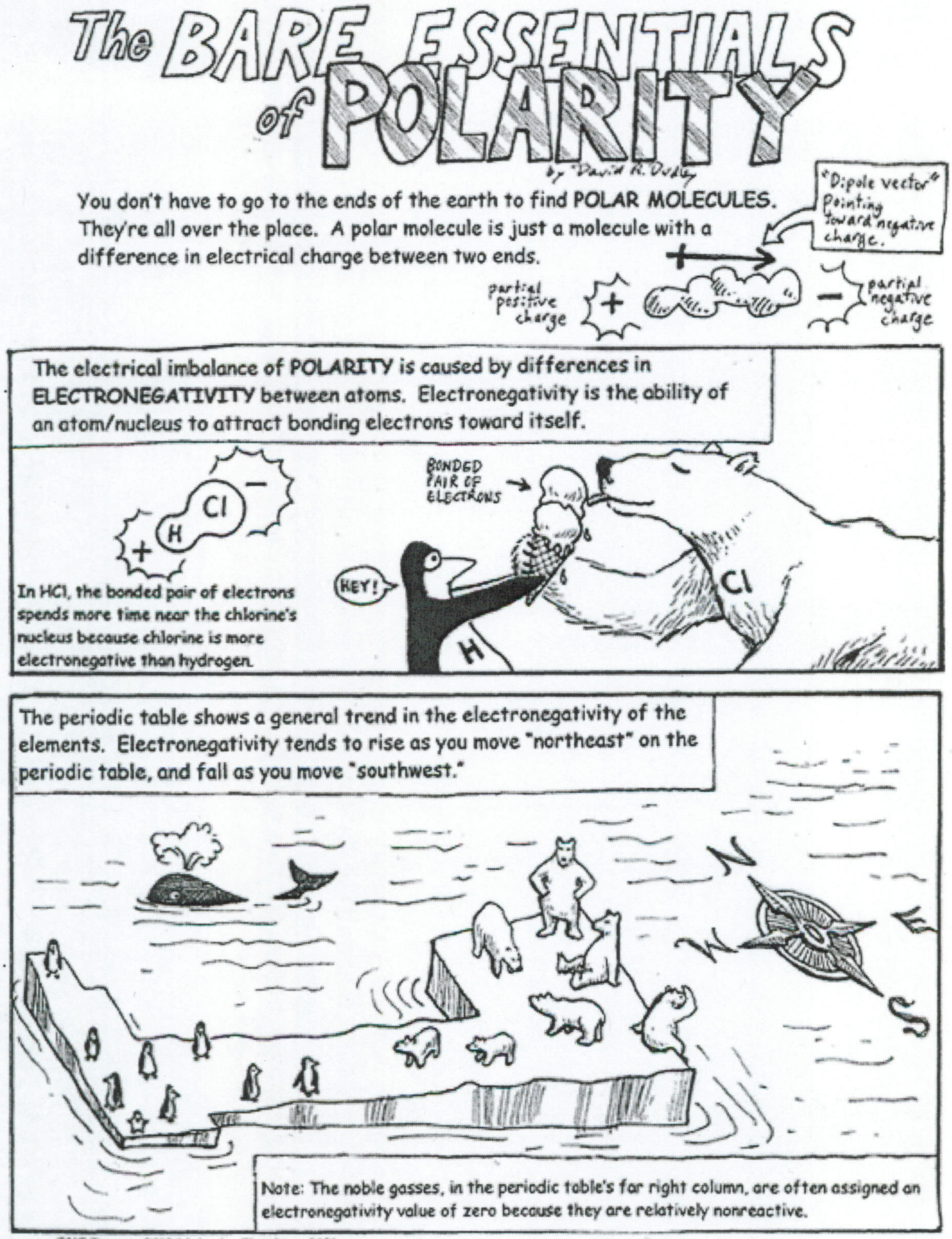
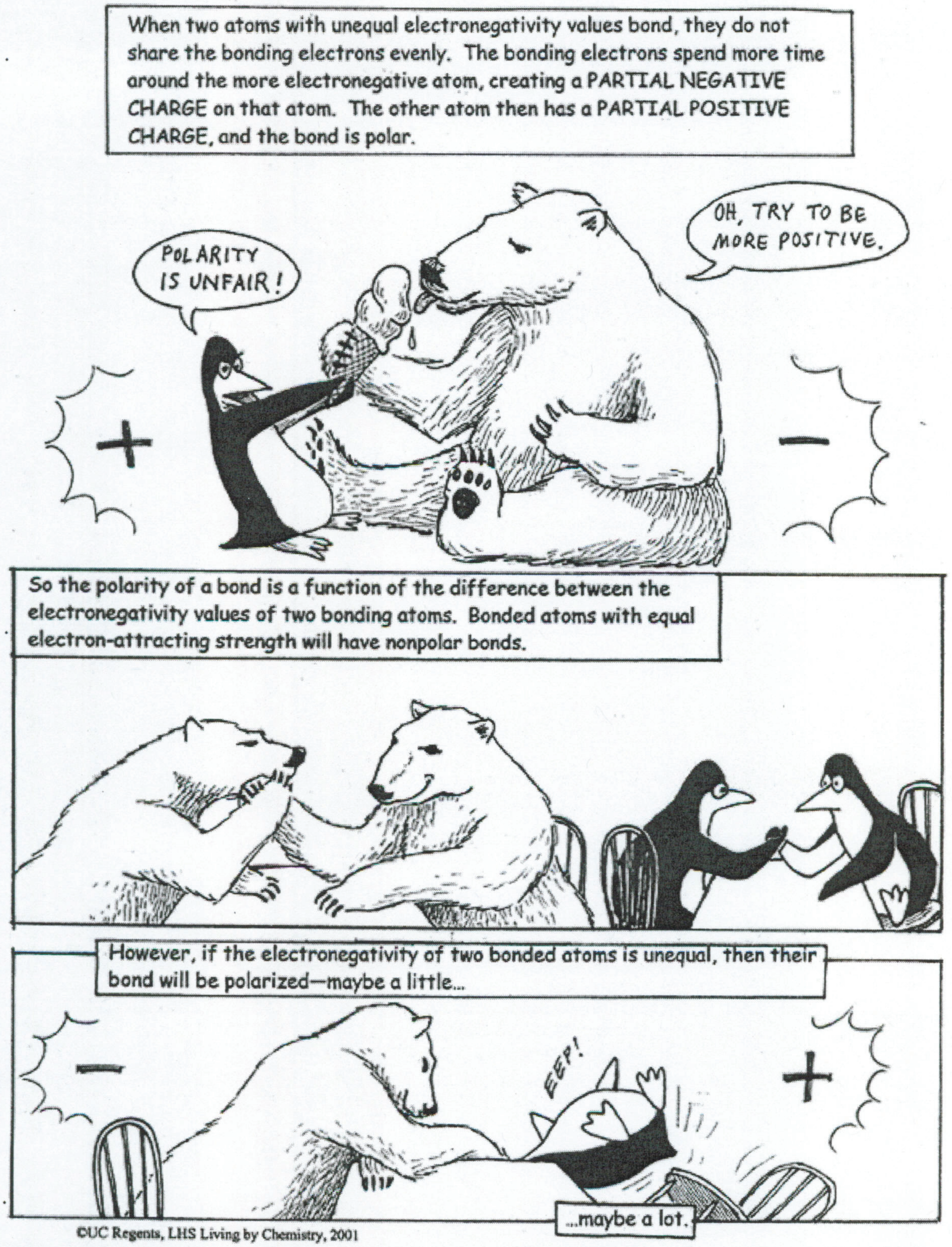

The BARE ESSENTIALS of POLARITY
You don't have to go to the ends of the earth to find POLAR MOLECULES. They're all over the place. A polar molecule is just a molecule with a difference in electrical charge between two ends.
"Dipole vector" Pointing toward negative charge.
partial positive charge
+
−
partial negative charge
The electrical imbalance of POLARITY is caused by differences in ELECTRONEGATIVITY between atoms. Electronegativity is the ability of an atom/nucleus to attract bonding electrons toward itself.
Cl
H
+
−
BONDED PAIR OF ELECTRONS
HEY!
Cl
H
In HCl, the bonded pair of electrons spends more time near the chlorine's nucleus because chlorine is more electronegative than hydrogen.
The periodic table shows a general trend in the electronegativity of the elements. Electronegativity tends to rise as you move "northeast" on the periodic table, and fall as you move "southwest."
N
E
W
S
Note: The noble gasses, in the periodic table's far right column, are often assigned an electronegativity value of zero because they are relatively nonreactive.


When two atoms with unequal electronegativity values bond, they do not share the bonding electrons evenly. The bonding electrons spend more time around the more electronegative atom, creating a PARTIAL NEGATIVE CHARGE on that atom. The other atom then has a PARTIAL POSITIVE CHARGE, and the bond is polar.
POLARITY IS UNFAIR!
OH, TRY TO BE MORE POSITIVE.
+
−
So the polarity of a bond is a function of the difference between the electronegativity values of two bonding atoms. Bonded atoms with equal electron-attracting strength will have nonpolar bonds.
However, if the electronegativity of two bonded atoms is unequal, then their bond will be polarized—maybe a little...
−
EEP!
+
...maybe a lot.
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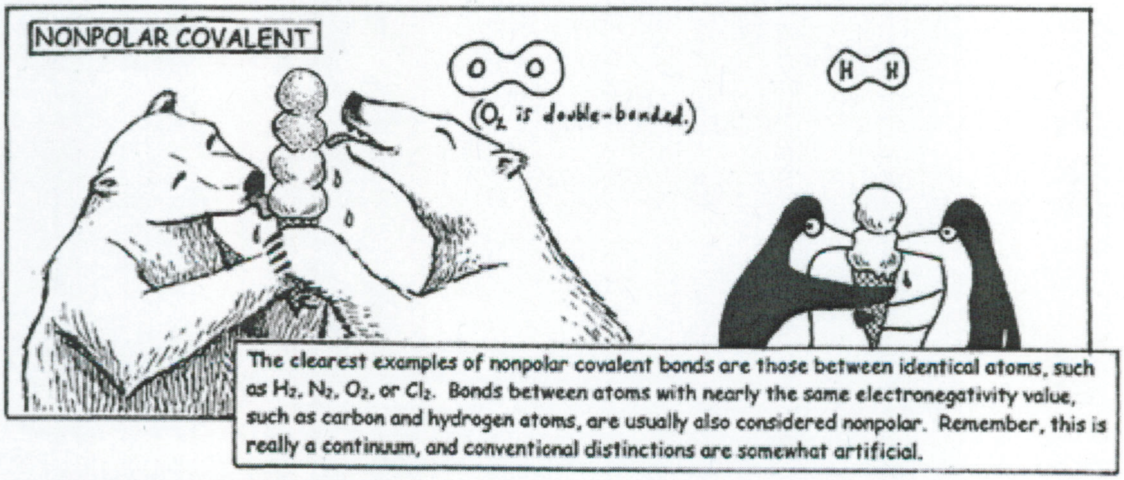
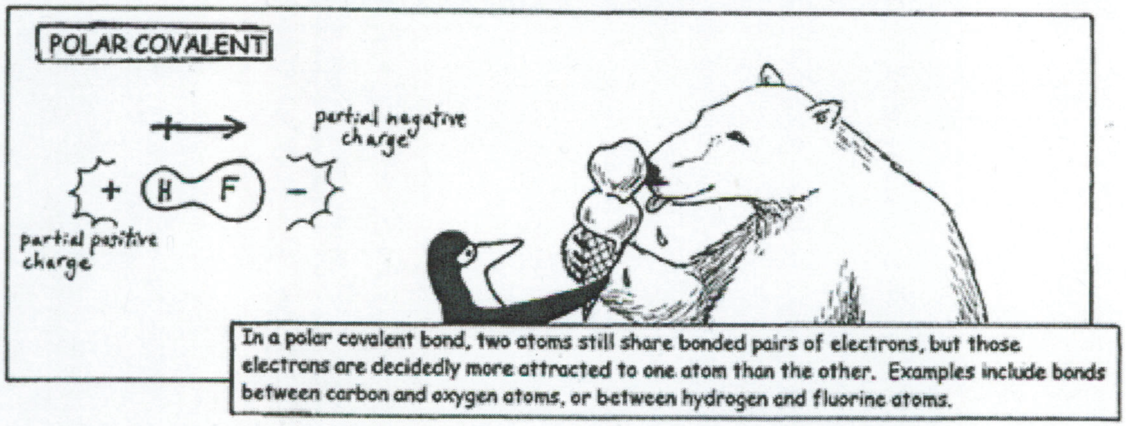
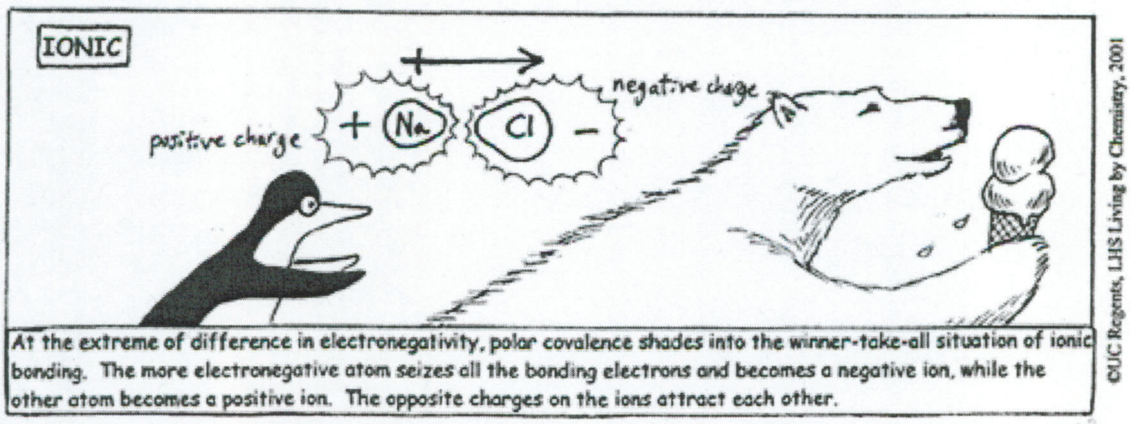
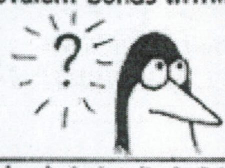
Because the elements have such varying electronegativities and can come together in so many different combinations, there is really a **CONTINUUM OF POLARITY IN BONDING.** For convenience, we can break the continuum down into three categories: (1) nonpolar covalent, (2) polar covalent, and (3) ionic.



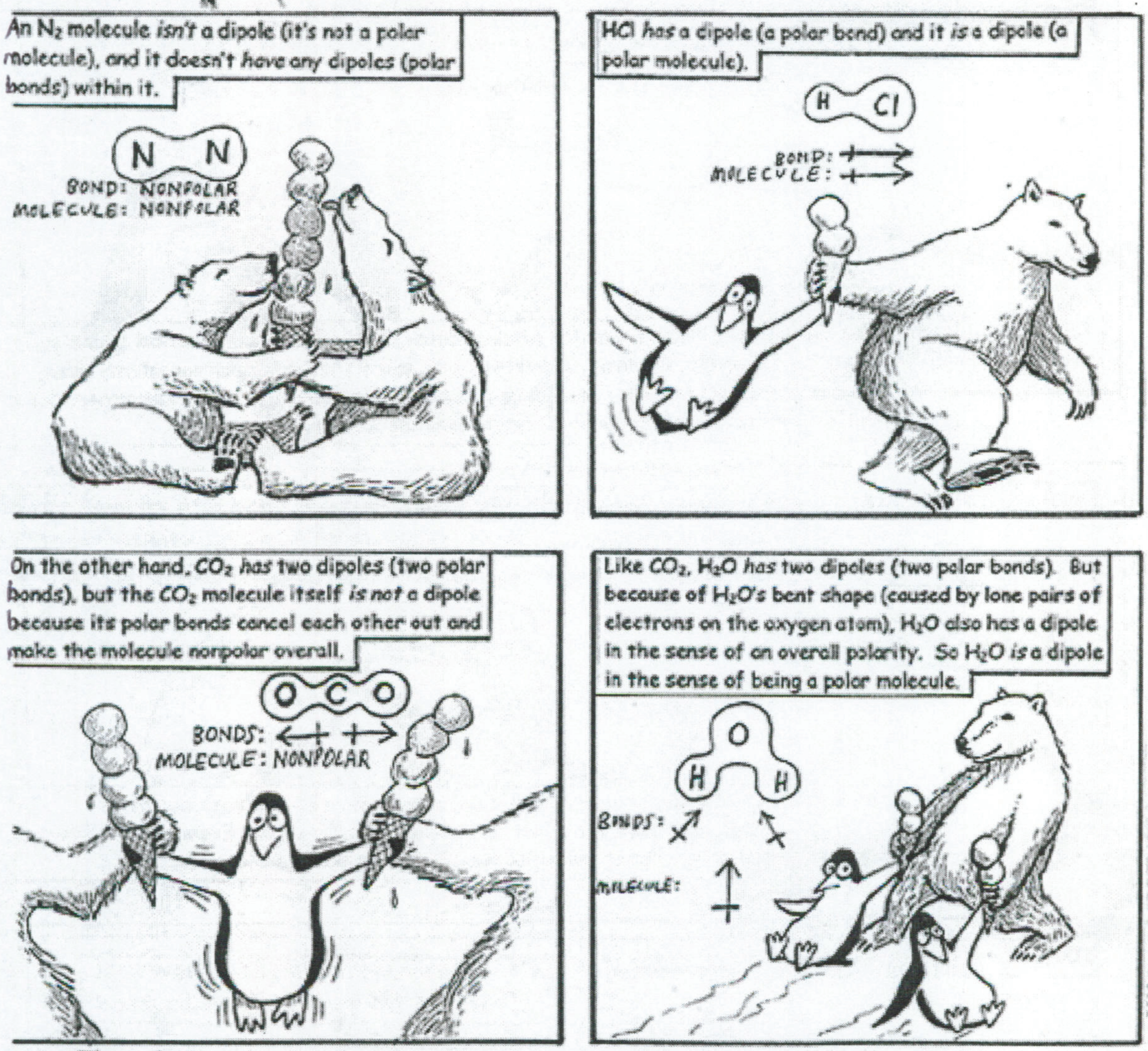




Polar bonds between atoms constitute **DIPOLES.** Actually, the word "dipole" can refer to several different things that are relevant here: (1) the polarity of an individual polar bond between atoms, (2) the net polarity of a polar molecule that may have several polar covalent bonds within it, and (3) the polar molecule itself.



Confusing? Let's look at some examples:



The polarity of molecules can affect many of their other properties, such as their solubility, their boiling and melting points, and their odor.