"Hydrogen Bonding"

EFFECT OF HYDROGEN BONDING ON IR

Proton Donor Group (S-Orbital)

Proton Acceptor Group (P-Orbital)

Hydrogen Bonding

EXAMPLES OF PROTON DONOR AND PROTON ACCEPTOR GROUP

Proton Donor Group

Carboxyl, Hydroxyl, Amine Or Amide Group

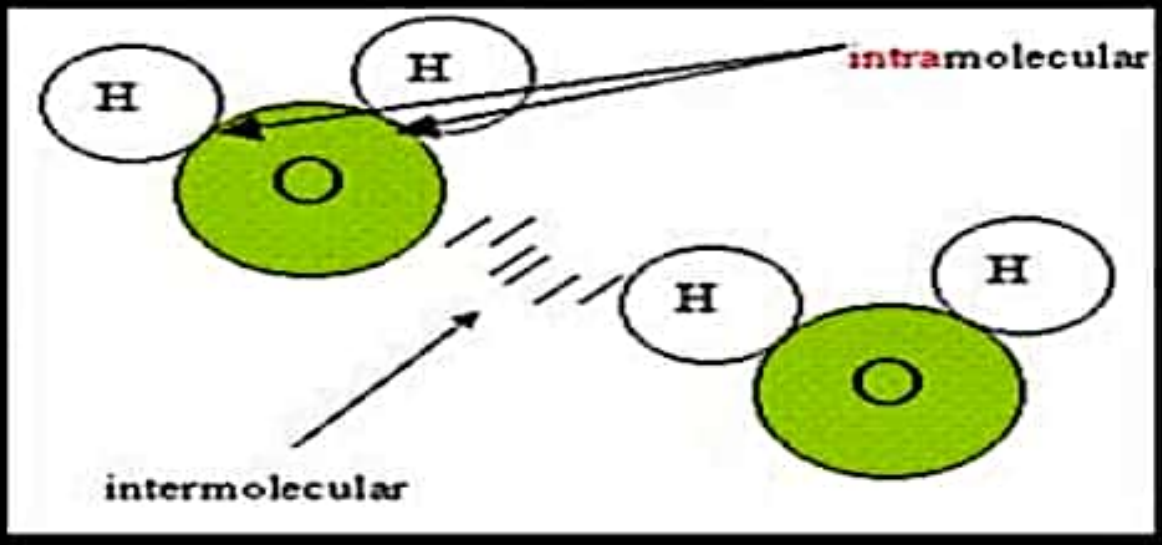
Proton Acceptor Group

Oxygen, Nitrogen, Halogens And Unsaturated Group

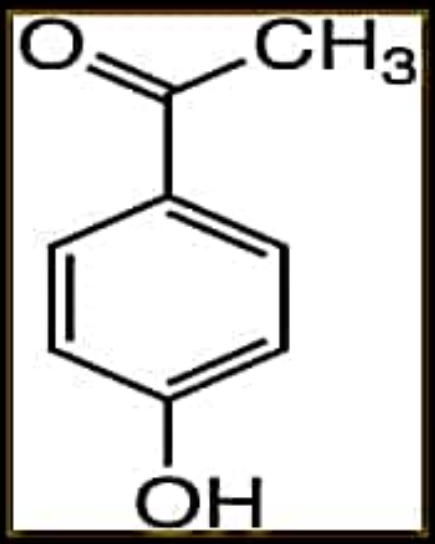
TYPES OF HYDROGEN BONDING

1-Intermolecular Hydrogen Bonding

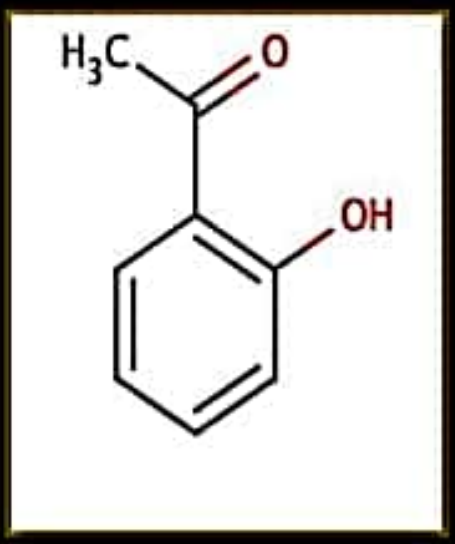
2-Intramolecular Hydrogen Bonding



STRENGTH OF HYDROGEN BONDING



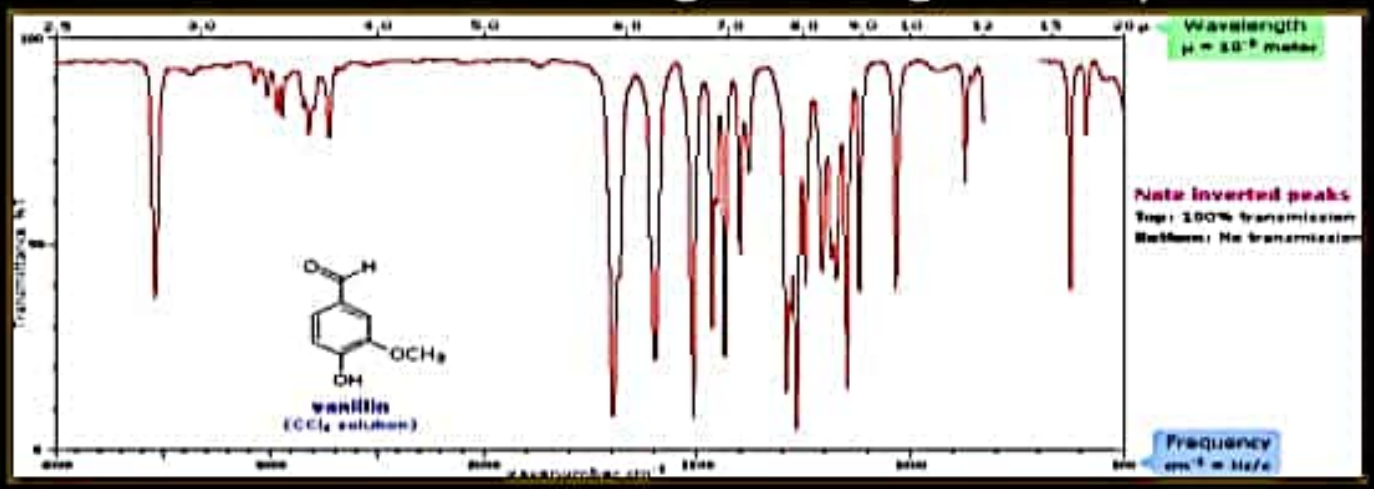
P-Hydroxyacetophenone



o-Hydroxyacetophenone

WHY HYDROGEN BOND ALTERS THE FORCE CONSTANT???

Stretching bands move towards longer wavelength or lower frequencies And Bending vibrations shift towards Shorter wavelength or Higher frequencies.



Bending vibrations

Stretching vibrations

FACTORS AFFECTING ON HYDROGEN BONDING

- ✓ *Temperature*
- ✓ *Concentration*
- ✓ *Molecular Geometry*
- ✓ *Relative Acidity*
- ✓ *Basicity*

INSTRUMENTATION

The main parts of IR spectrometer are as follows:

- *radiation source*
- *sample cells and sampling of substances*
- *monochromators*
- *detectors*
- *recorder*

INFRARED SOURCES

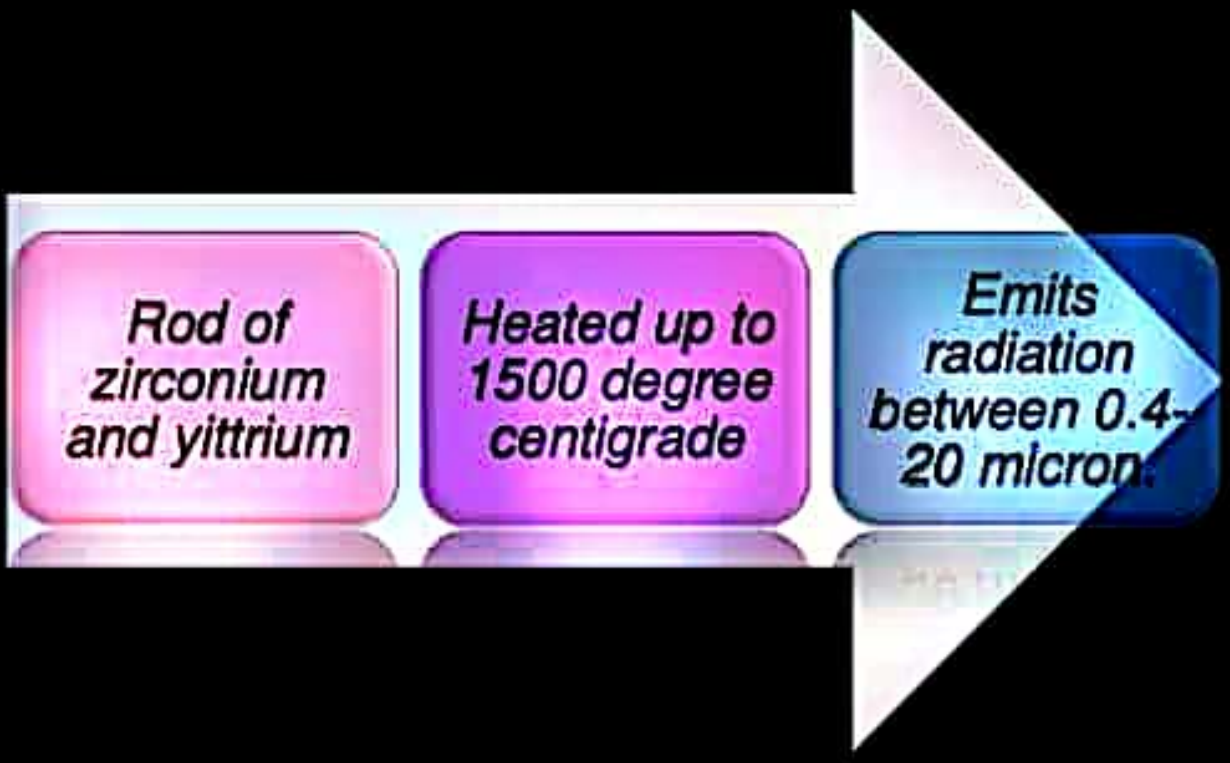
IR instruments require a source of radiant energy which emit IR radiation which must be:

Another technique is to ground a milligram or less of the sample with about 100 milligram potassium bromide. The mixture is then pressed in an evaluable die to produce a transparent disk.

- **For solid sample:**

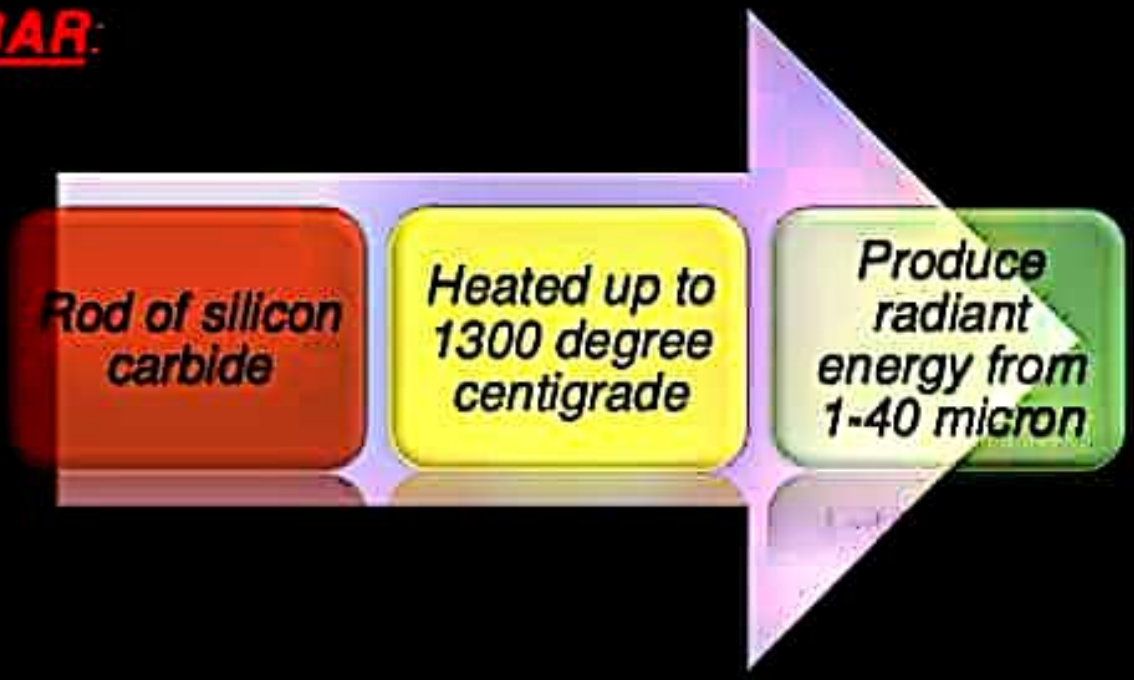
Solids reduced to small particles (less than 2 micron) can be examined as a thin paste or mull. The mull is formed by grinding a 2-5 milligrams of the sample in the presence of one or two drops of a hydrocarbon oil (nujol oil). The resulting mull is then examined as a film between flat salt plates.

- **NERNST GLOWER:**



Sources of IR radiations are as follows:

GLOBAR:



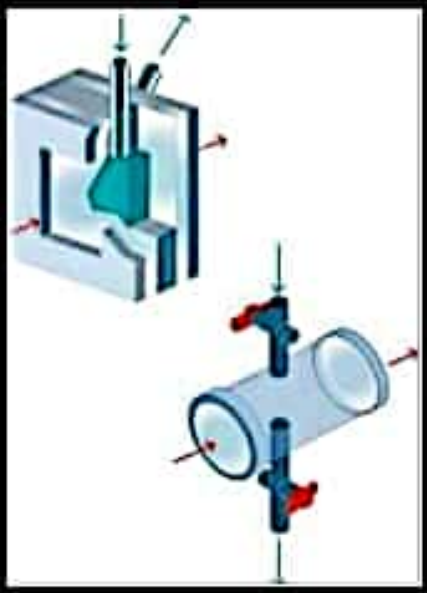
SAMPLE CELL

- **For gas samples:**

The spectrum of a gas can be obtained by permitting the sample to expand into an evacuated cell, also called a cuvette.

- **For solution sample:**

Infrared solution cells consists of two windows of pressed salt sealed. Samples that are liquid at
room temperature are usually analyzed in pure form or in solution. The most common solvents are
Carbon Tetrachloride (CCl_4) and Carbon Disulfide
(CS_2).



MONOCHROMATORS