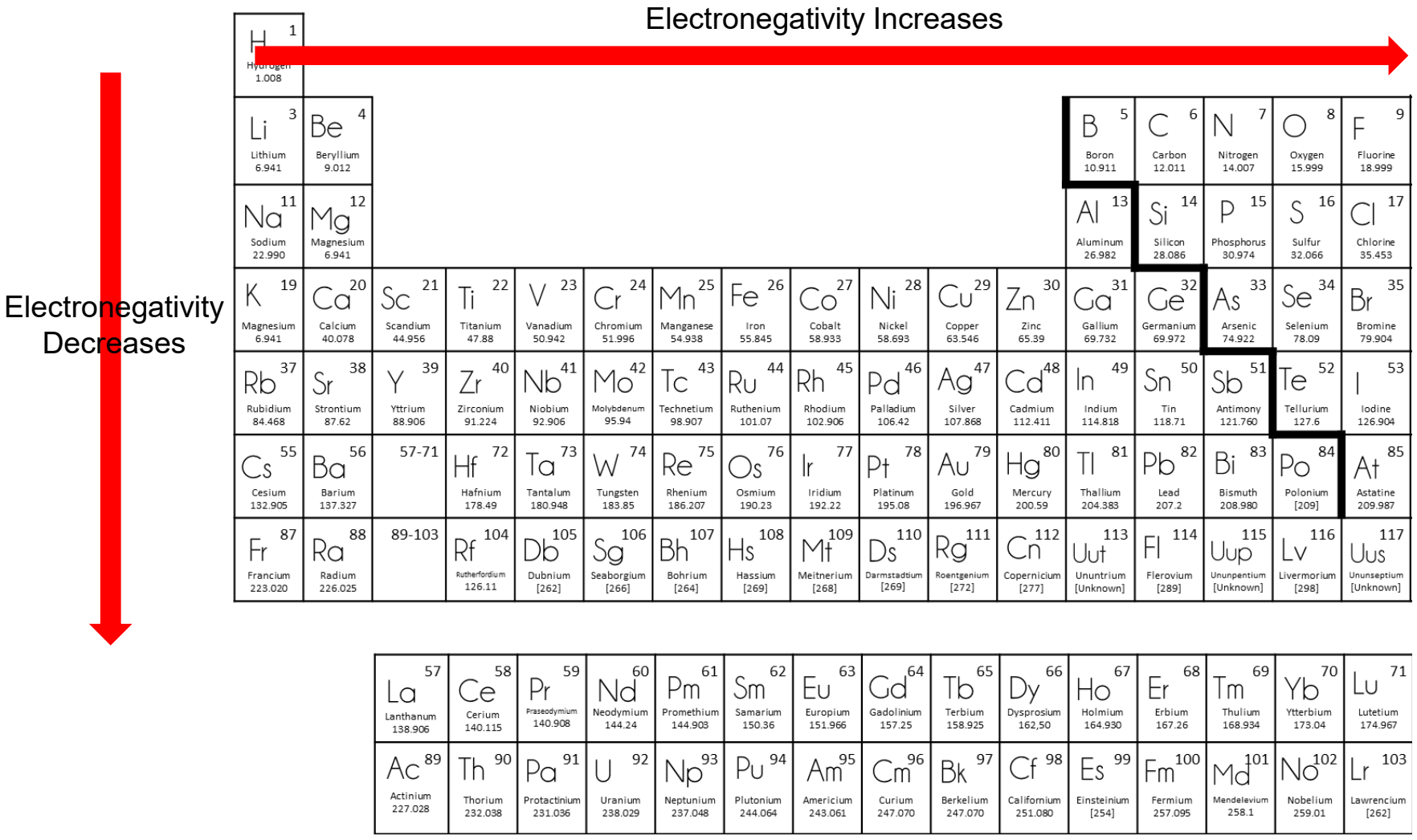
- Electron density will be “pulled” towards Cl

….but WHY??

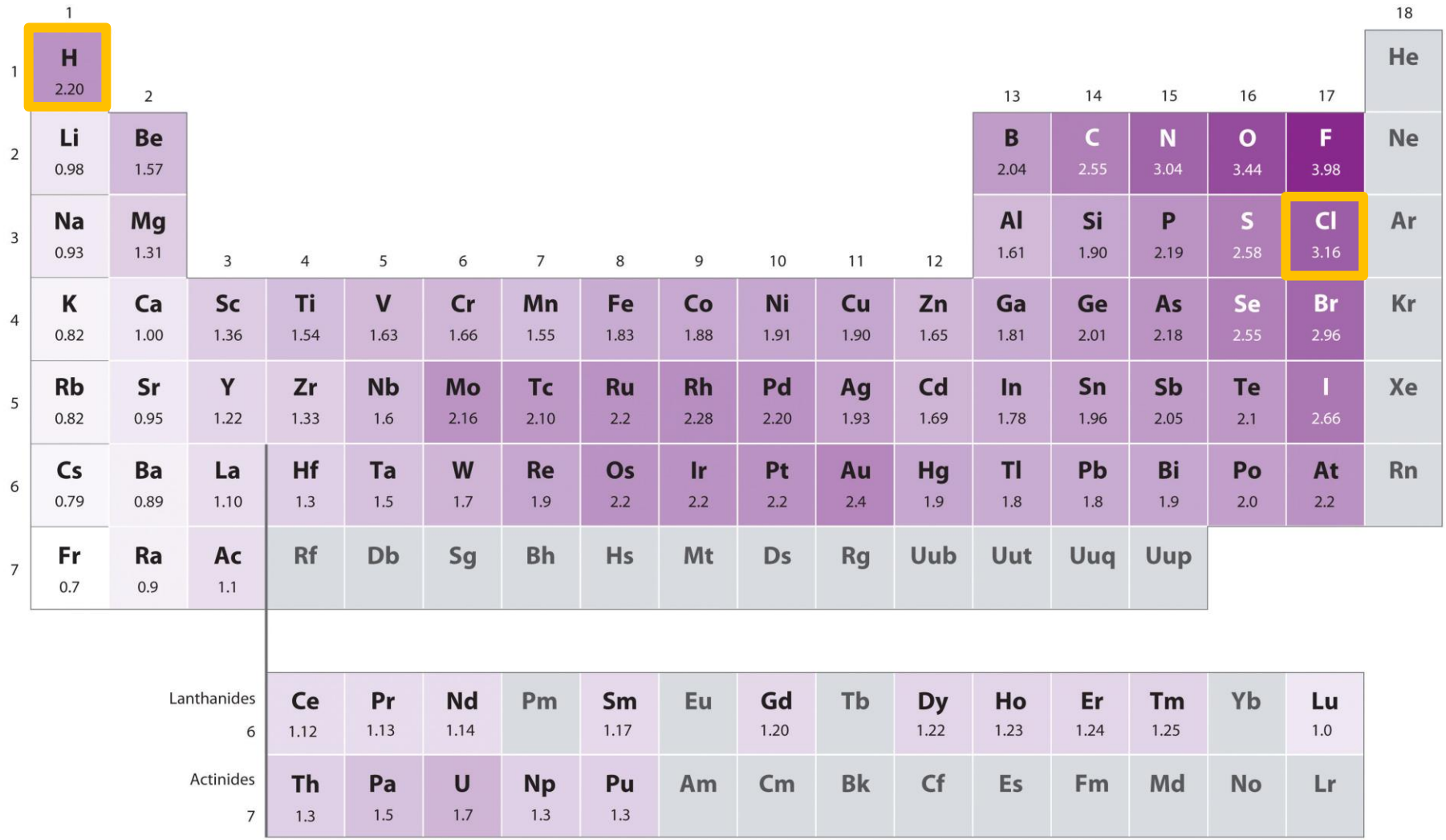
Recall: Periodic Trends



Electronegativity Trend

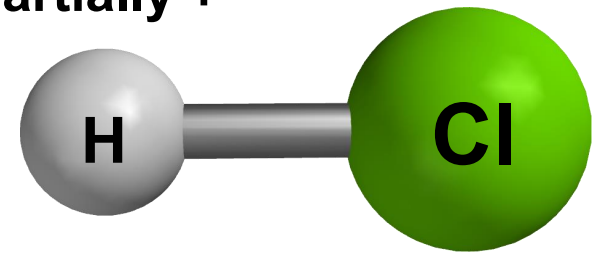


Pauling Scale of Electronegativity



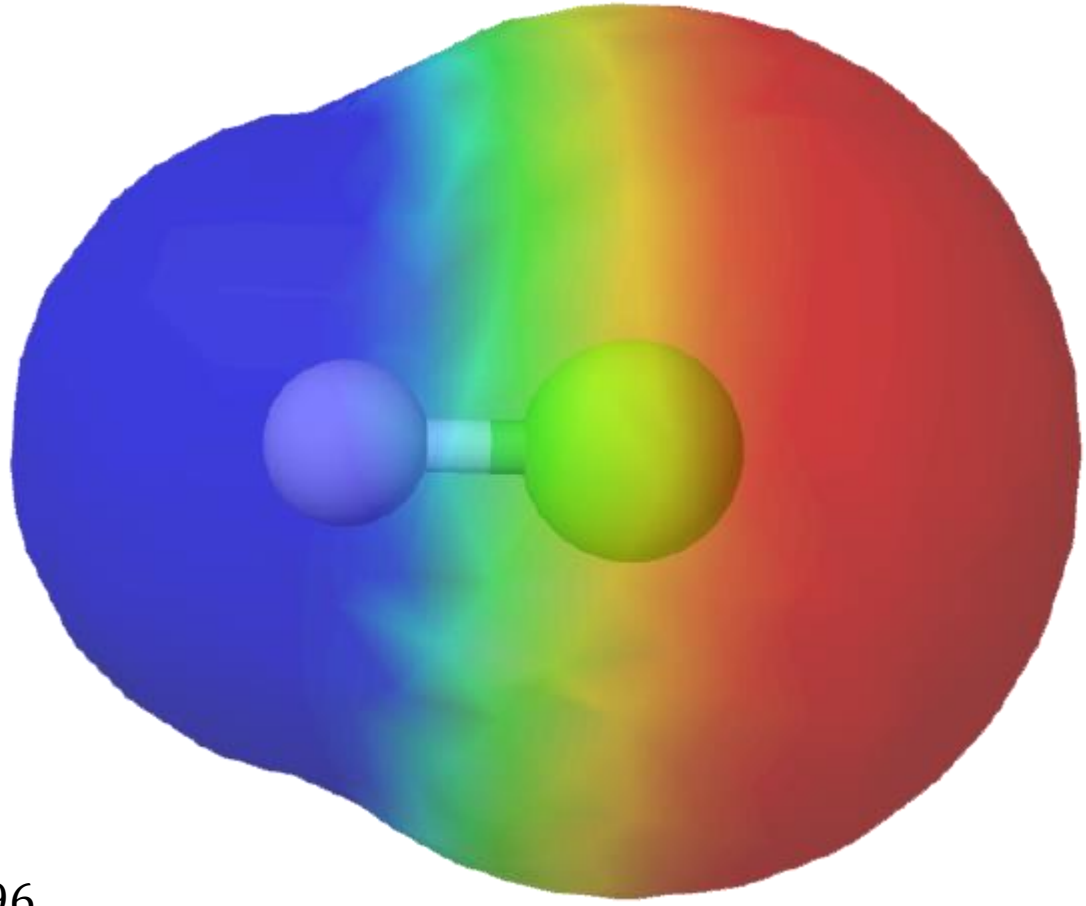
Partially +

Partially –



2.20 3.16

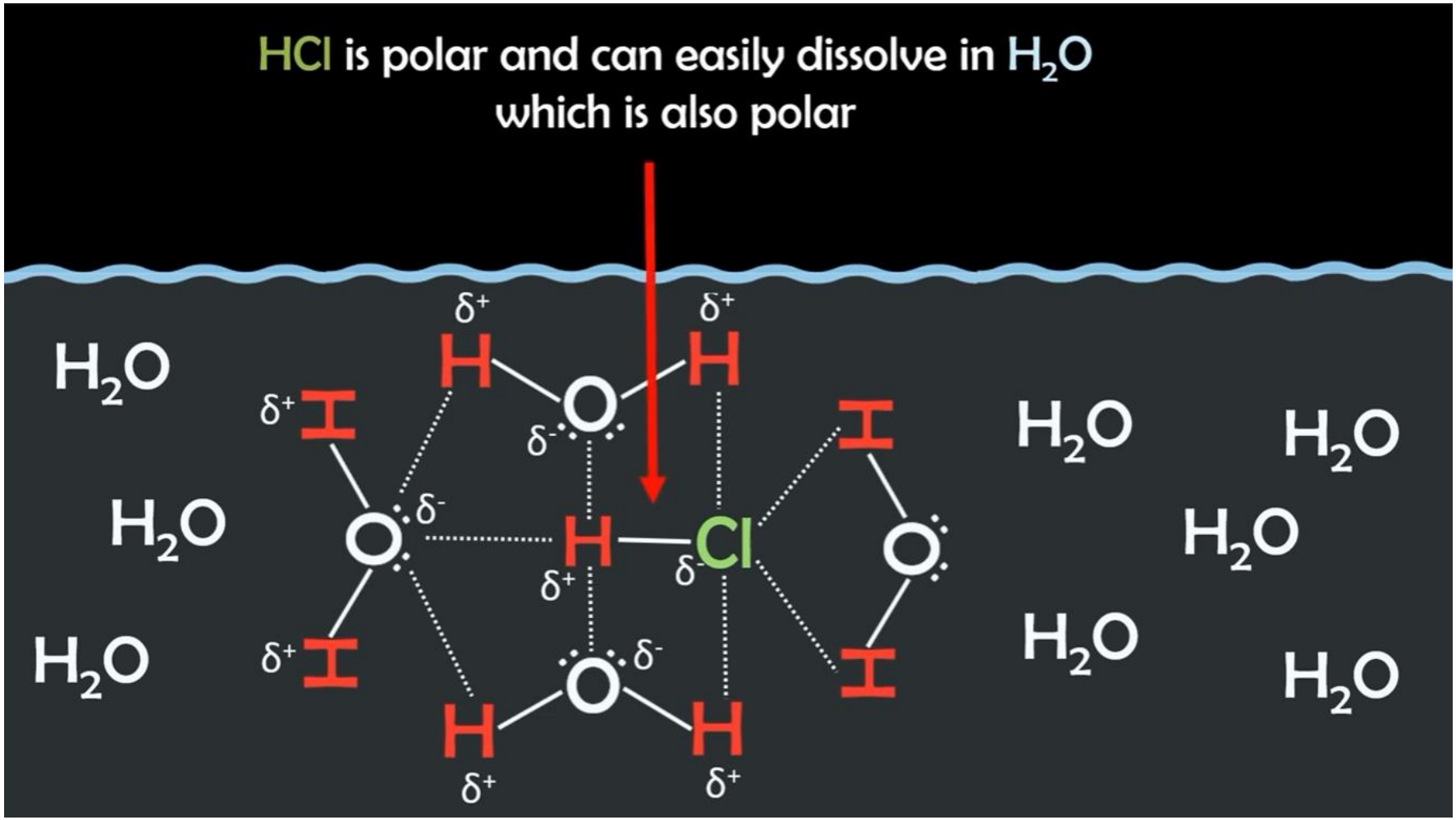
Electron Density Map



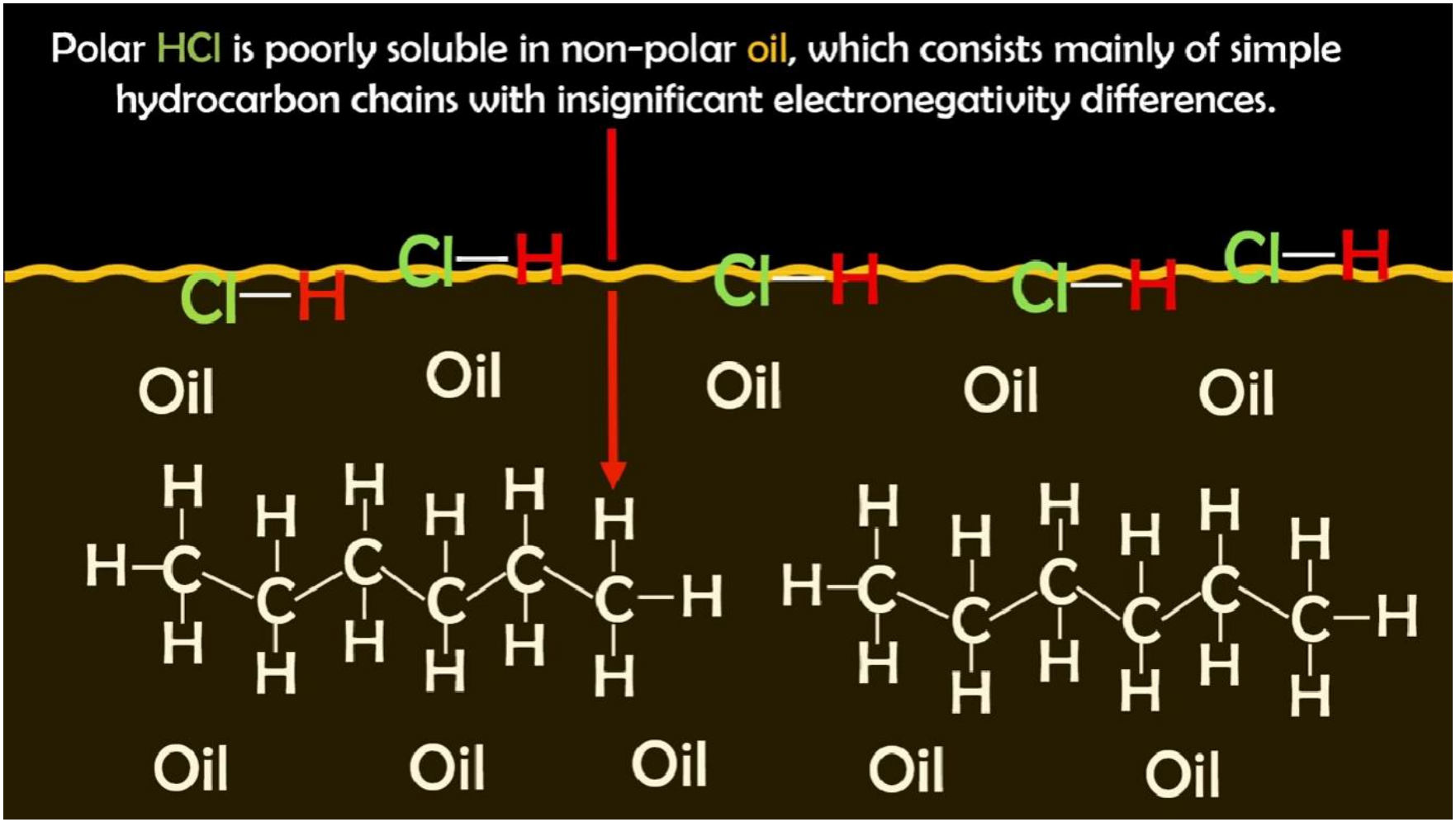
To calculate the degree of polarity

$$\Delta\chi = |\chi_{Cl} - \chi_H| = |3.16 - 2.20| = 0.96$$

Implications of polarity



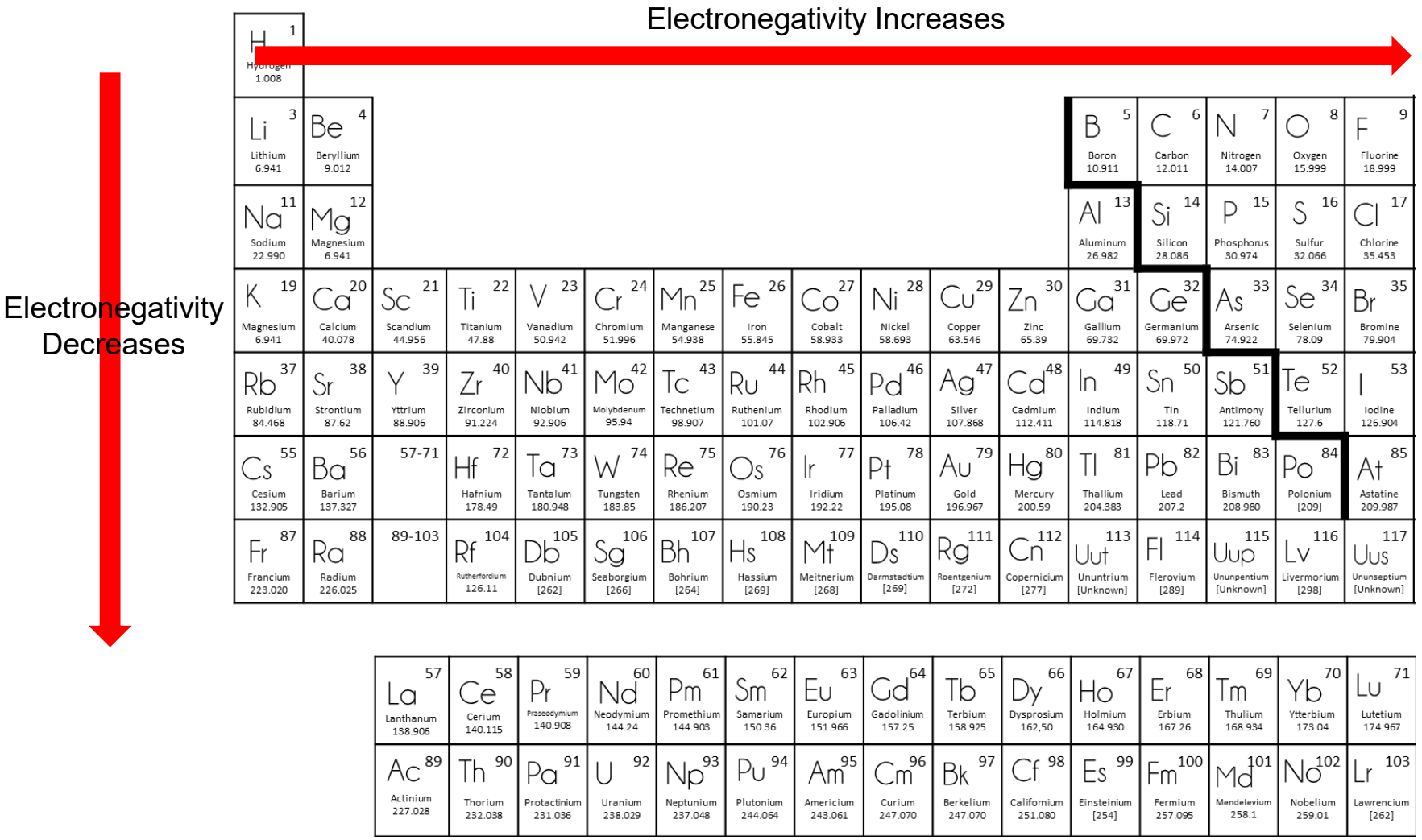
Implications of polarity

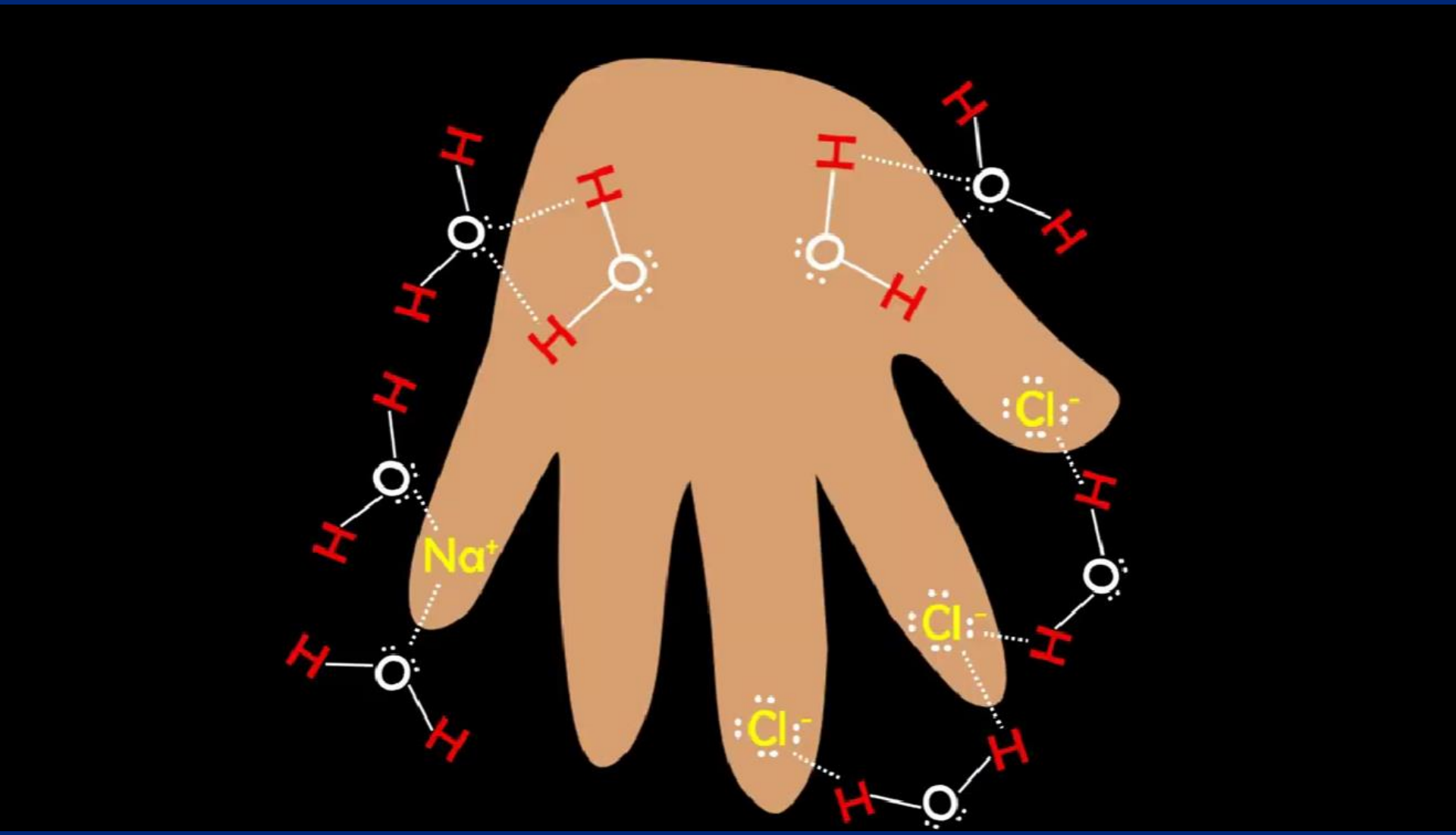


Is water sticky?....yes, but why?

Using the concepts we have just discussed,
explain at an atomic or molecular level
why water "sticks" to my hand?

Electronegativity Trend




Na+
Cl-
Cl-
Cl-

Follow-Up Questions

“What makes water polar molecule?”

“Why is oxygen more electronegative than hydrogen?”