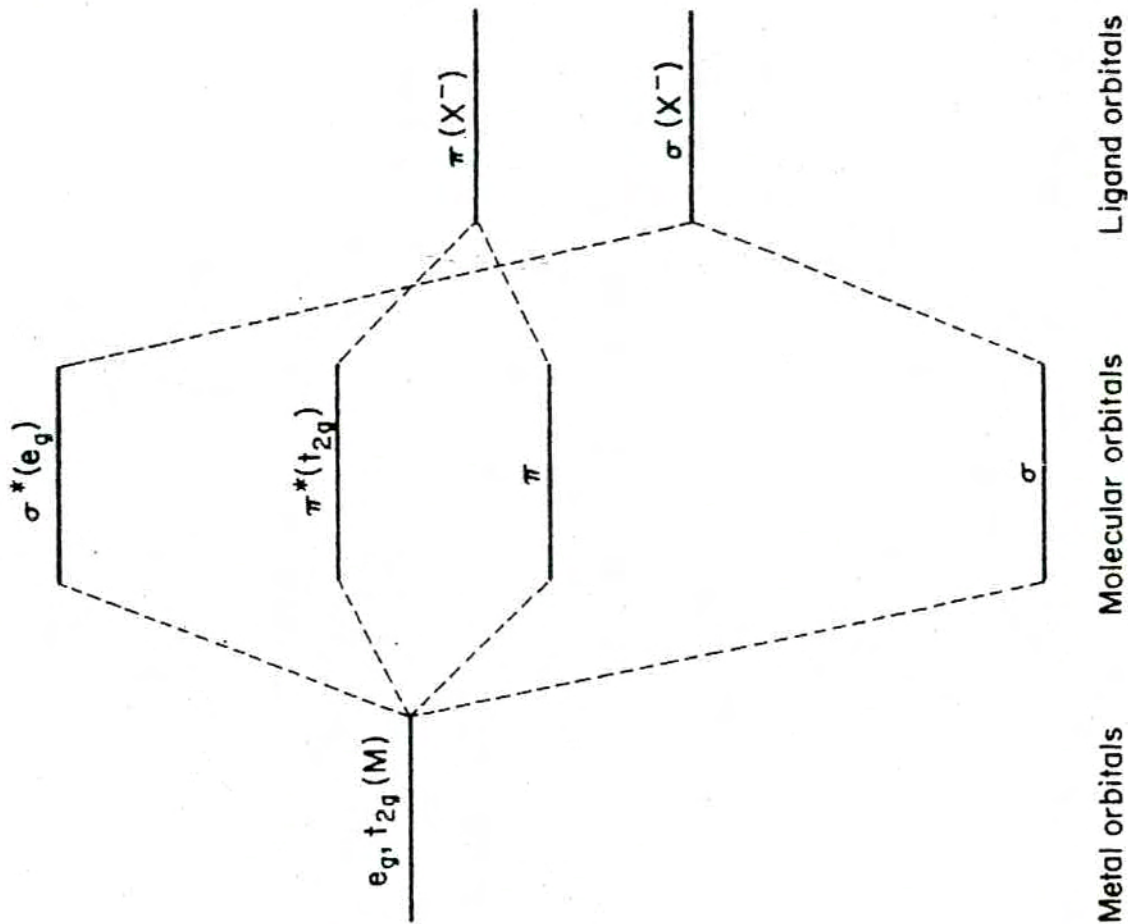
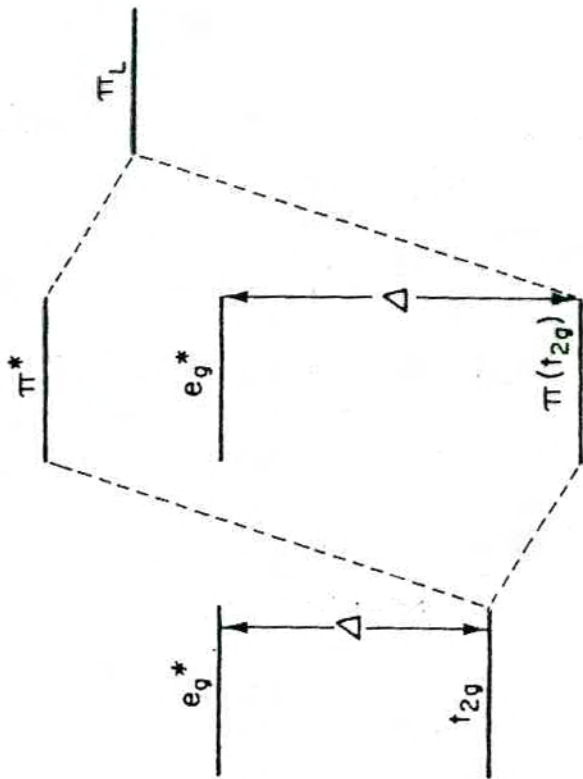


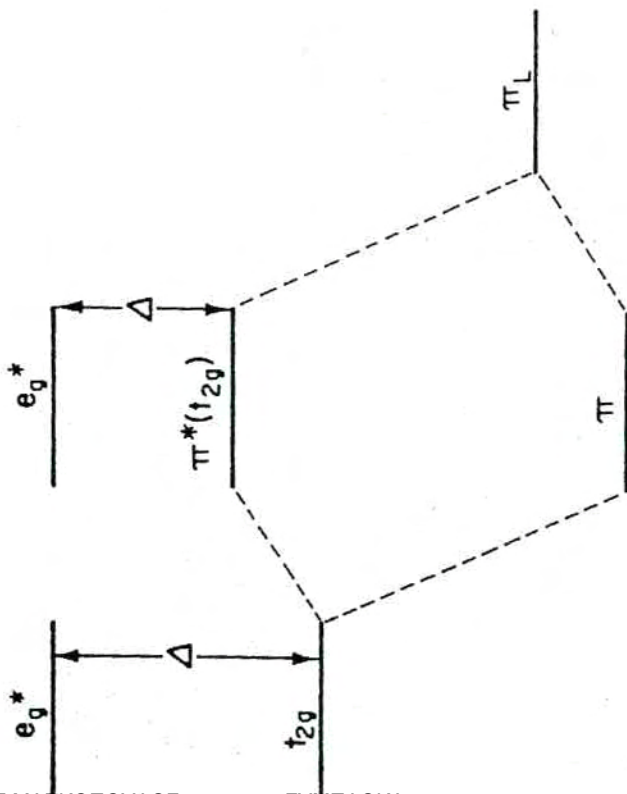
Molecular-orbital energy-level diagram for a  $\sigma$ -bonded octahedral complex  $ML_6$



Simplified molecular orbital energy-level diagram for an octahedral  $\text{MX}_6^{n-}$  complex ( $X^- = \text{a halide ion}$ )



(b)



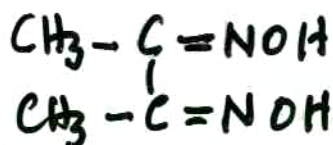
(a)

The effect of  $\pi$ -bonding on the magnitude of  $\Delta$ : (a) with low-energy filled  $\pi$  orbitals on the ligand; (b) with high-energy empty  $\pi$  orbitals on the ligand

# ΑΝΑΛΥΤΙΚΗ ΧΗΜΕΙΑ

① Ανίχνευση και προσδιορισμός  $M^{n+}$  με γχηματιωκό ΔΝΣΔΙΑΛΥΤΩΝ βυρωλόκων.

π.χ.  $Ni^{2+}$  + διμεθυλογλυοξίμη.

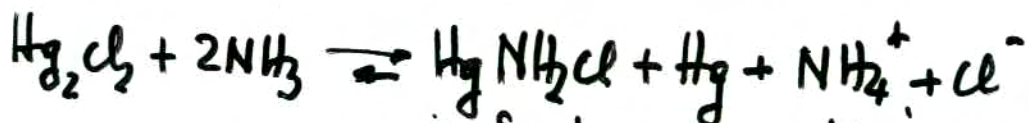
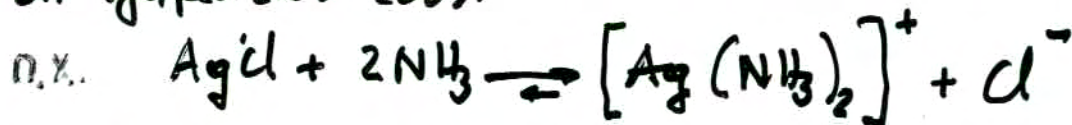


② Δέσμευση ανεπιθύμητων  $M^{n+}$  με συμπλοκοποίηση με EDTA

π.χ.  $Mg^{2+}$ ,  $Ca^{2+}$ ,  $Fe^{2+}$ ,  $Cu^{2+}$  + EDTA



③ Διαχωρισμός ιόντων με εκλεκτική διαλυτοποίηση ή φυμάτιων τους.

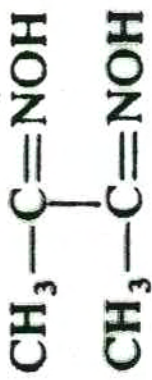


αμιδοχλωριούχος υδράργυρος

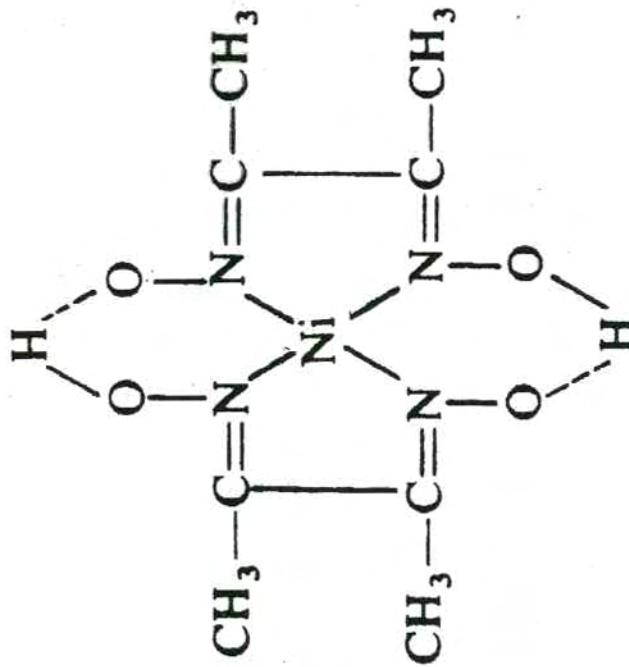
④ φασματοφωτομετρικός προσδιορισμός  $M^{n+}$  μετά τη μετατροπή του σε χρωμα εώμπλοκα.



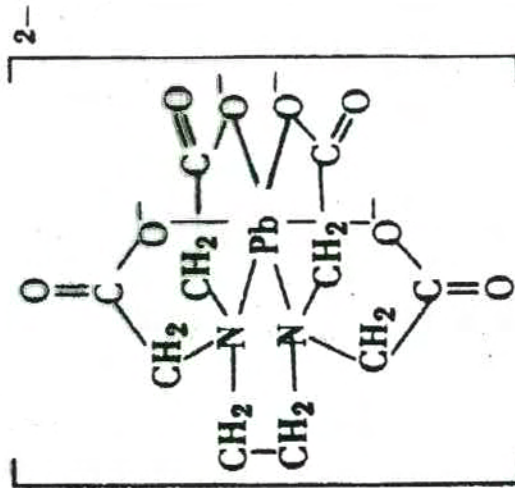
μπλε



(a)

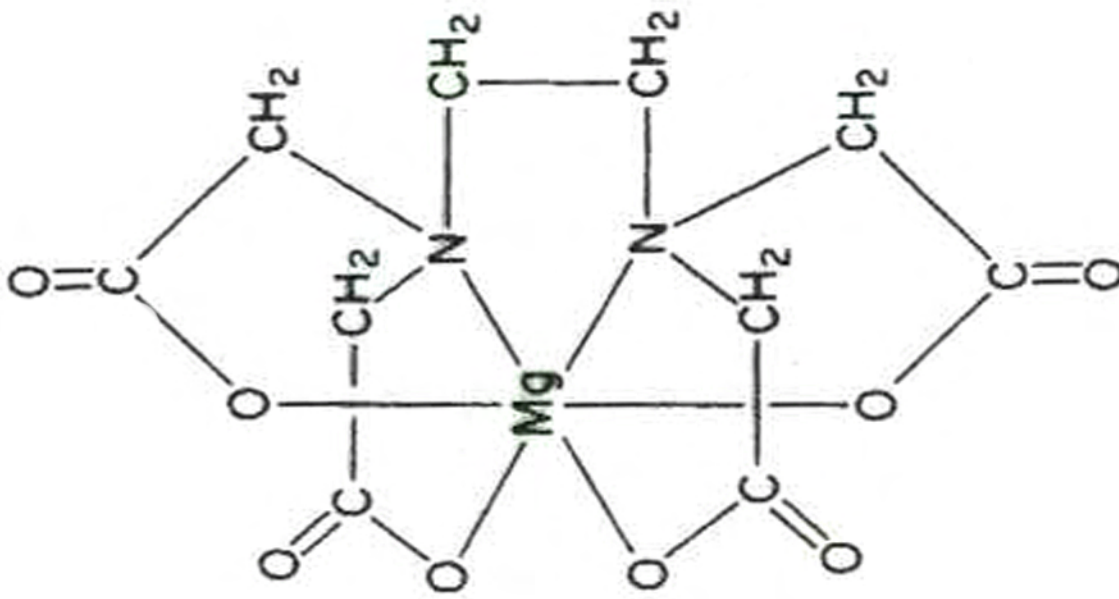


(b)



(c)

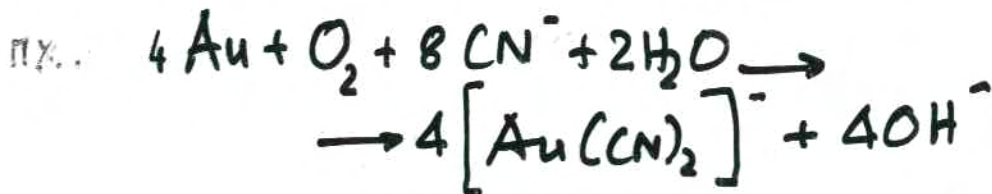
(a) Διμεθυλογλουξίμη. (b) Σύμπλοκο του  $\text{Ni}^{2+}$  με διμεθυλογλουξίμη.  
(c) σύμπλοκο του  $\text{Pb}^{2+}$  με EDTA



Magnesium complex of the anion from ethylenediaminetetraacetic acid (EDTA)

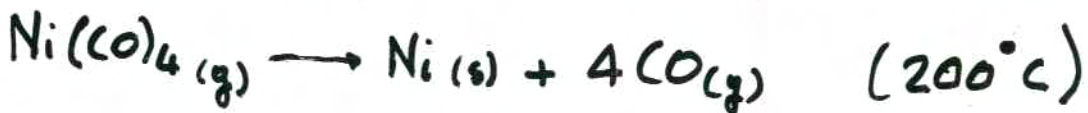
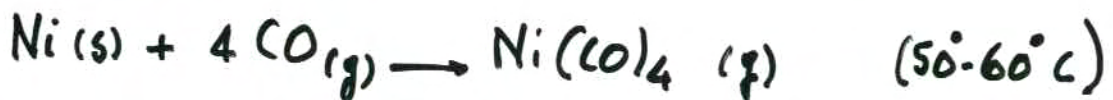
## ΜΕΤΑΛΛΟΥΡΓΙΑ

① Ανάκτηση μετάλλων με τη μορφή συμπλόκων



② Παρασκευή πολύ καθαρών μετάλλων

π.χ. Μέθοδος Mond



③ Ηλεκτρολυτική επιμετάλλωση (γαλβανοπλαστική)

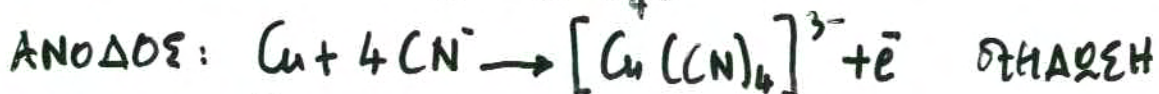
π.χ. Cu, Ag, Au αποτίθενται κατά τις επιμεταλλώσεις αντικείμενων από διαλύματα κυανωσυμπλόκων τους

- Ηλεκτρολυτική επιχάλκωση αντικείμενου

Τιθεται ως ΚΑΘΟΔΟΣ τὸ ἀντικείμενο

Τιθεται ως ΑΝΟΔΟΣ ὁ Cu

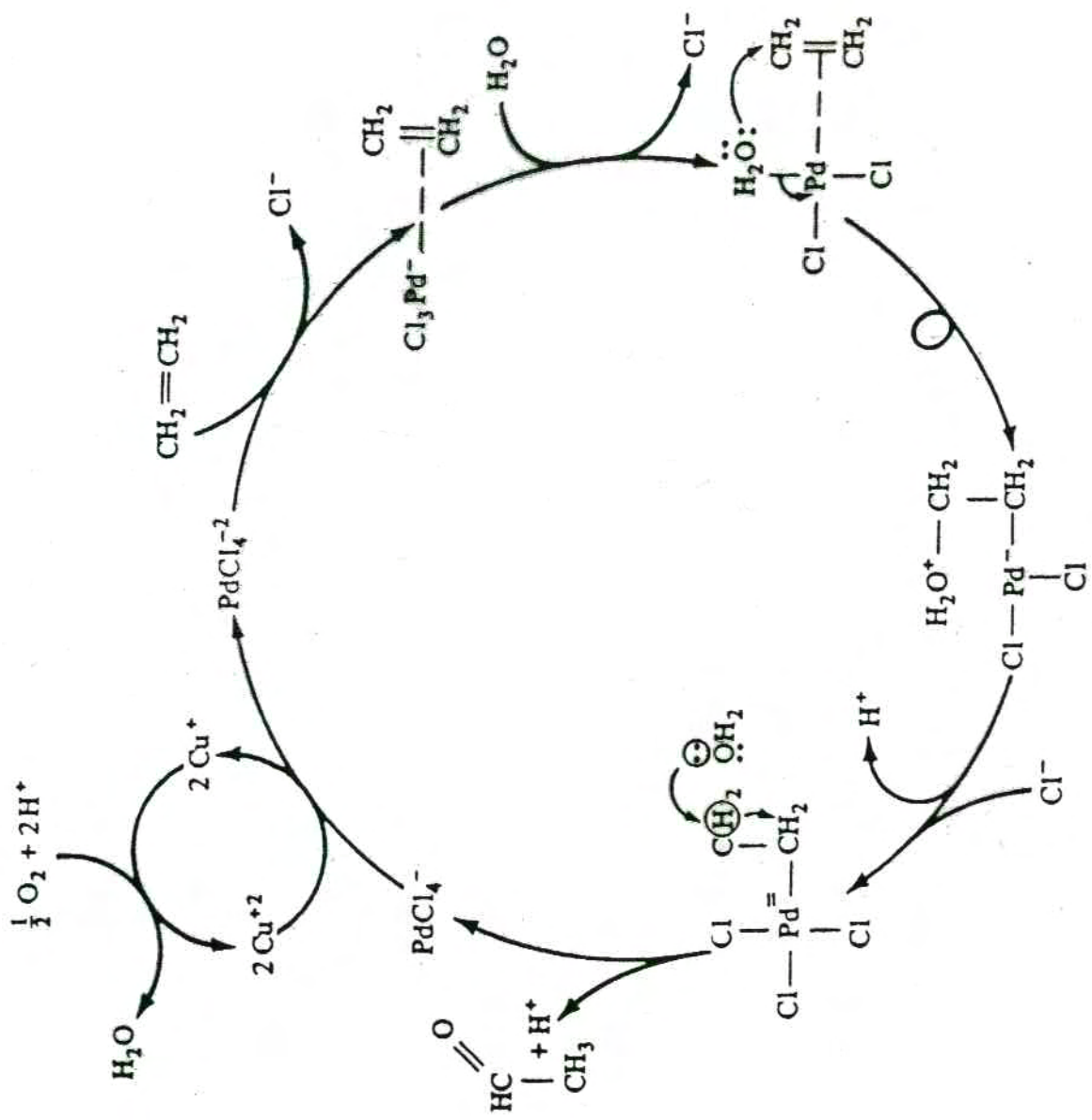
Διαλύτης  $[\text{Cu}(\text{CN})_4]^{3-}$





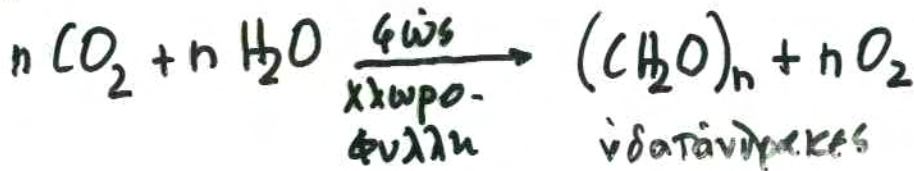
## ΚΑΤΑΛΥΣΗ

- ① Πολυμερισμός αιθυλενίου, προπυλενίου με χρήση του καταλύτη: Ziegler-Natta ( $\text{TiCl}_4 + \text{AlEt}_3$ )
- ② Δμογενής υδροφόρυνση ολεφινών με καταλύτη  $[(\text{Ph}_3\text{P})_3\text{RhCl}]$
- ③ Ίσομερείωση ολεφινών με καταλύτη  $\text{Fe}(\text{CO})_5$
- ④ Οξειδωση αιθυλενίου προς εκεταλδεΐδη με καταλύτη  $[\text{PdCl}_2]^{2-}$
- ⑤ Υδροφορμυλίωση ολεφινών  
Σχηματισμός αλδεϋδών και κετονών από  
ολεφίνη +  $\text{H}_2$  +  $\text{CO}$   
με καταλύτη  $\text{HCo}(\text{CO})_4$
- ⑥ Δέσμευση  $\text{N}_2$  από το σύμπλοκο  $[\text{Ru}(\text{NH}_3)_5(\text{H}_2\text{O})]^{2+}$



# ΒΙΟΛΟΓΙΑ - ΒΙΟΧΗΜΕΙΑ

## ① Χλωροφύλλη

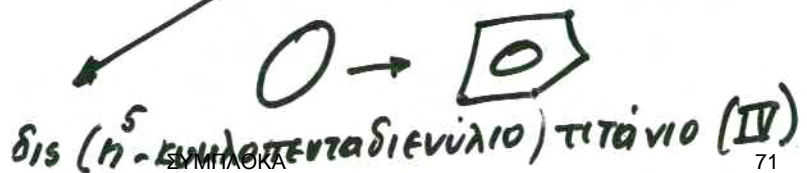
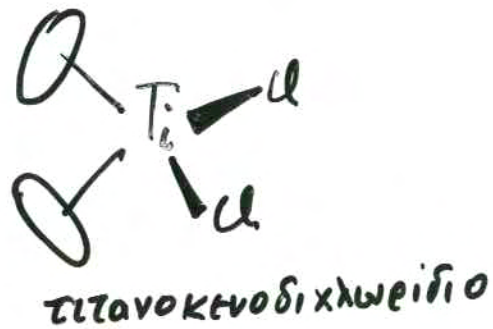
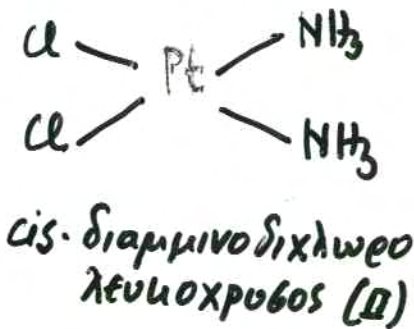


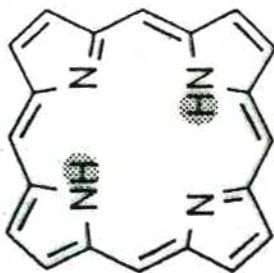
## ② Αίμη της αιμογλοβίνης Χηλικό σύμπλοκο του $\text{Fe}^{2+}$ με πορφυρίνη



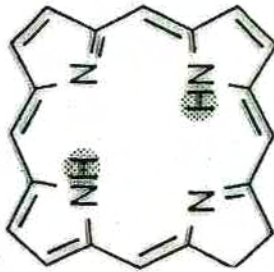
## ③ Κυανοκοβαλαμίνη - Βιταμίνη B<sub>12</sub> Χηλικό σύμπλοκο του $\text{Co}^{3+}$ με κορρίνη

## ④ Σύμπλοκα με κυτταροστατικές ιδιότητες

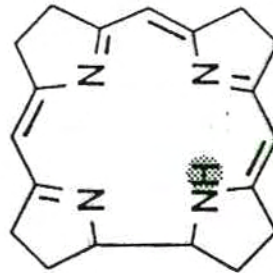




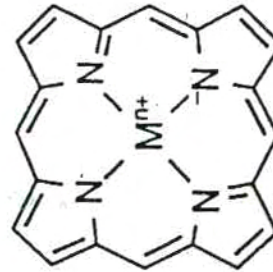
porphyrin  
or 'porphin' (in  
unsubstituted form)




chlorin  
(2,3-dihydroporphyrin)

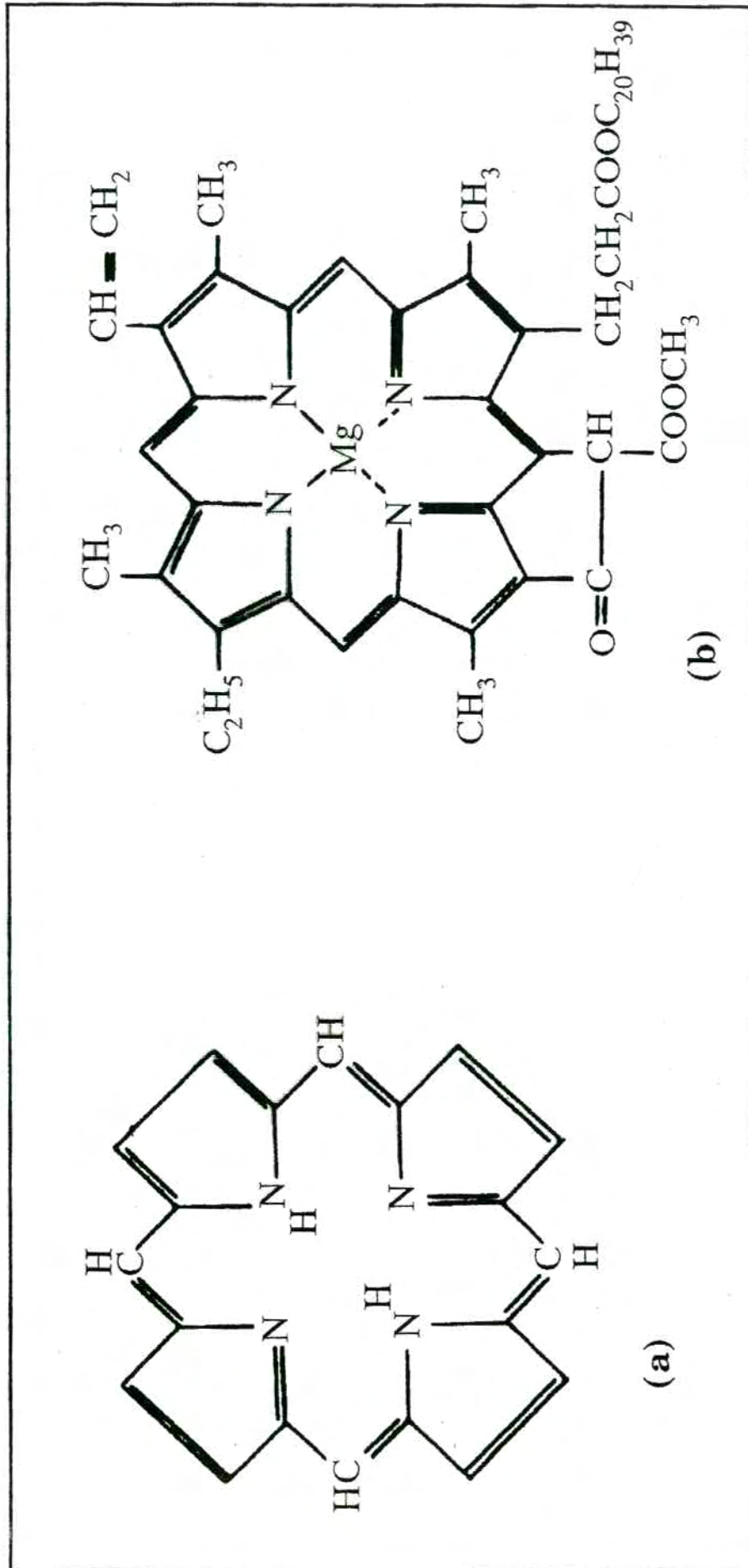


corrin

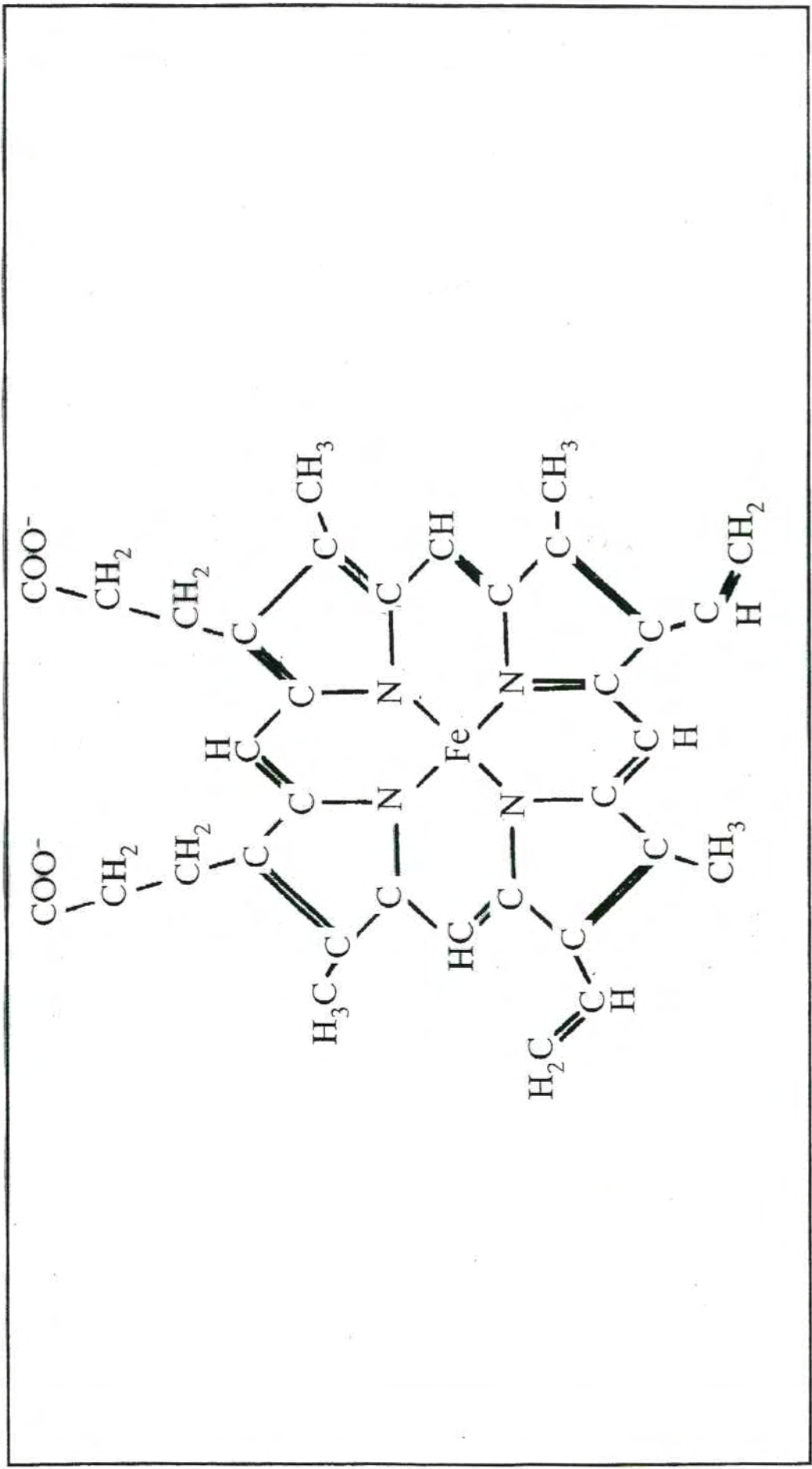


metalloporphyrin  
complex

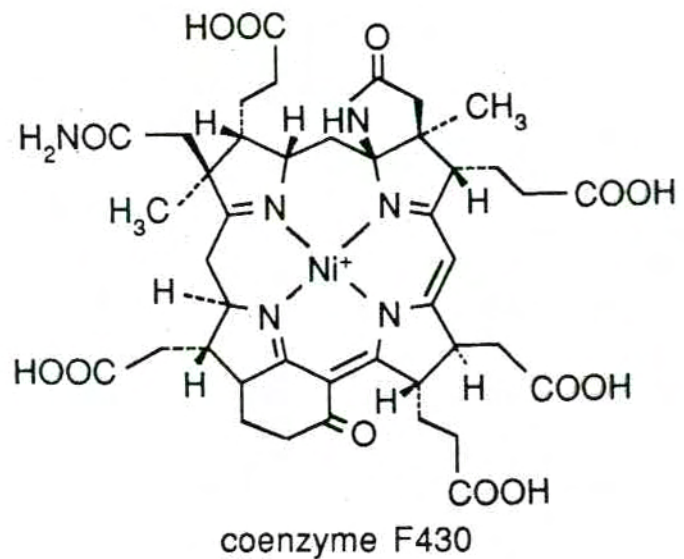
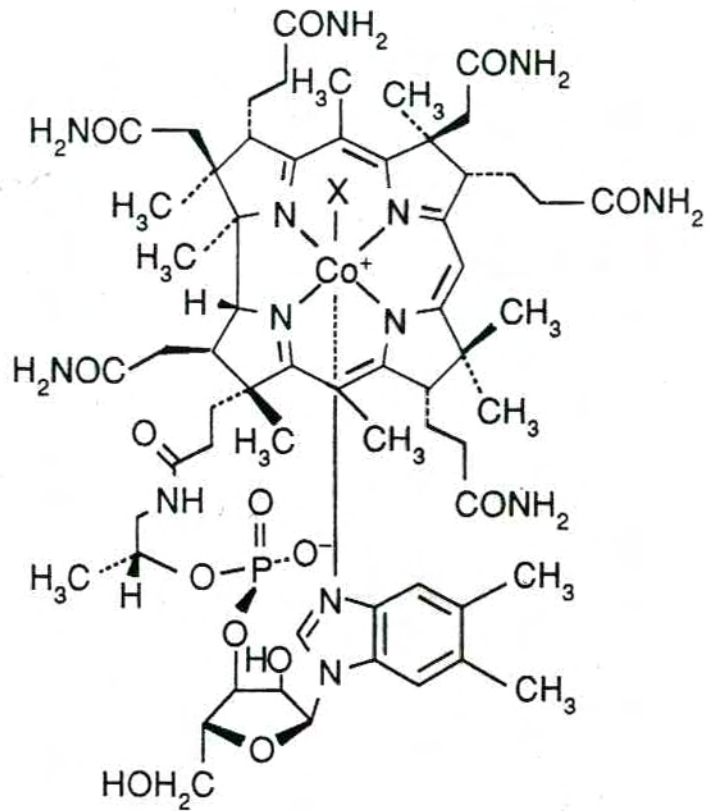
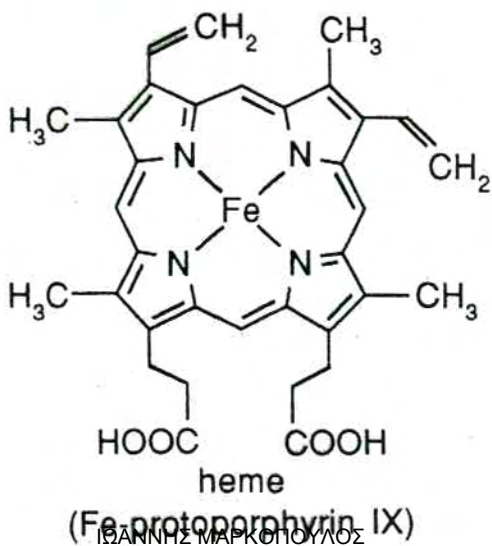
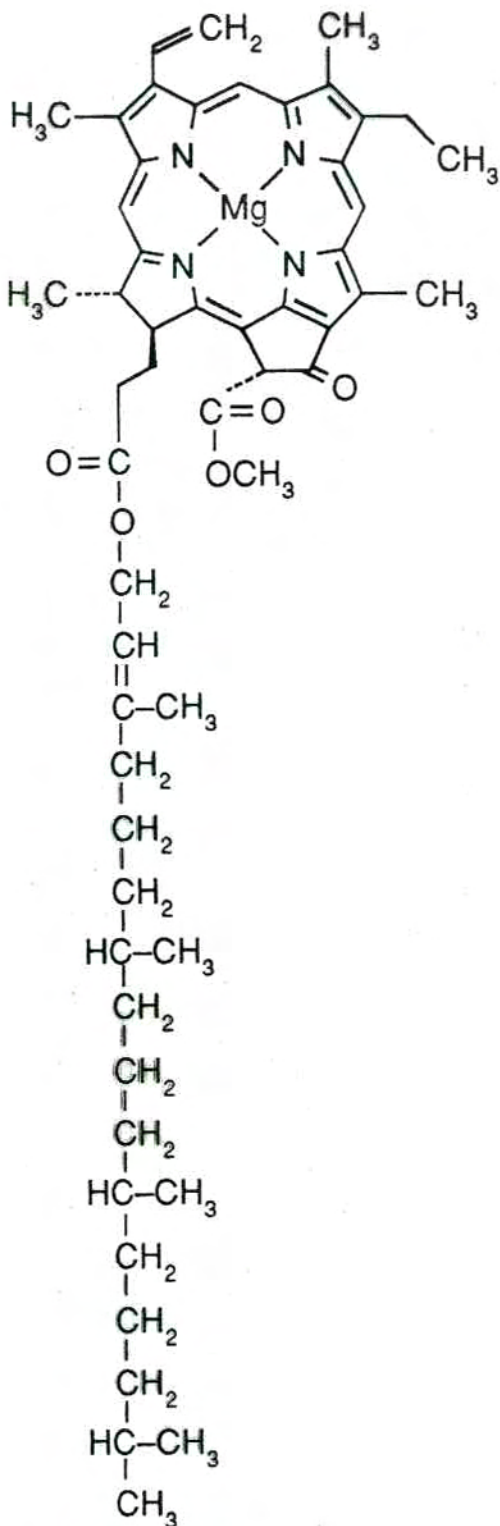
 acidic protons which may be substituted by metal ions



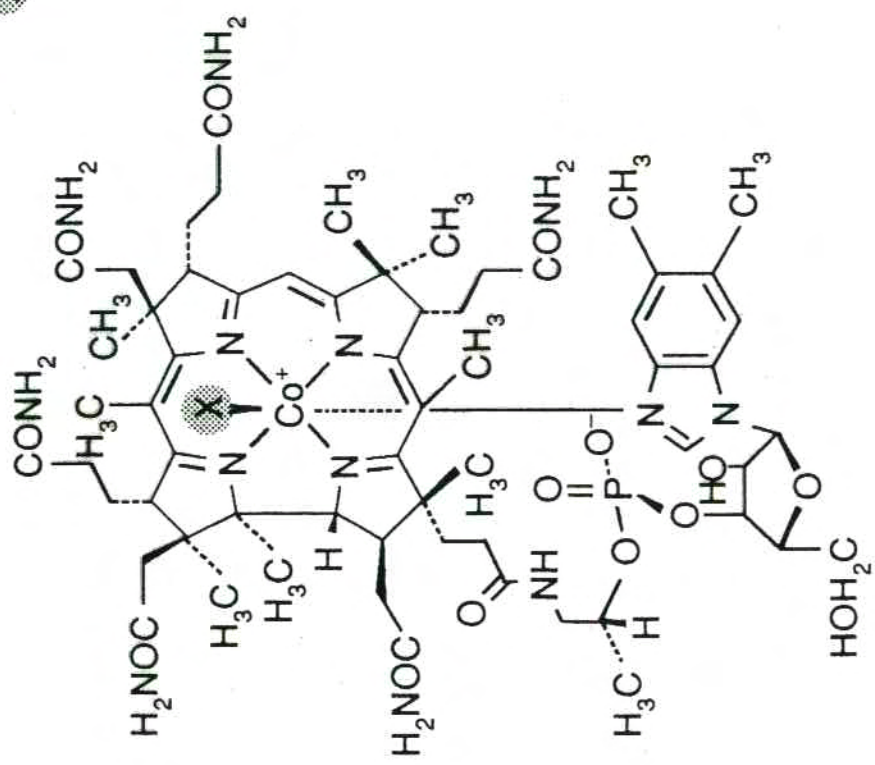
(a) δομή πορφίνης (μητρικής ένωσης των πορφυρινών) (b) Δομή χλωροφύλλης α



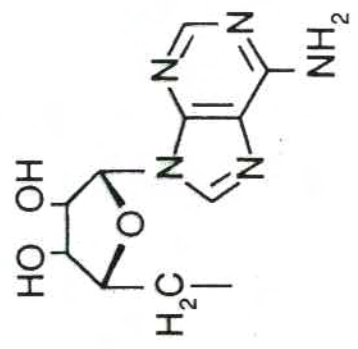
Δομή αίμης



- $\text{X} = \text{CH}_3$  : methylcobalamin (MeCbl or MeB<sub>12</sub>)
- CN : cyanocobalamin (vitamin B<sub>12</sub>)
- OH : hydroxycobalamin
- H<sub>2</sub>O : aquacobalamin
- R : 5'-deoxyadenosyl-cobalamin (coenzyme B<sub>12</sub>, AdoCbl or AdoB<sub>12</sub>)

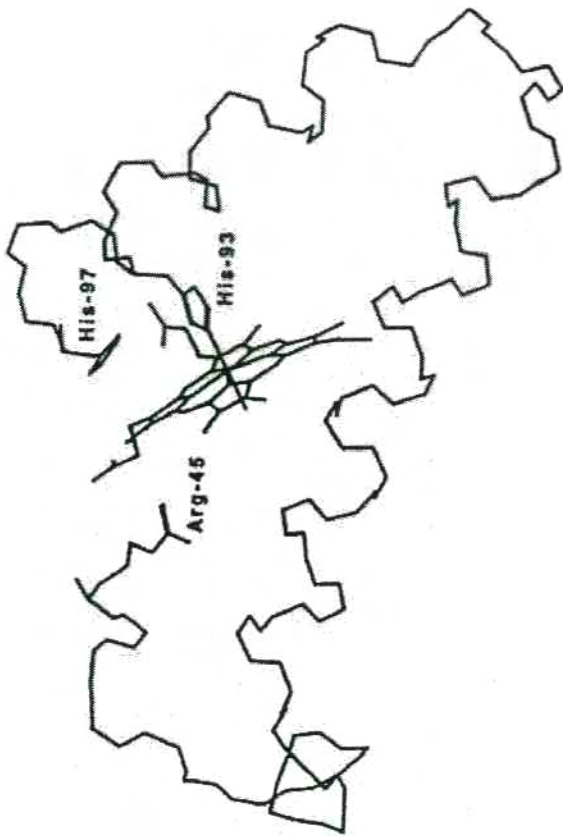


R = 5'-deoxyadenosyl

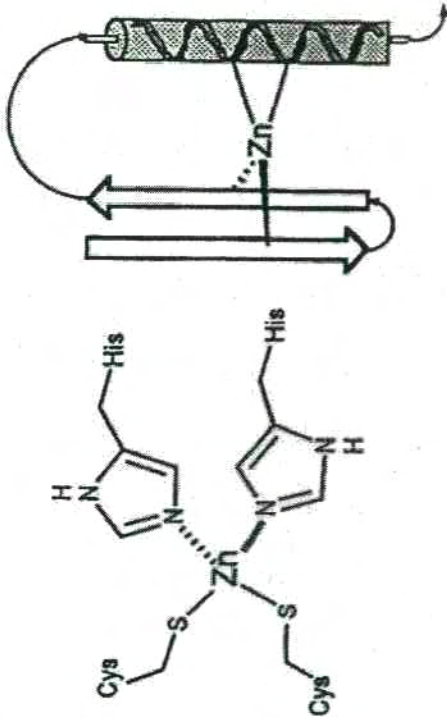




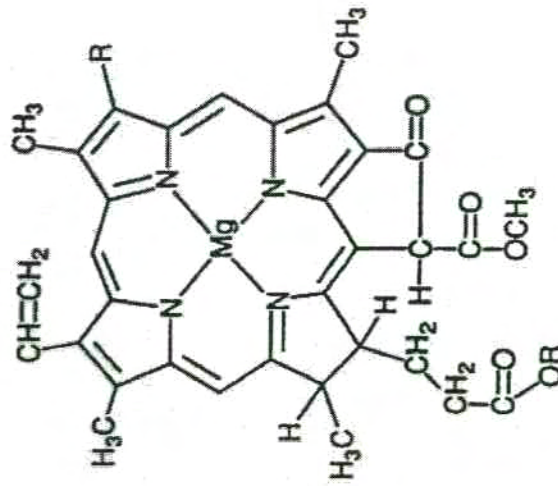
(A)



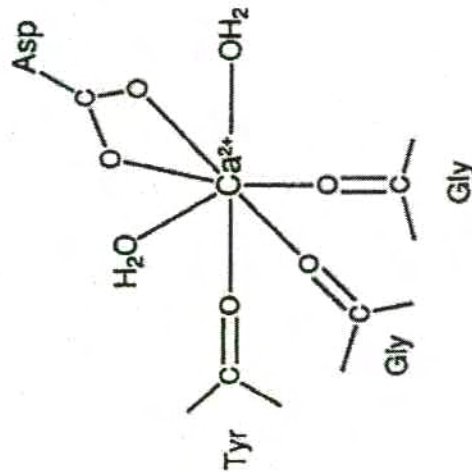
(B)



(D)



(C)



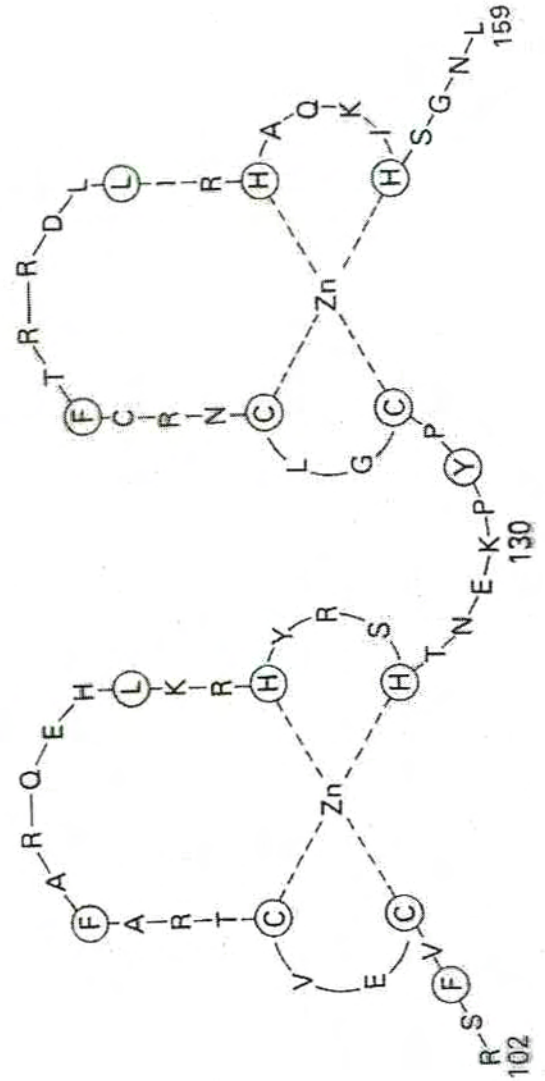
Coordination modes for metal binding to metalloproteins and peptides. (A) The heme prosthetic center and a portion of the backbone in myoglobin. (B) Bound Zn<sup>2+</sup> in a zinc finger. On the right the portion of the protein backbone that forms the "finger" is traced. Figure 1.19 gives more details on such schematic diagrams. (C) The metal-binding domain of a Ca<sup>2+</sup>-activated enzyme (phospholipase A<sub>2</sub>) showing coordination of a chelating carboxylate, two water molecules, and three backbone carbonyls. (D) Chlorophyll from the light-harvesting complex of the photosynthetic reaction center.

## Zinc finger proteins

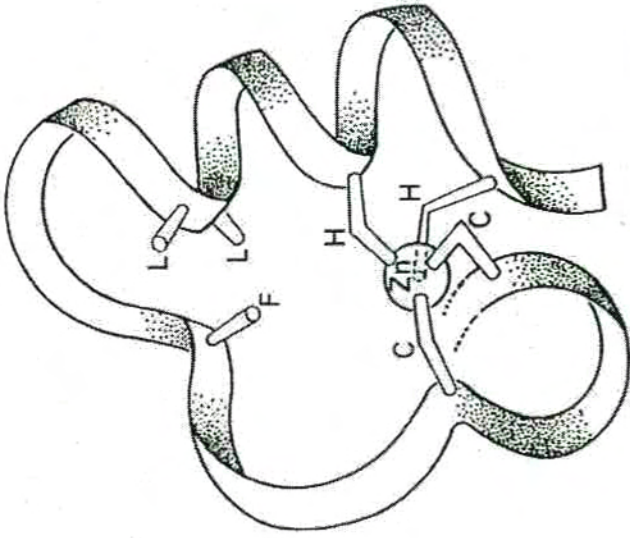
Protein	Function
Many DNA promotor region binders	Receptor for hormones*, etc.
Aspartate transcarbamylase Kinase C(?)	Nucleotide base synthesis Critical signalling(?)

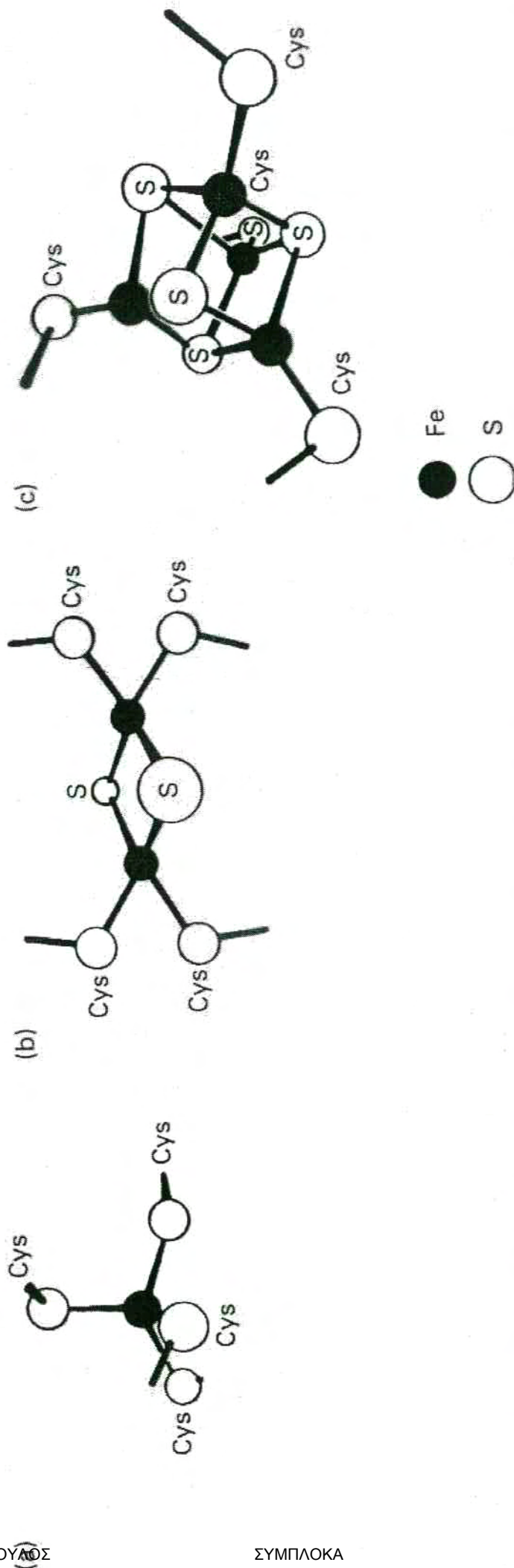
\* Sterols, thyroxime, retinoic acid, etc.

An example of a usual sequence around zinc sites in two zinc fingers. The circled amino acids are conserved and are either ligands or part of the hydrophobic core.

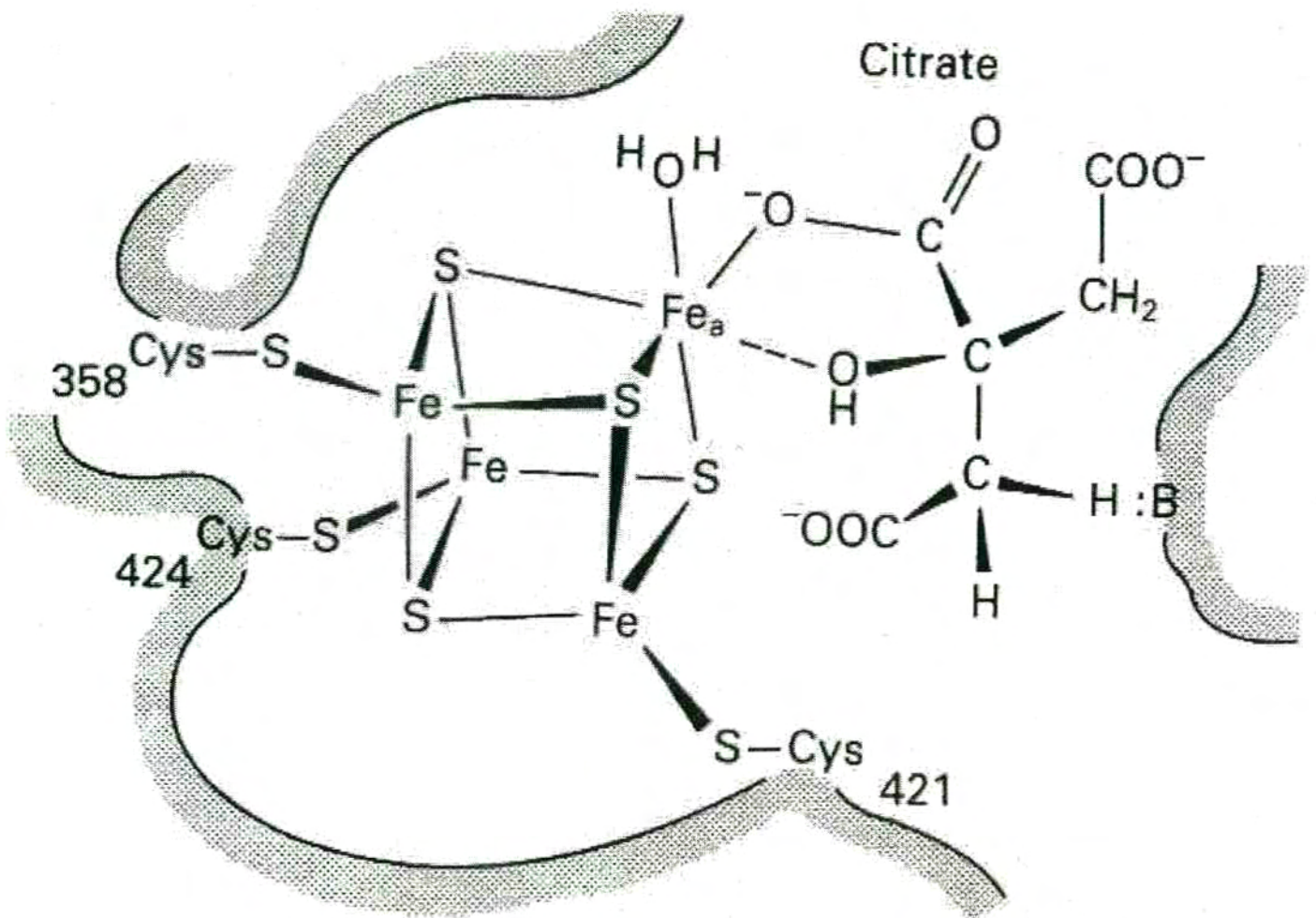


The structure of one kind of zinc finger as determined by NMR methods. Here certain amino-acid residues are shown: L, leucine; F, phenylalanine; H, histidine; and C, cysteine. (After R. E. Klevit and P. E. Wright.)

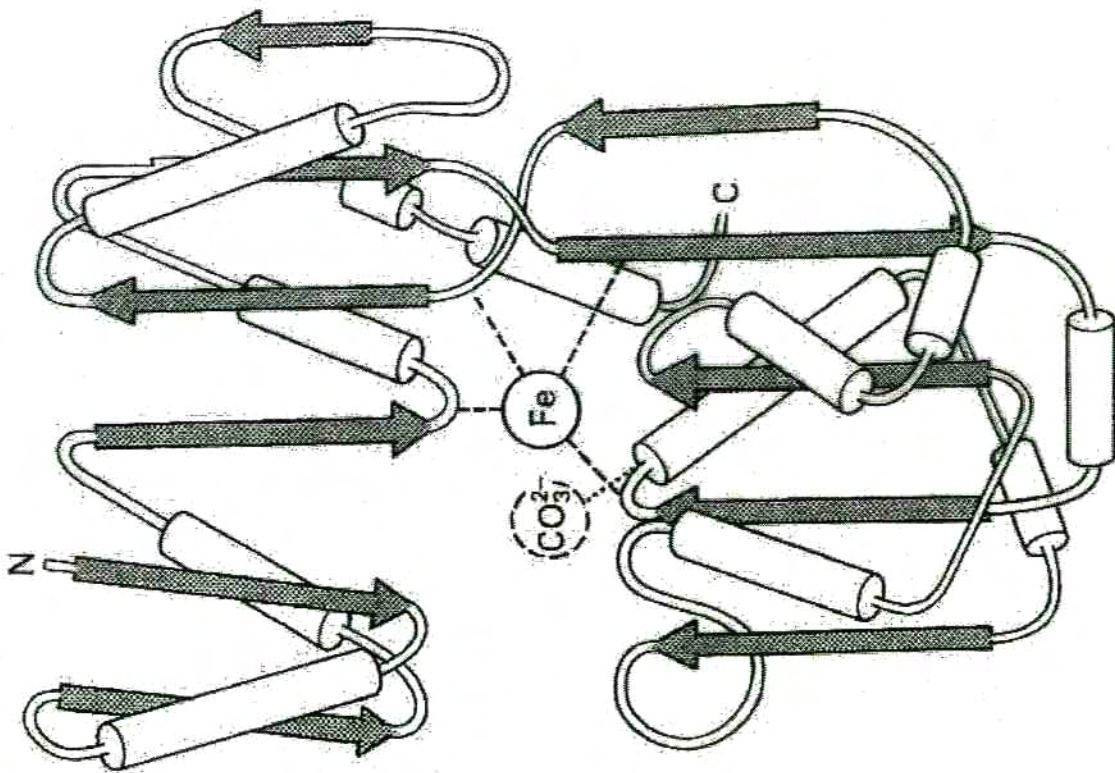




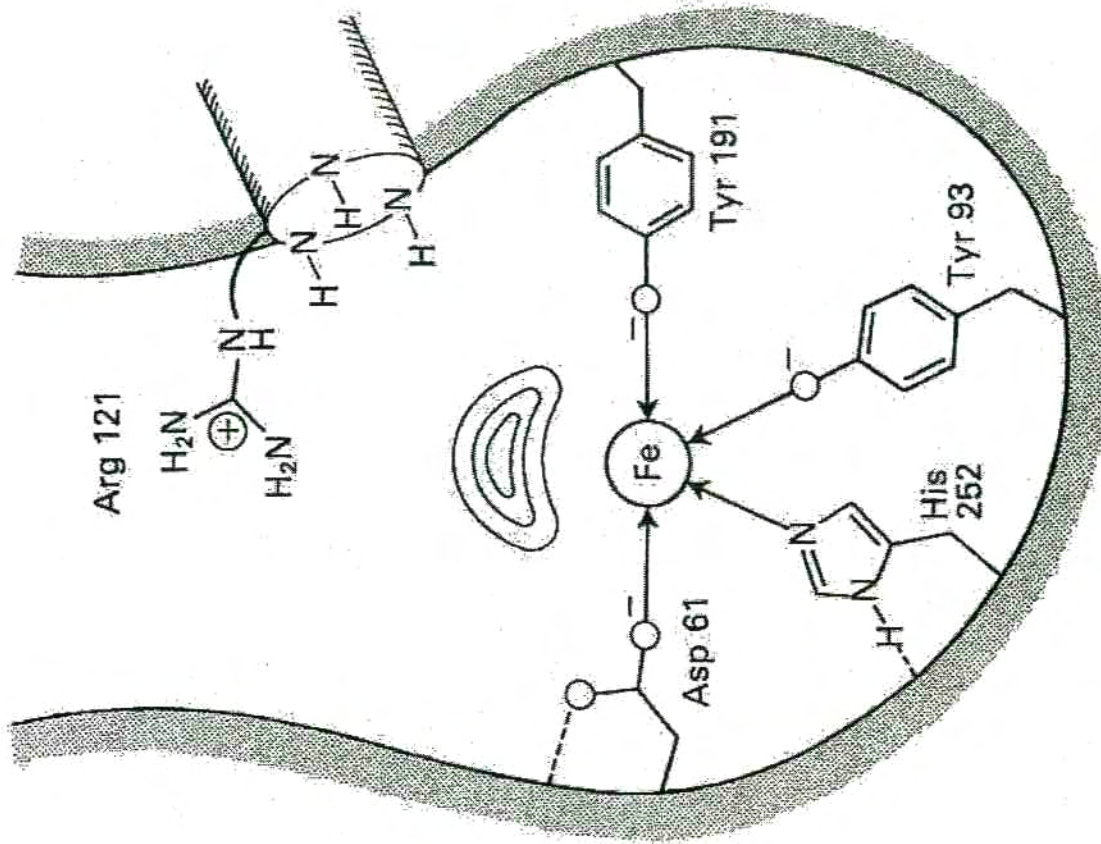
The co-ordination in iron/sulphur proteins: (a) rubredoxin; (b)  $\text{Fe}_2\text{S}_2$  ferredoxin; (c)  $\text{Fe}_4\text{S}_4$  ferredoxin. The  $\text{Fe}_3\text{S}_4$  unit is like that of  $\text{Fe}_4\text{S}_4$  with one Fe removed. ●, Fe; ○, sulphur—those marked 'S' are sulphide,  $\text{S}^{2-}$ , while those marked 'cys' are cysteinate sulphur.



The proposed active site of aconitase showing substrate bound to one iron. (After H. Beinert.)



(a)



(b)

(a) The outline fold of transferrin, a hinged protein. (b) Details of the binding site for iron; the open side interacts with bicarbonate.  
 (After E. N. Baker and T. Blundell.)

Η νέα εποχή ανήκει  
στη Βιολογία.