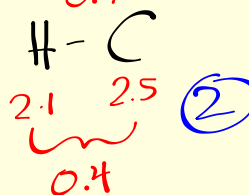
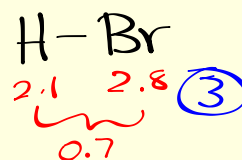
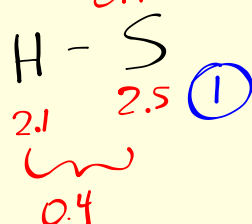
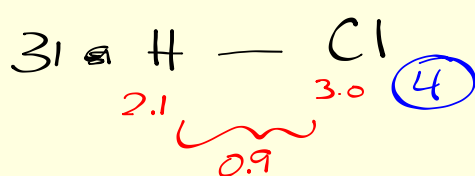
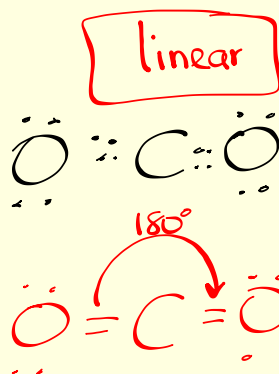
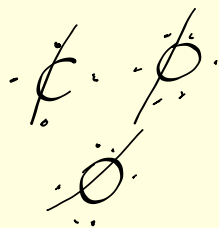
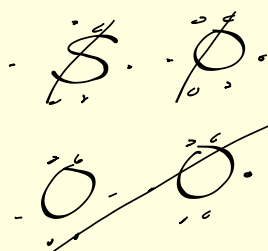
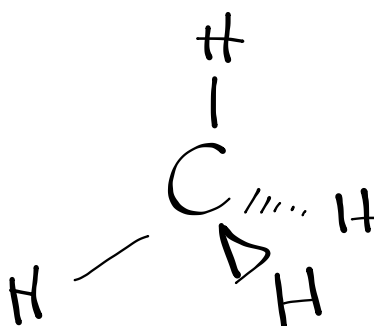
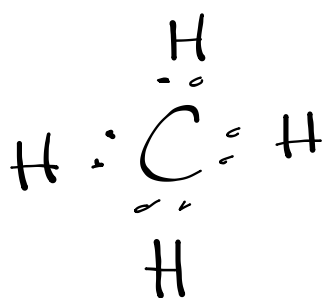
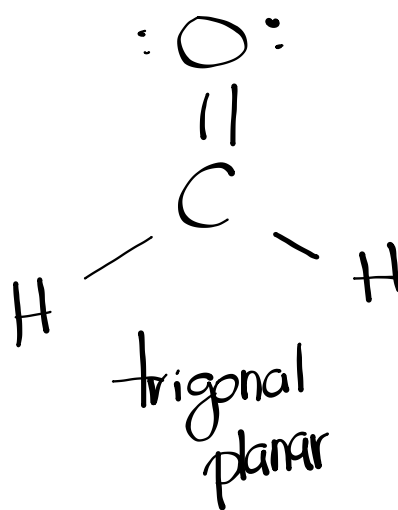


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#30, 31

31 a) H and Br

54. a) CO<sub>2</sub>c) SO<sub>3</sub>



## Attraction Between Molecules

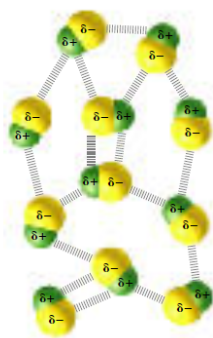
Intermolecular forces are weaker than both ionic and covalent bonds.

### Van der Waals Forces

- Weakest attractions between molecules.
- Can be separated into two categories:

### Dipole Interactions

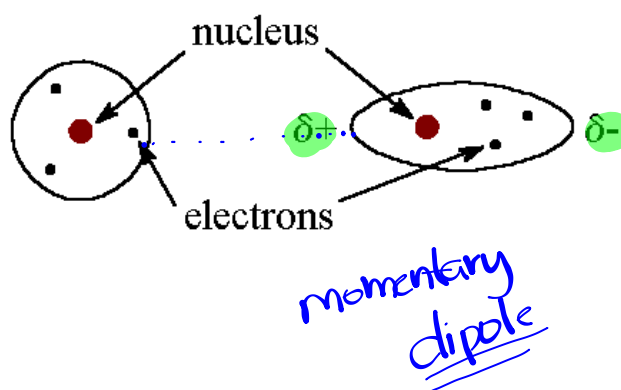
Electrical attraction between oppositely charged regions of polar molecules.

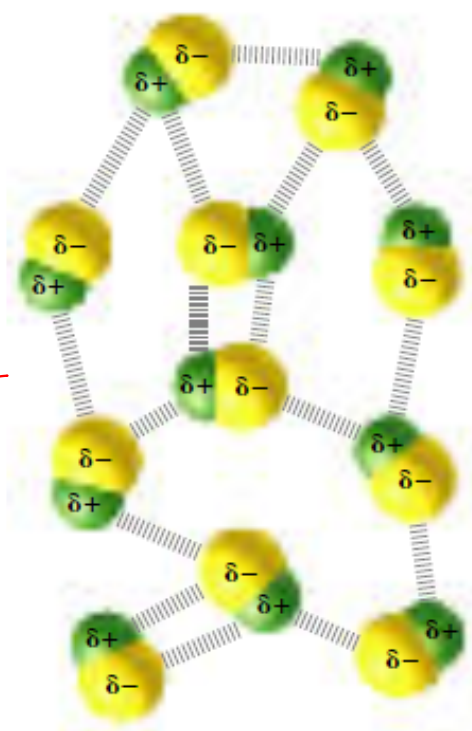
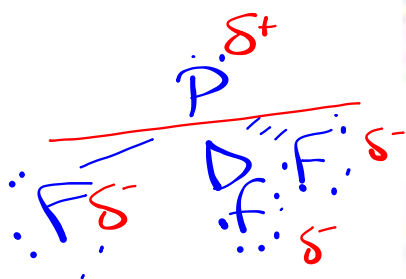


### Dispersion Forces (London Dispersion Forces)

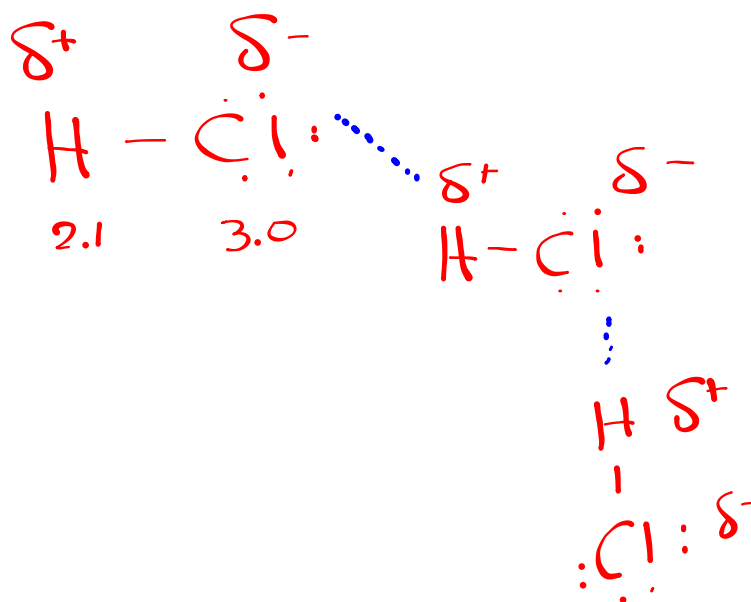
- weakest of all molecular interactions
- occur between even **non-polar** molecules
- caused by the motion of electrons

when moving electrons are momentarily on one side of a molecule, the electrons of the neighbouring molecule will move to the opposite side, causing a weak attraction.

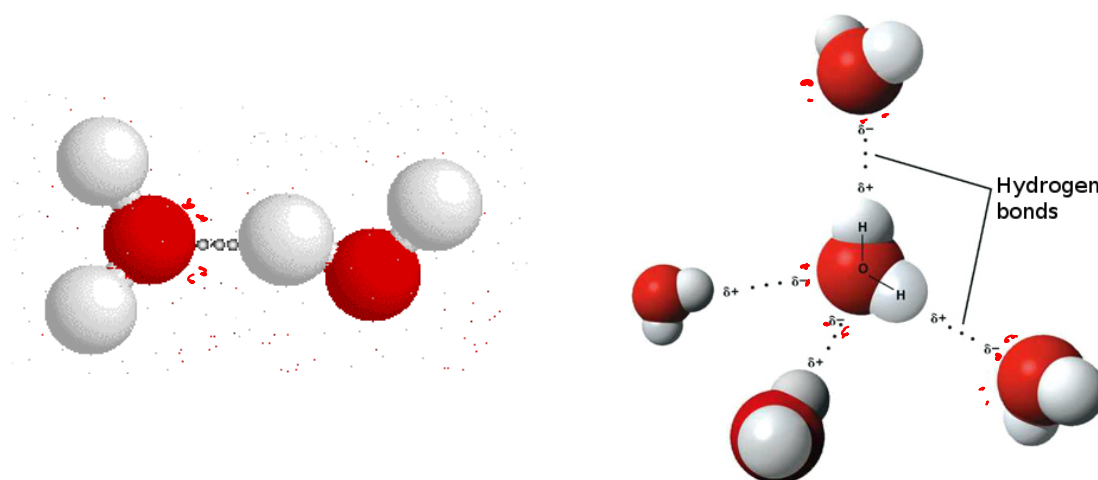




Polar  
 $\epsilon$   
Polar



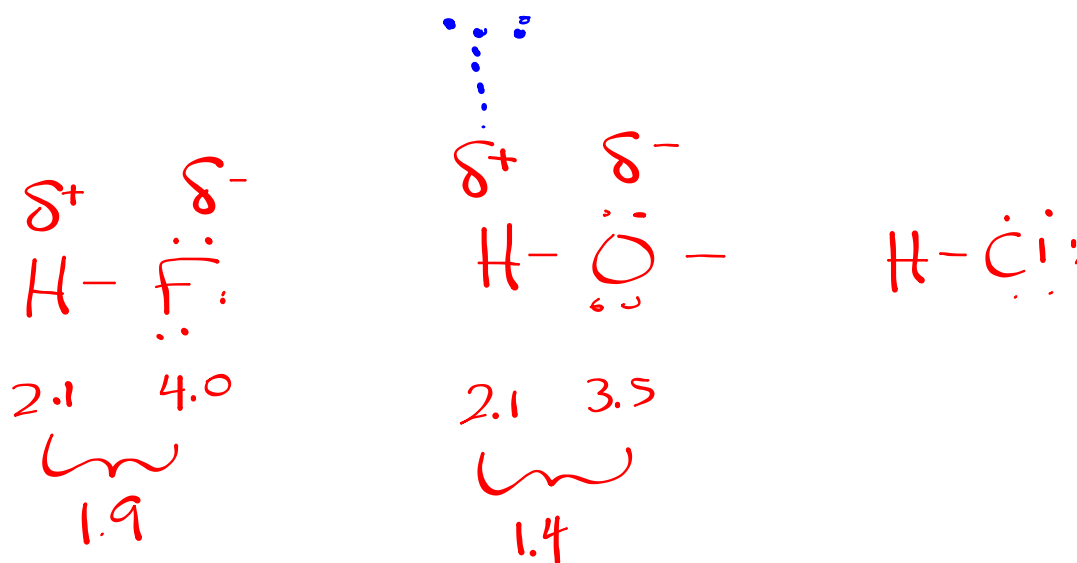
## Hydrogen Bonds

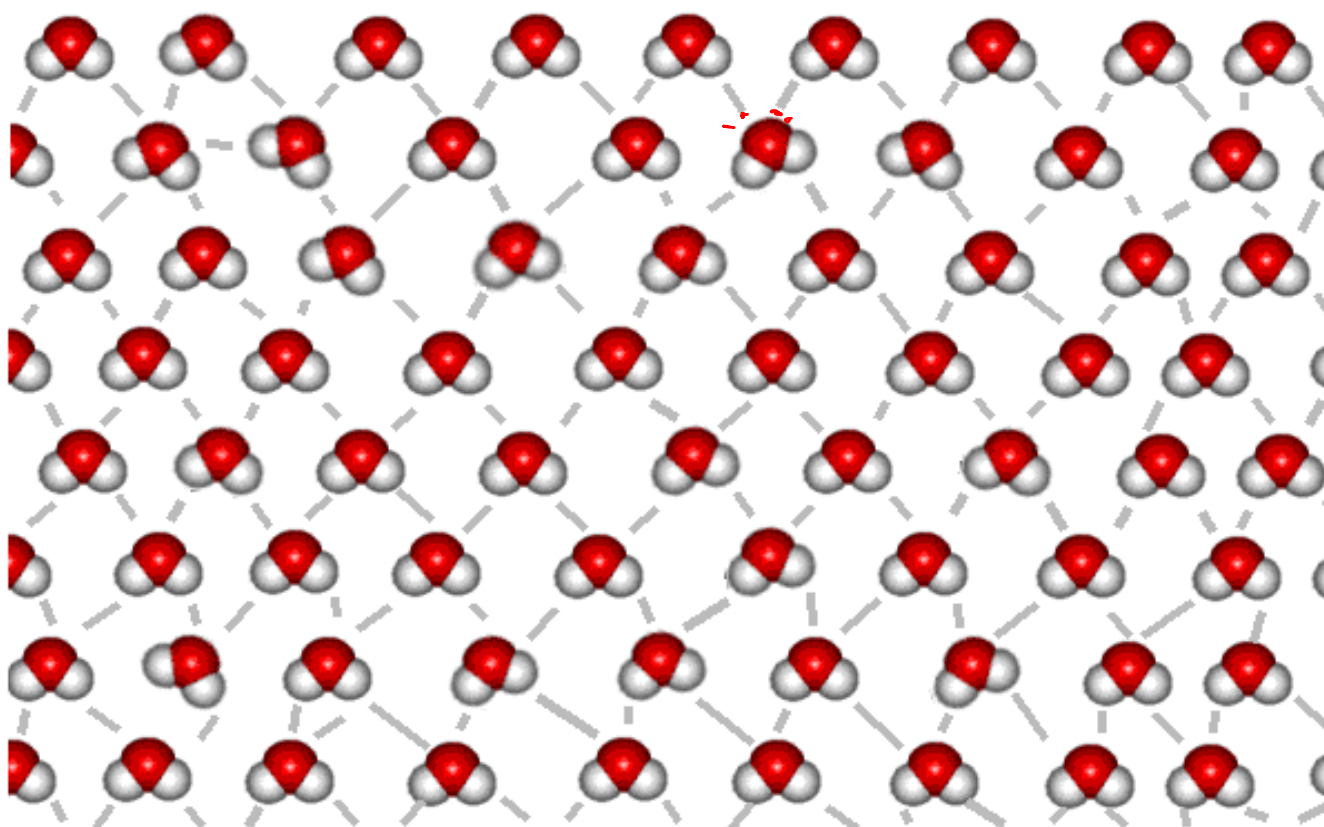


### Hydrogen Bonds

Strong attractive forces in which a hydrogen covalently bonded to a very electronegative atom (O, N, F), is weakly bonded to an unshared electron pair of another electronegative atom.

- strongest intermolecular force
- not as strong as an ionic or covalent bond







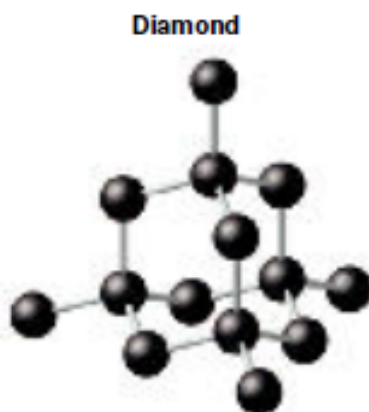
## Hydrogen Bonding in Water

- Hydrogen bonding causes many molecules to be attracted, meaning  $\text{H}_2\text{O}$  is very dense.
- High density results in water being a liquid at room temperature. Requires a great deal of energy to separate the particles and disrupt the attraction.

## Network Solids

solids in which all of the atoms are covalently bonded to each other

- very stable substances with very high melting and boiling point
- melting requires breaking covalent bonds throughout the solid



# Homework

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