Class 7

CH 827

November 5, 2020

* α-helix, β-sheet & random coil } secondary protein structures

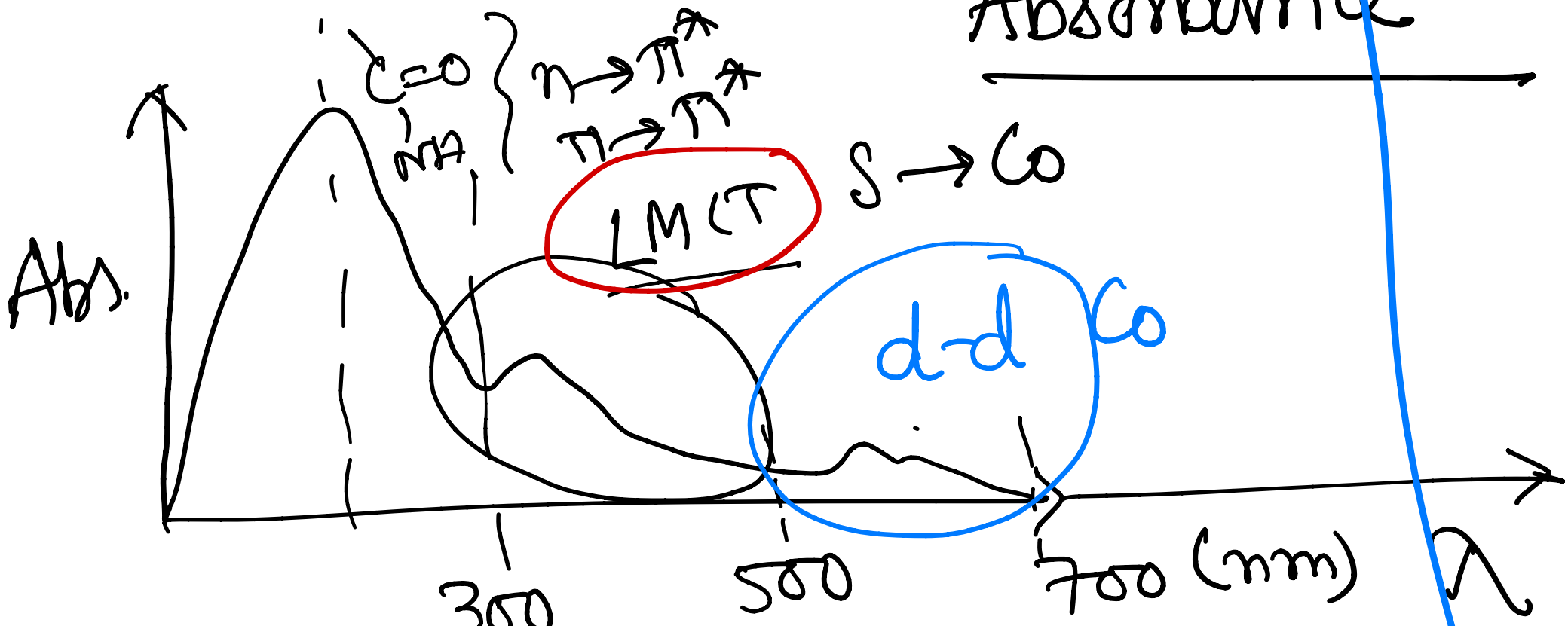
⟹ via CD spectroscopy

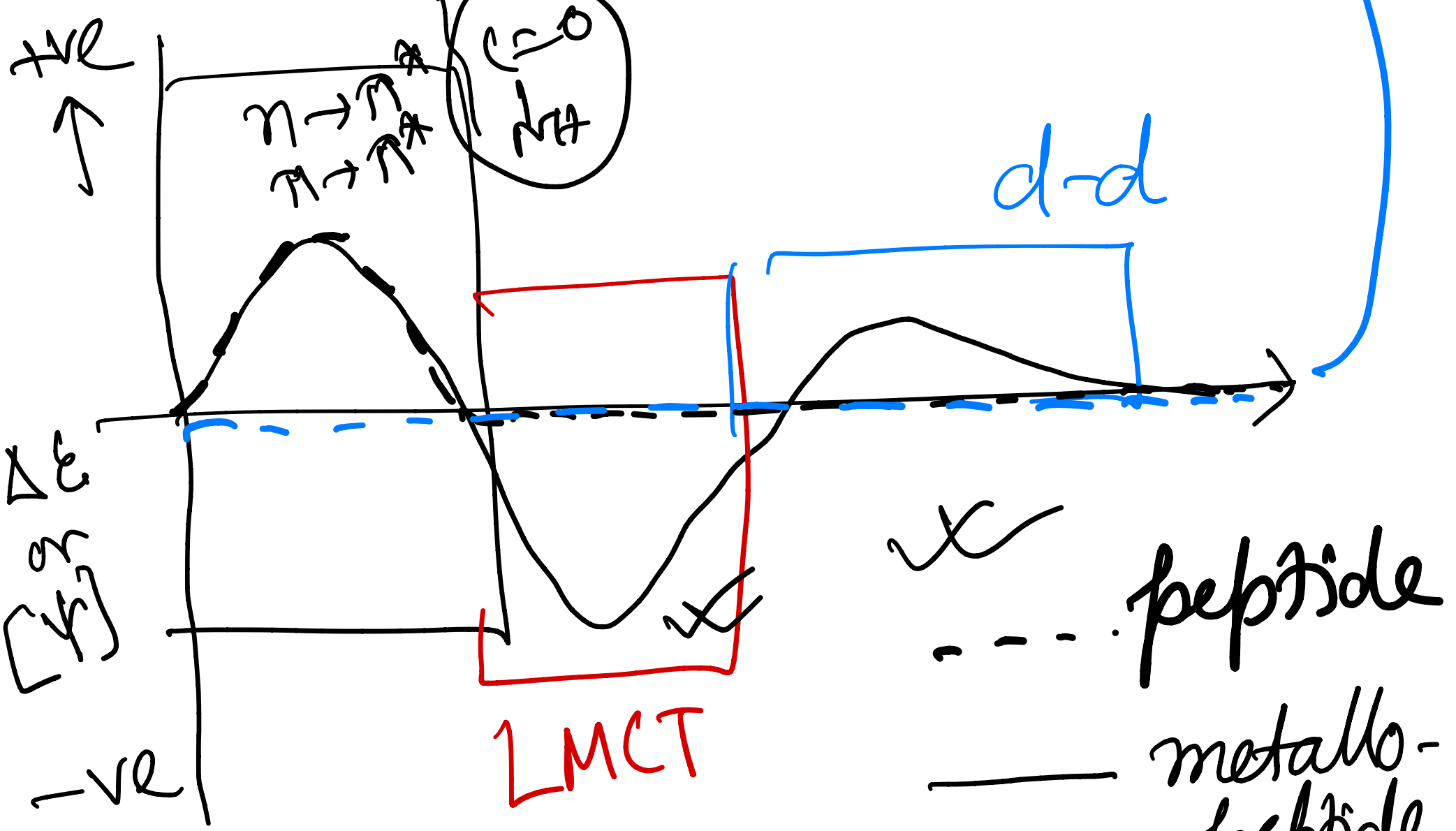
* secondary structural determination / som.
* dynamic picture
  → denaturation of protein
  → melting curve of protein
* induced chirality
* metallopeptide / protein
  → CD active / LMCT / d-d transition band region
  metal-based absorbance

metallopeptide

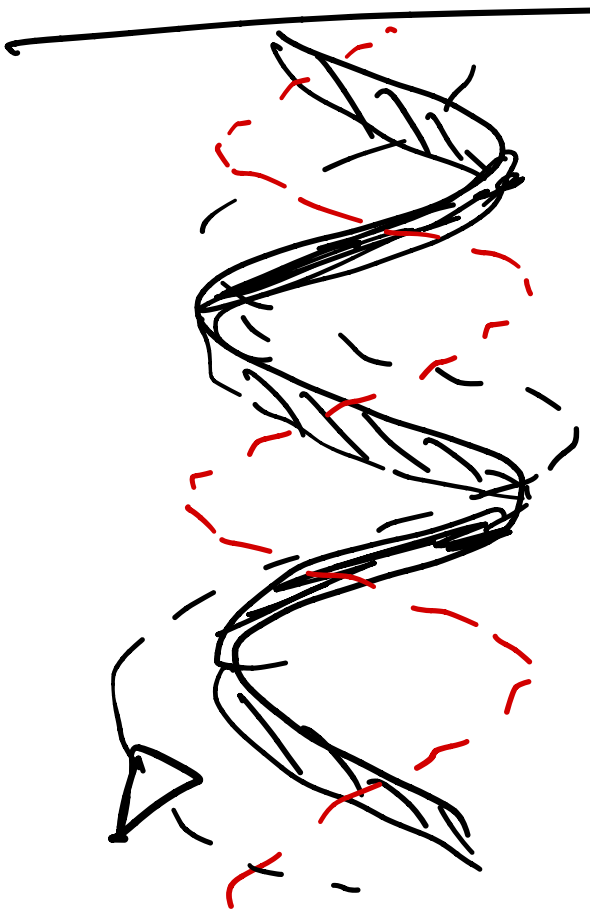
ACDLPCG

Absorbance





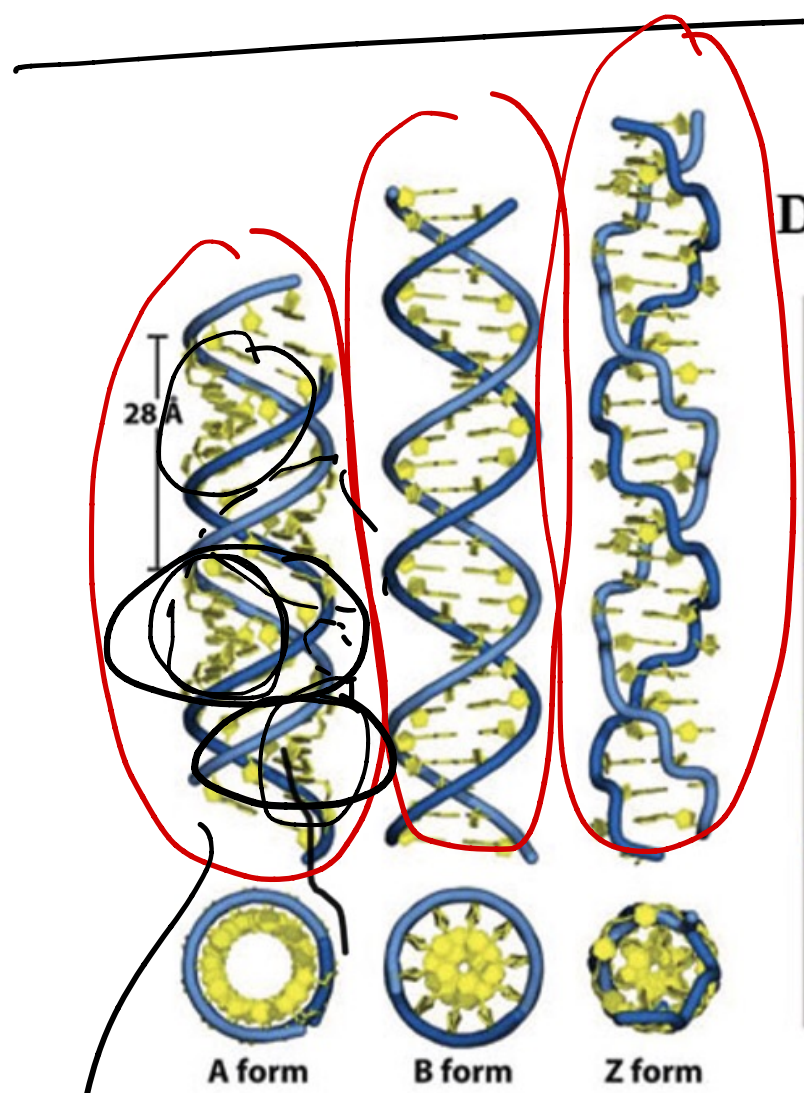
DNA- based molecules via CD

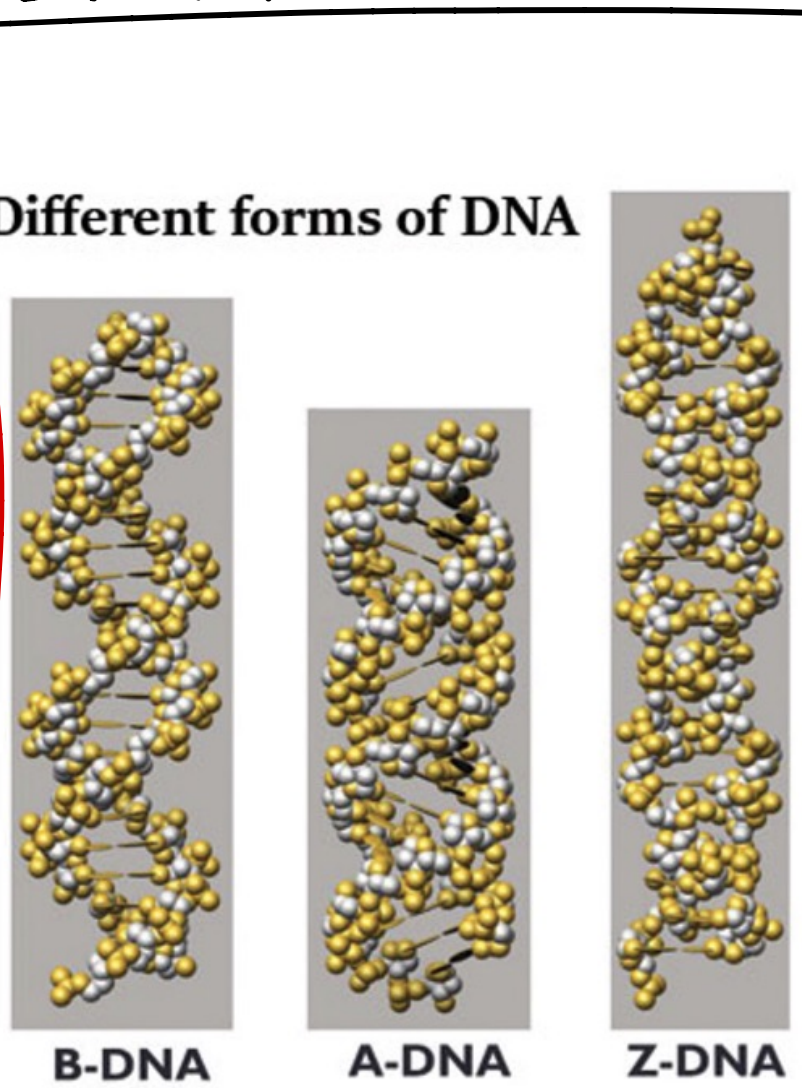


single-strand DNA (ss-DNA)

double-strand DNA (ds-DNA)

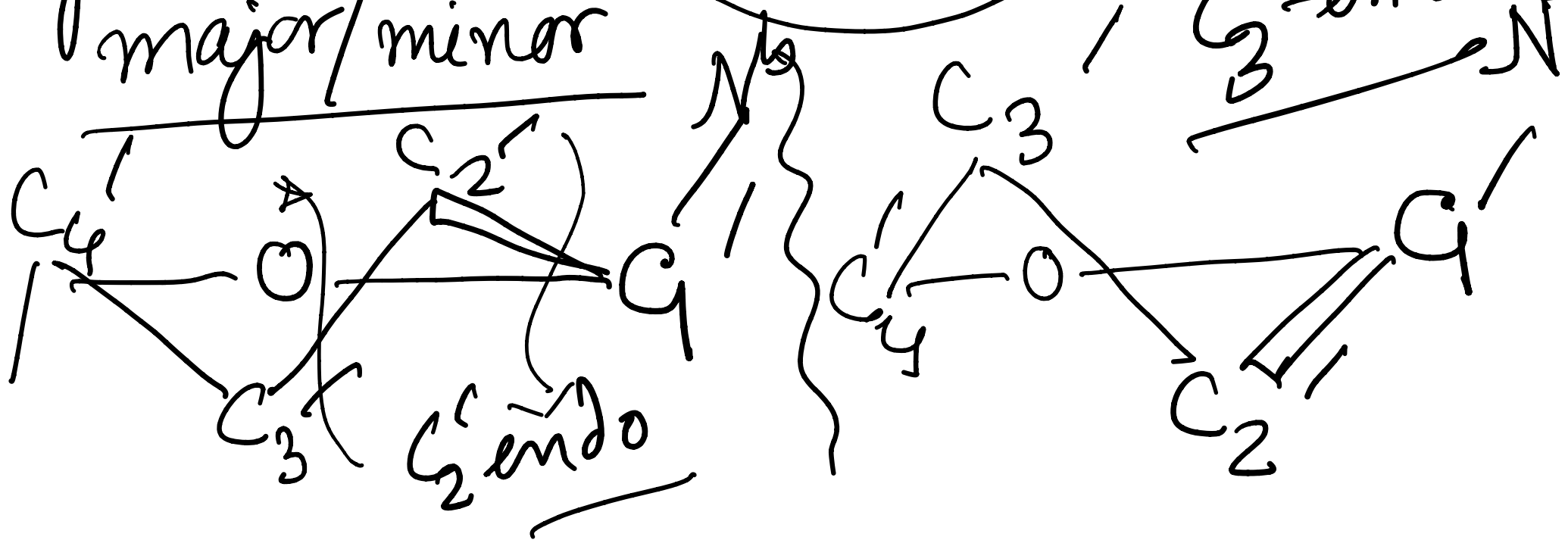
DNA





groove

major/minor

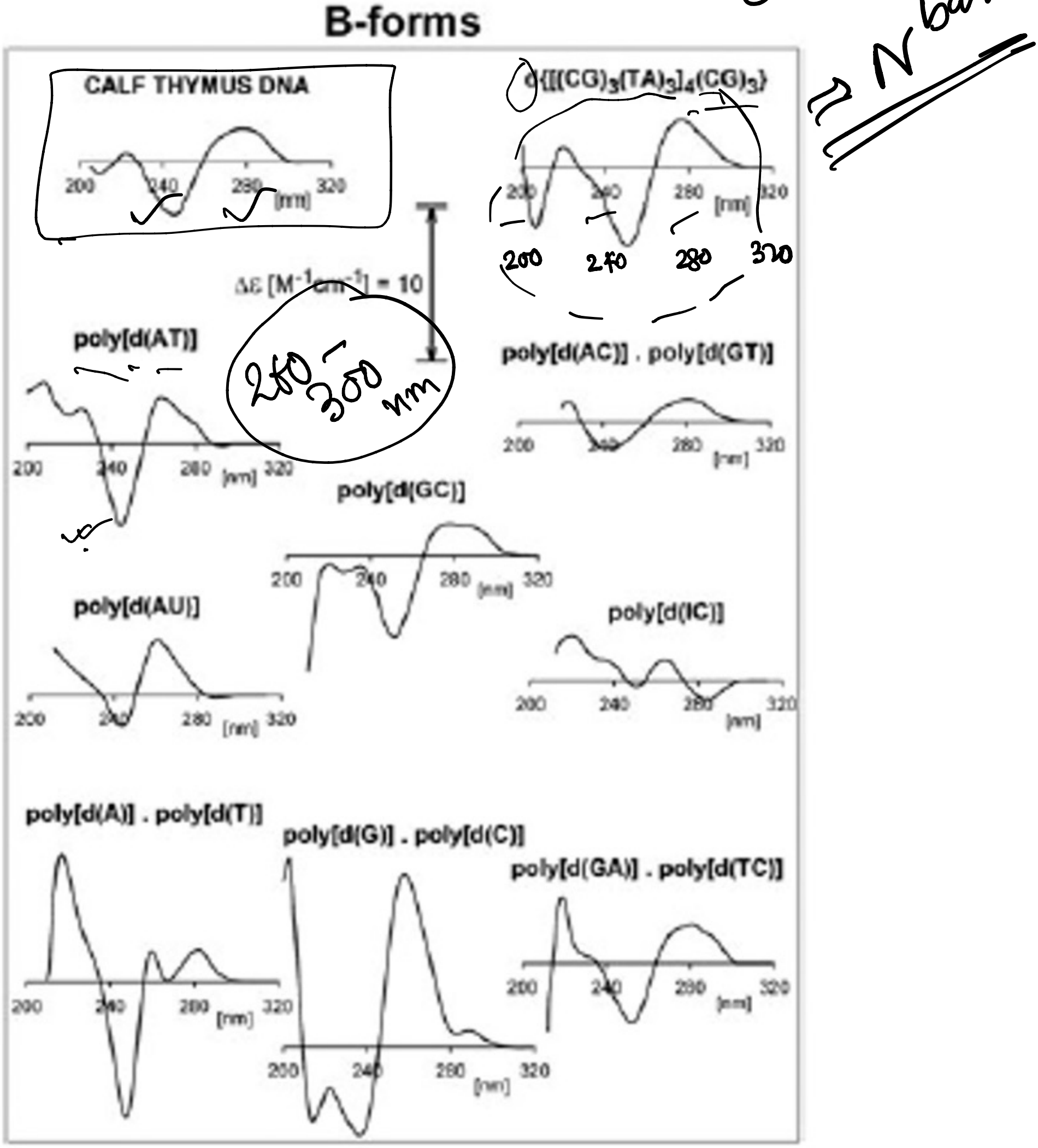


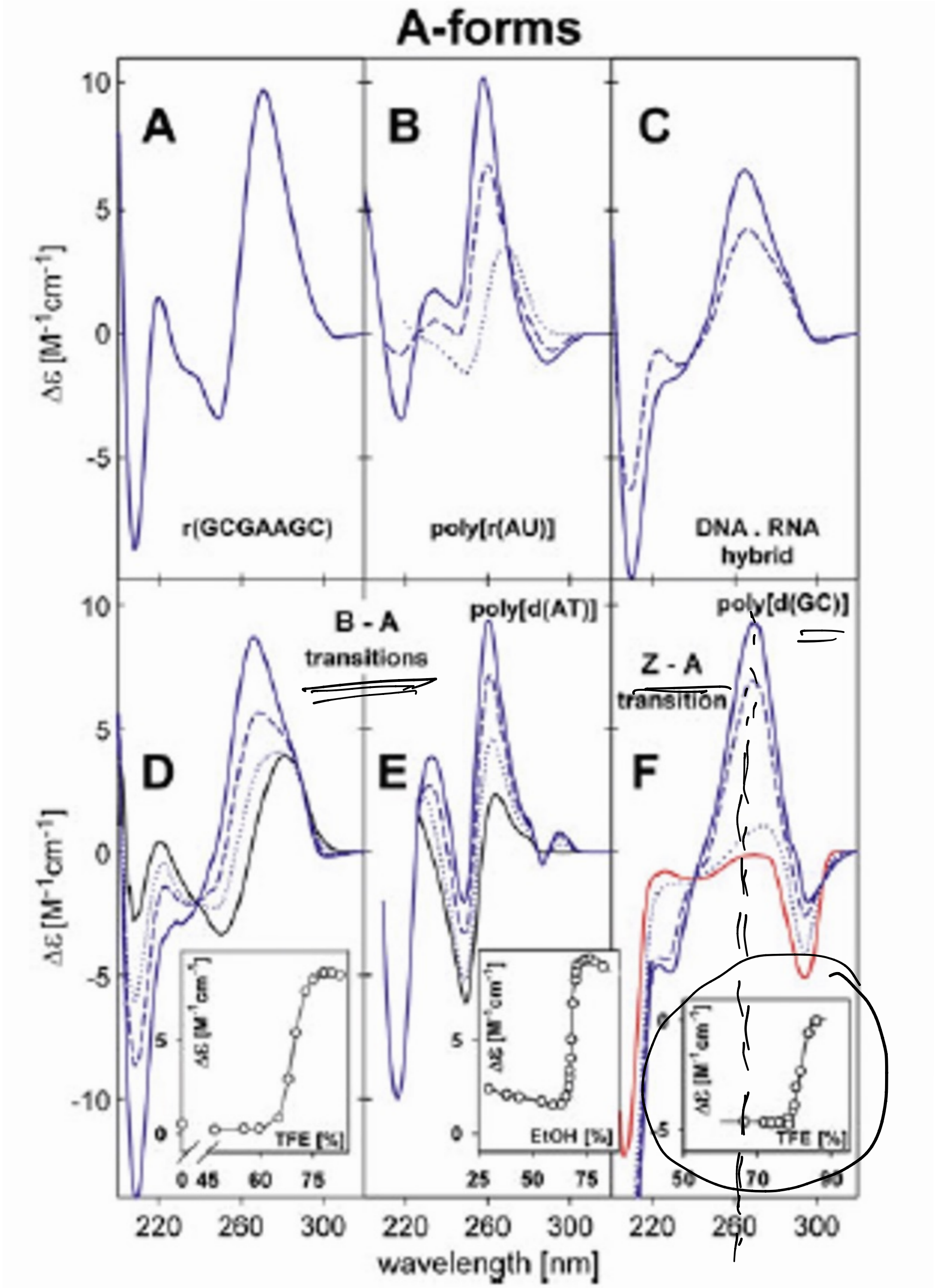
B-DNA/ most common

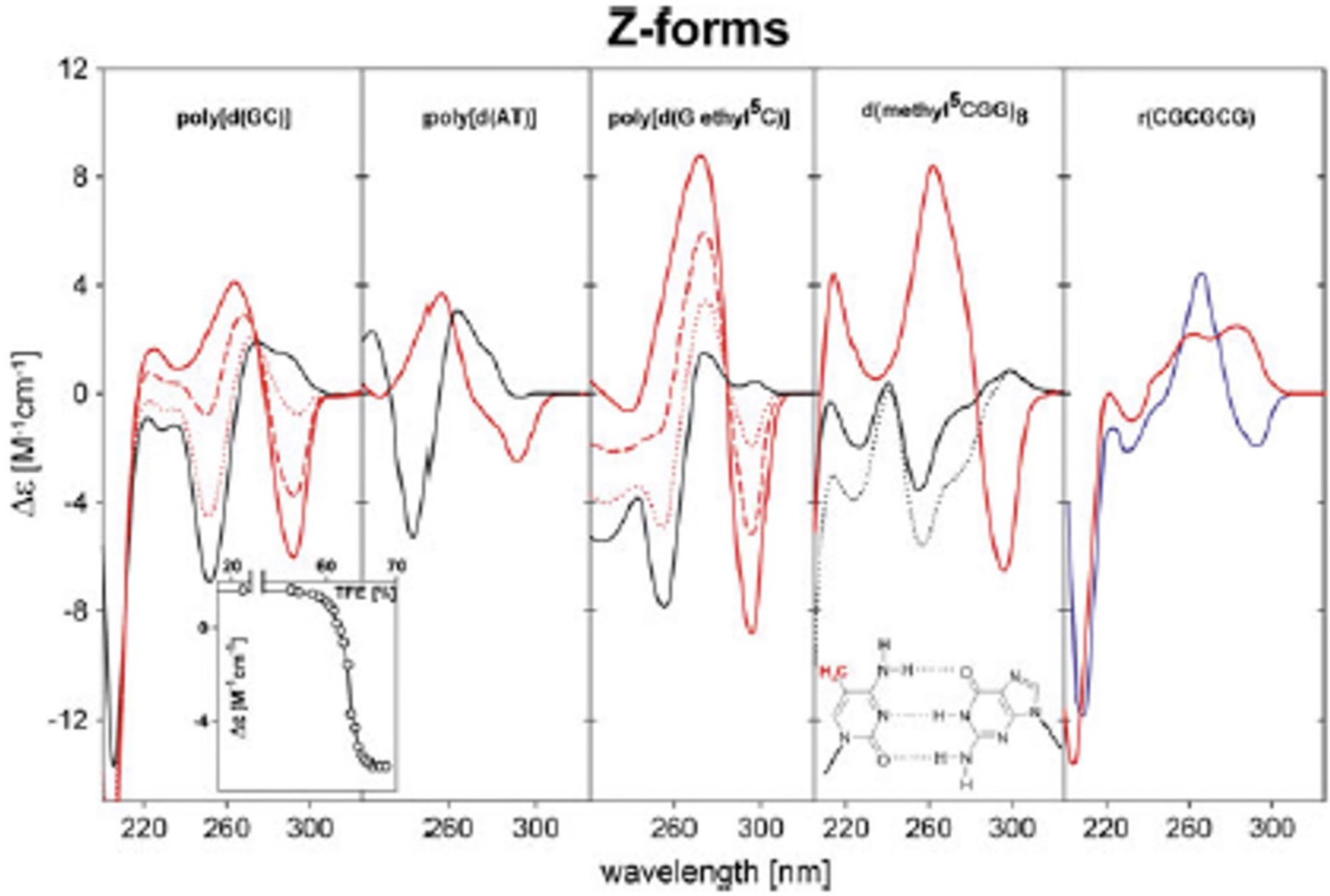
A-DNA// low hydration ✓

Z-DNA// high salt

induced chirality



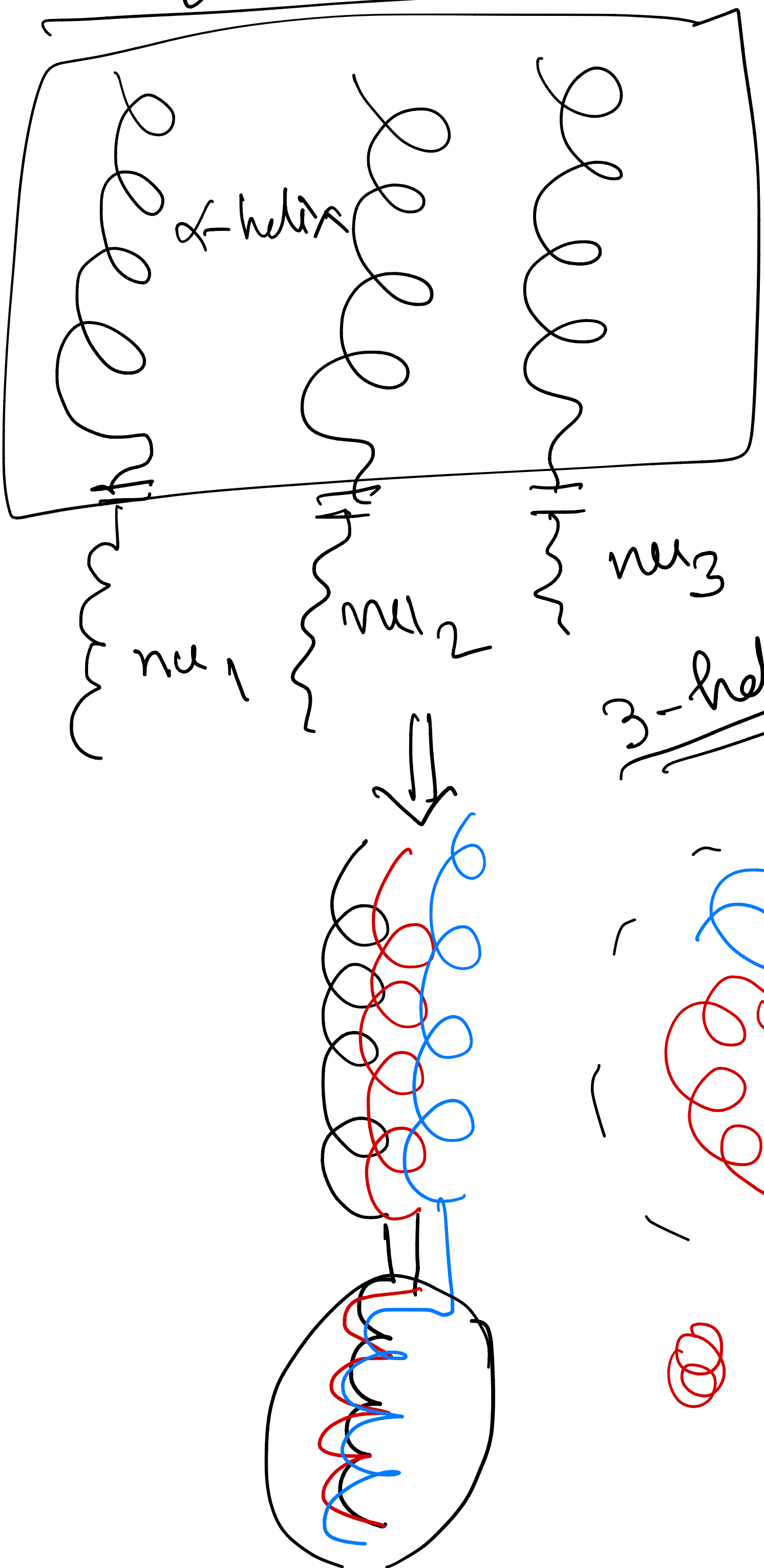

A-forms
A
B
C
r(GCGAAGC)
poly[r(AU)]
DNA . RNA hybrid
B - A transitions
poly[d(AT)]
poly[d(GC)]
Z - A transition
D
E
F
Δε [M-1cm-1]
TFE [%]
EtOH [%]
wavelength [nm]



CD useful tool → DNA

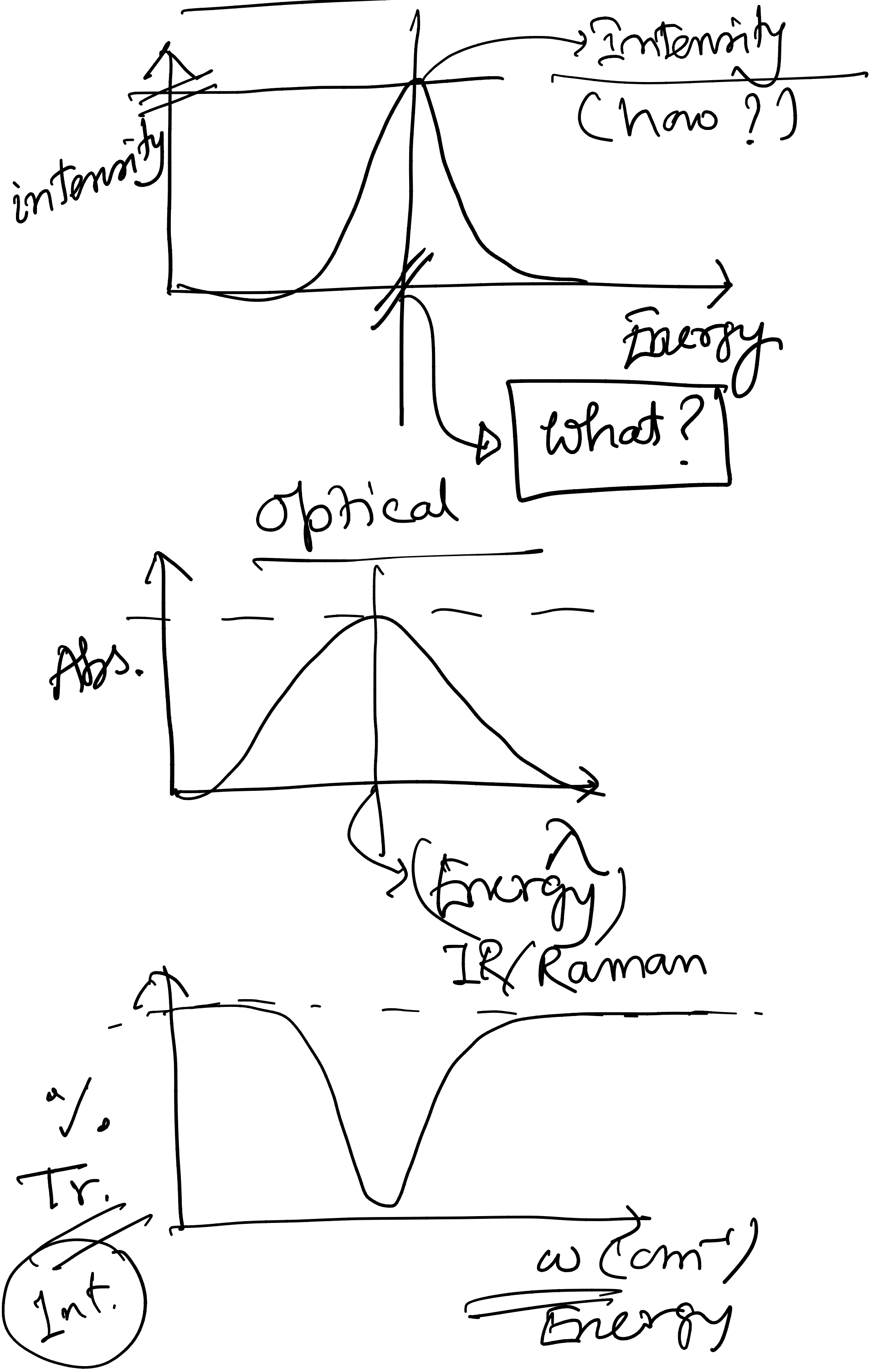
→ 'A', 'B' or 'Z'

Quiz 2 discussion



1. chirality
2. optical rotation / circular birefringence ($n_L \neq n_R$)
   circular dichroism / ellipticity ($A_L \neq A_R$)
3. molecular origin ⇒ CD
4. protein structures / DNA
5. polymers

Mössbauer Spectroscopy



Mössbauer Spectroscopy

↳ change in the nuclear state

NMR ⟶ ⟵ nuclear state

nuclear spin-state

NMR

E_0

— $I = 1/2$ — g.s.

$I = 1/2$

$-1/2$

$+1/2$

$h\nu$

flip

$\vec{B_0}$

$-1/2$

$+1/2$

$\sqrt{s(s+1)} \cdot \hbar$

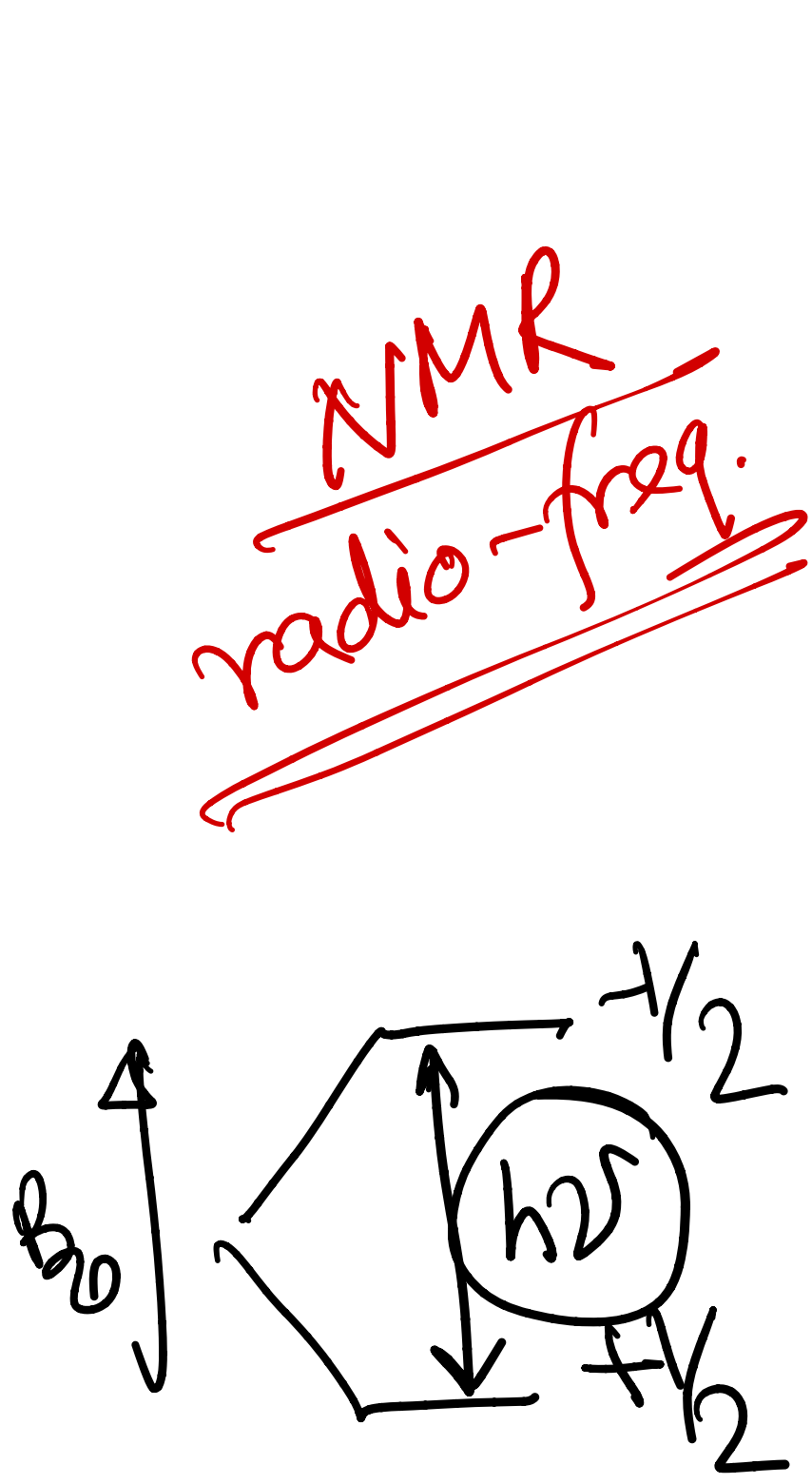
change in nuclear state

Mössbauer spectroscopy

γ-ray

NMR

radio-freq.



nuclear spin-state

NMR