UNIVERSITE DE RENNES I

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FACULTE DE MEDECINE

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DEPARTEMENT DE BIOCHIMIE ET BIOLOGIE MOLECULAIRE

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PCEM 1

Biochimie Structurale

CO-ENZYMES

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Année Universitaire 2006-2007

LES COENZYMES

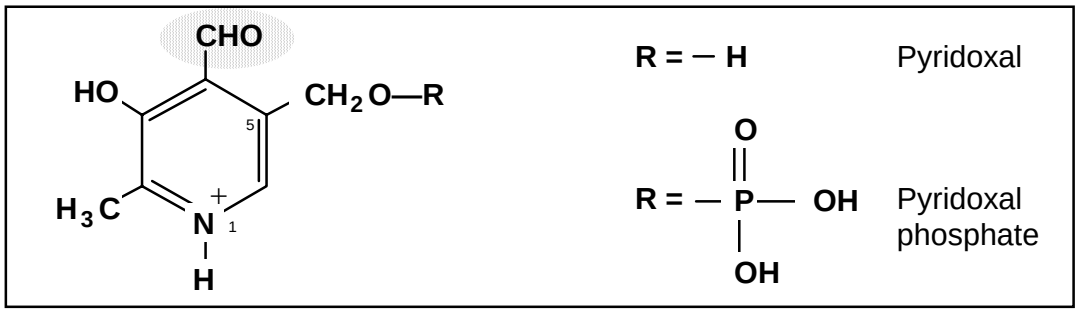
1. DEFINITION ET PROPRIETES

2. CLASSIFICATION

COENZYMES DE TRANSFERT DE GROUPES

1. PYRIDOXAL PHOSPHATE (PLP)

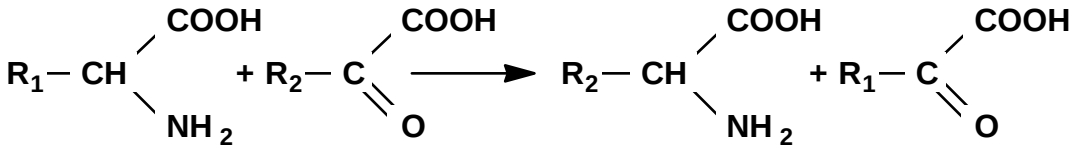
1.1. Structure

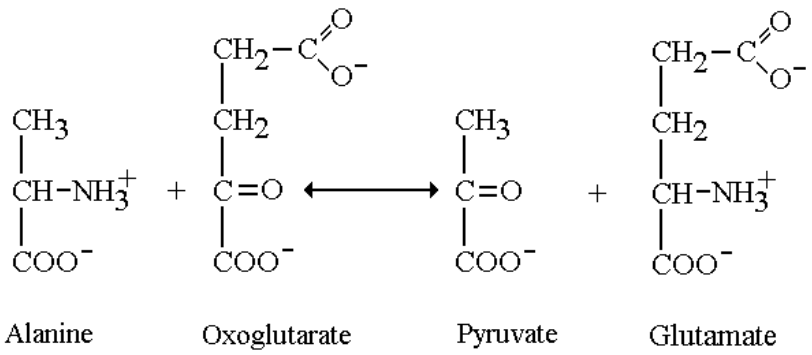


1.2. Source

1.3. Réactivité

1.3.1. Transamination entre un α aminoacide et un α cétoacide



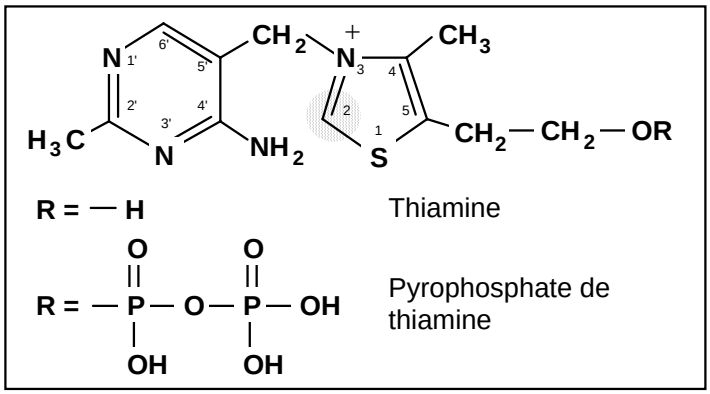


1.3.2. Décarboxylation

1.3.3. Racémisation

2. PYROPHOSPHATE DE THIAMINE (TPP)

2.1. Structure



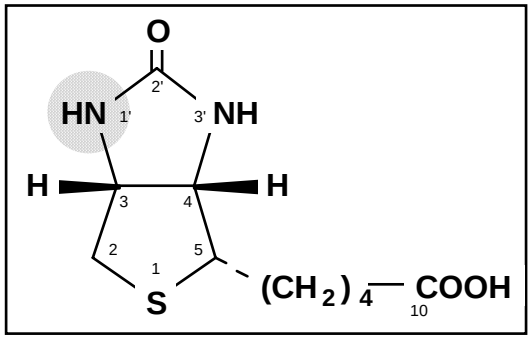
2.2. Source

2.3. Principaux types de réactions catalysées

2.3.1. Décarboxylation d'acides α cétoniques
2.3.2. Réactions de transcétolisation

3. BIOTINE

3.1. Structure

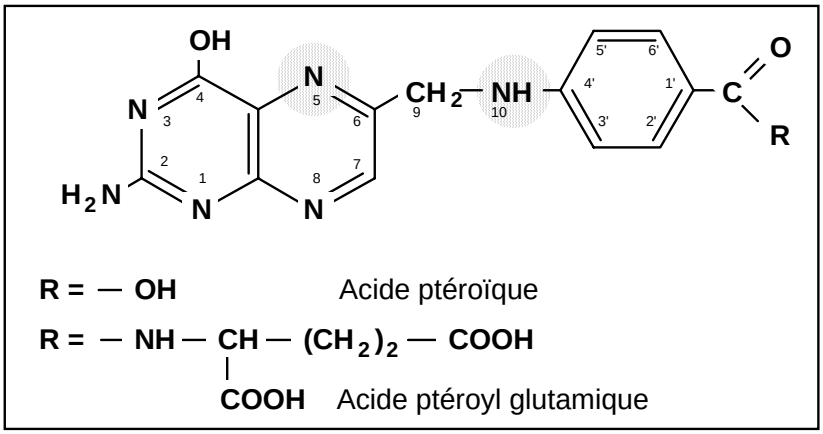


3.2. Réactivité

3.2.1. Carboxylation
3.2.2. Décarboxylation
3.2.3. Transcarboxylation

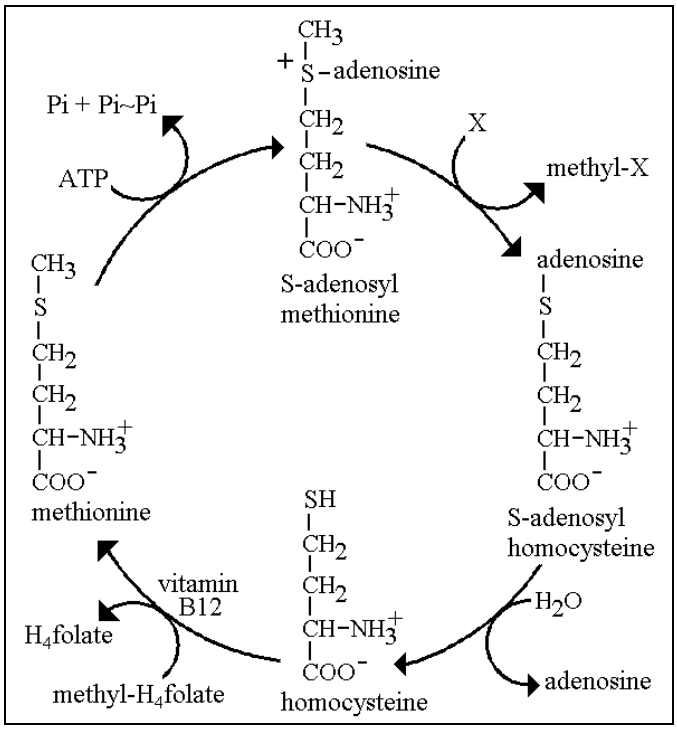
4. FOLATES (vit B9)

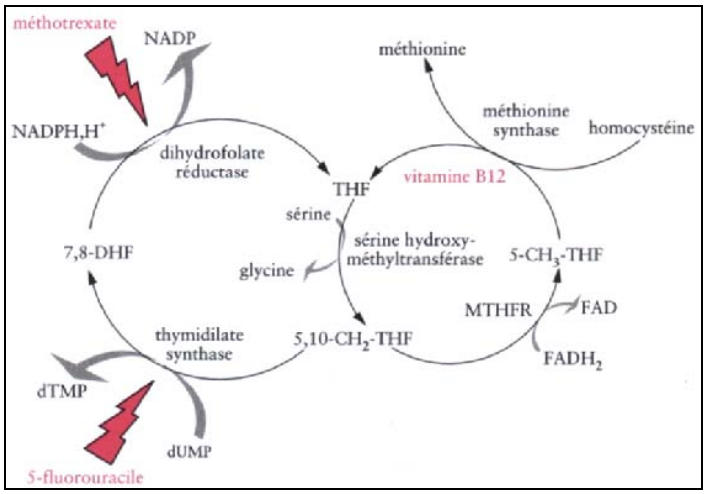
4.1. Structure



4.2. Source

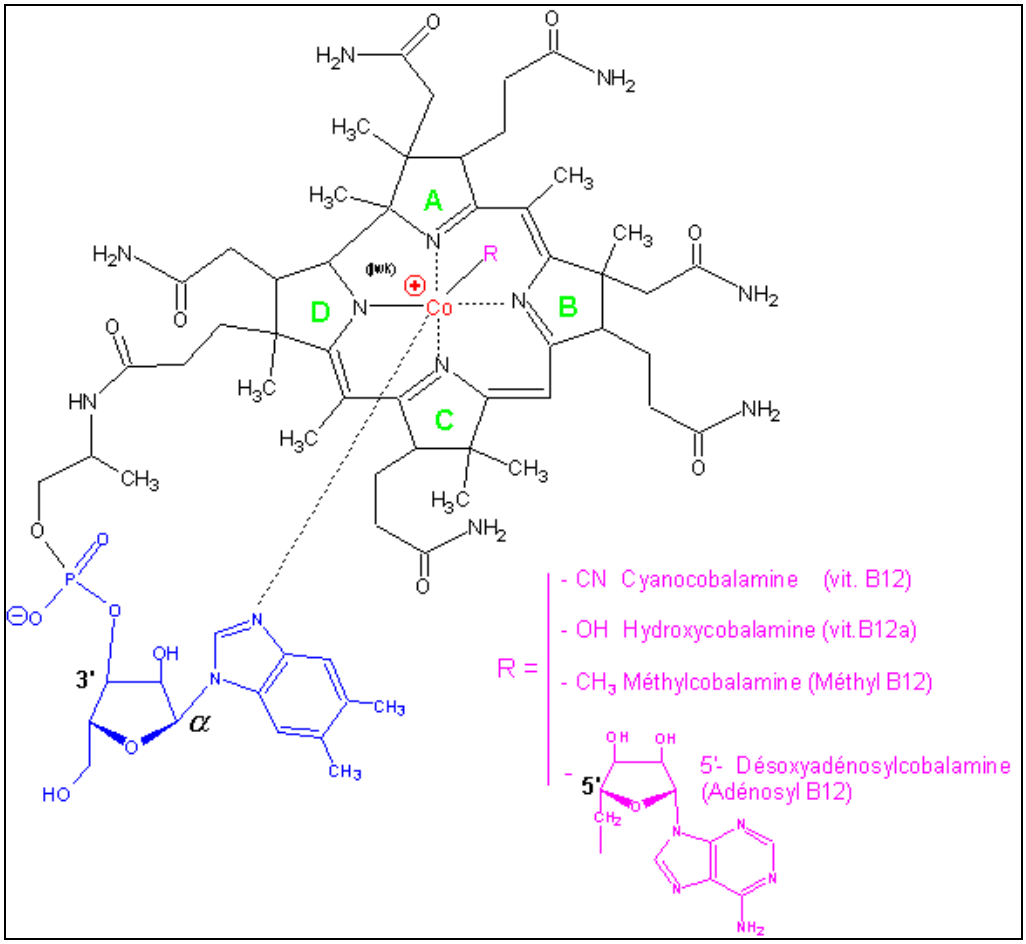
4.3. Réactions catalysées





5. COBALAMINE (vitamine B12)

5.1. Structure



- le cobamide coenzyme B12 **R = — 5' désoxyadénosine**
- les vitamines B12 :
  - **R = — CN** pour la cyanocobalamine (vit B12)
  - **R = — OH** pour l'hydroxycobalamine (vit B12a)
  - **R = — CH3** pour la méthylcobalamine (méthyl B12)

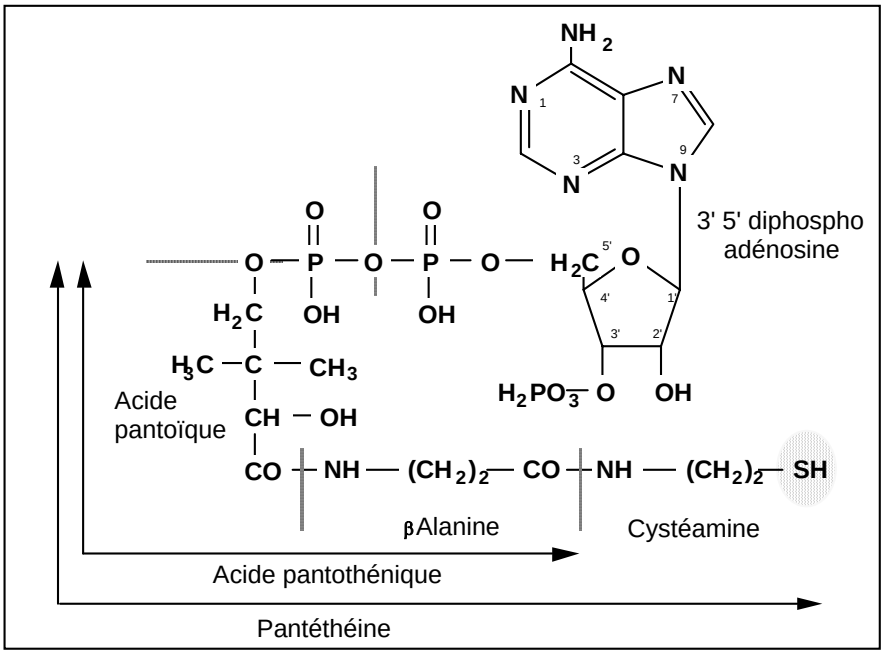
5.2. Source

5.3. Types de réactions où intervient le coenzyme B12

5.3.1. Isomérisations
5.3.2 Transfert de groupe CH_3

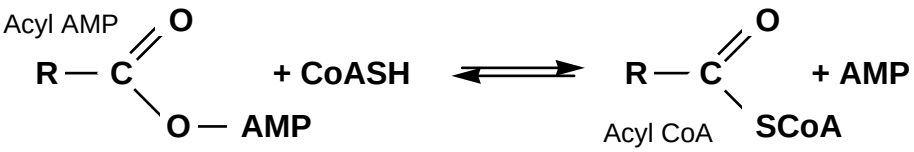
6. COENZYME A

6.1. Structure



6.2. Réactions catalysées

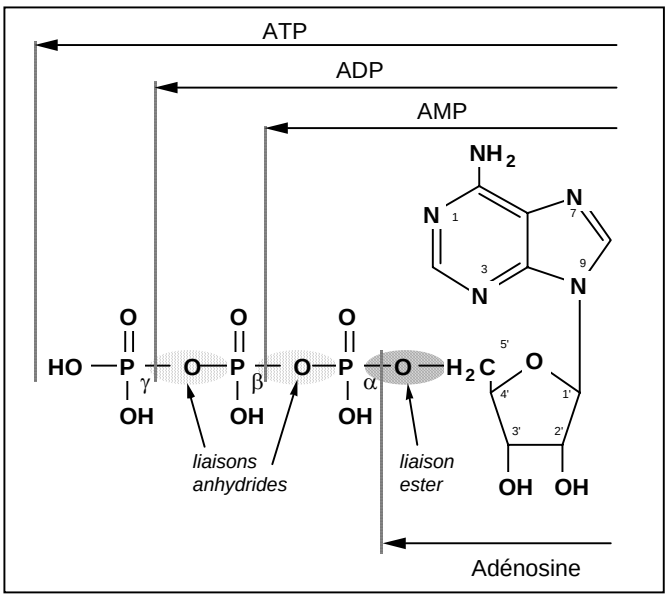
6.2.1. Réactions d'acylation



6.2.2. Réactions de condensation

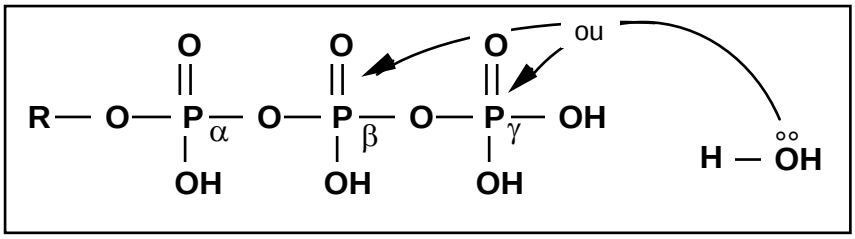
7. NUCLEOSIDES 5' MONO ET POLYPHOSPHATES

7.1. Structure de l'ATP



6.2. Propriétés de l'ATP

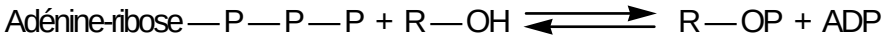
6.2.1 Hydrolyse de l'ATP



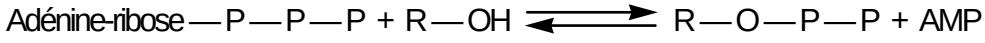
6.2.2. Complexation

6.3. Principaux types de réactions ou intervient l'ATP

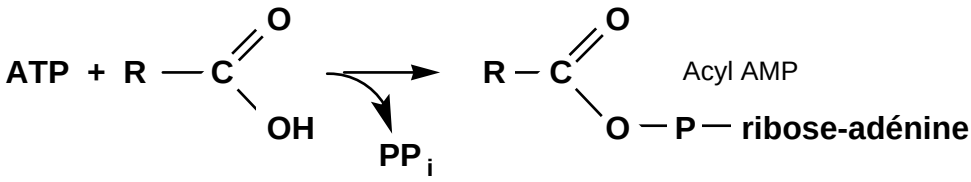
6.3.1. Transfert de phosphate

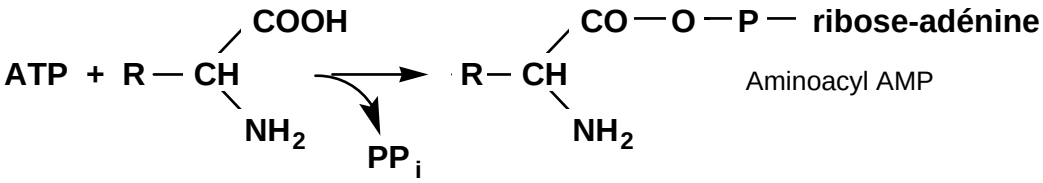


6.3.2. Transfert de pyrophosphate



6.3.3. Transfert d'adénosine monophosphate

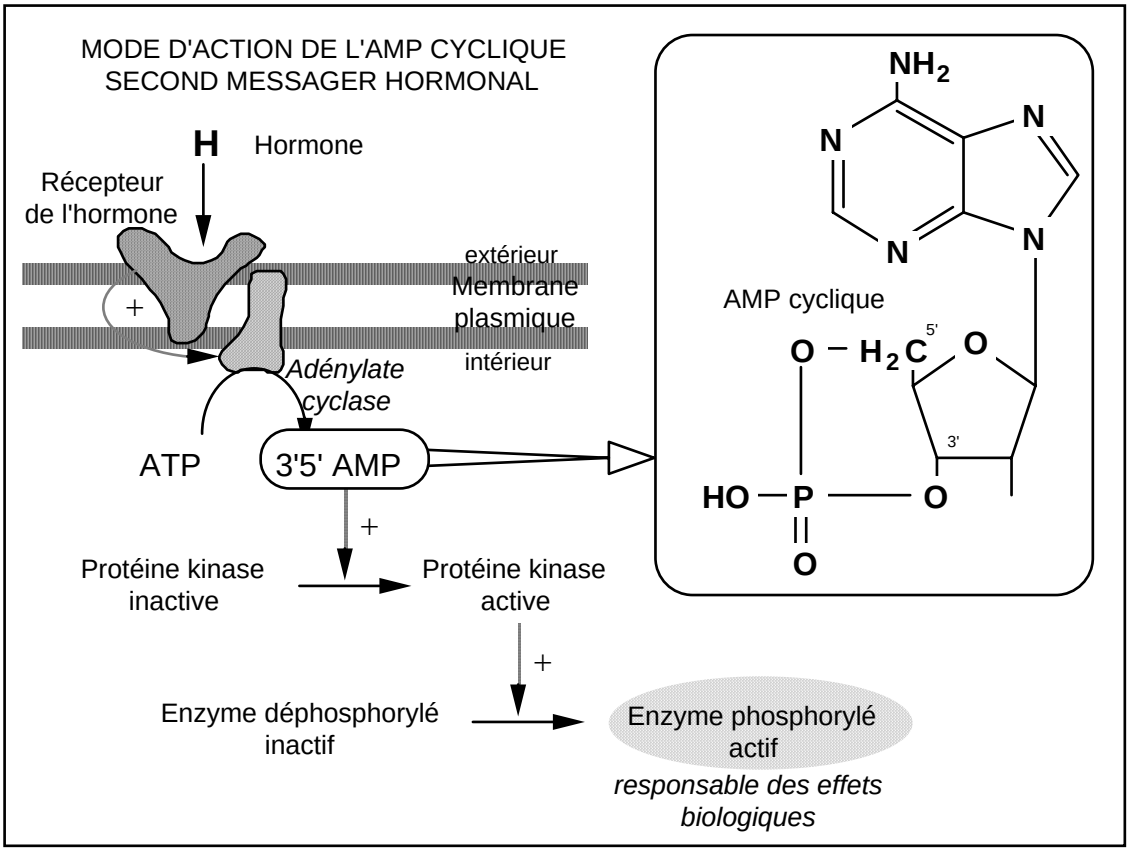




6.4. Autres nucleosides phosphates

6.4.1. Nucléosides diphospho – oses

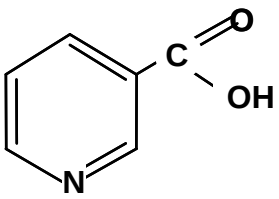
6.4.2. Nucléosides monophosphate cycliques


MODE D'ACTION DE L'AMP CYCLIQUE
SECOND MESSAGER HORMONAL
H
Hormone
Récepteur
de l'hormone
extérieur
Membrane
plasmique
intérieur
+
Adénylate
cyclase
ATP
3'5' AMP
+
Protéine kinase
inactive
Protéine kinase
active
+
Enzyme déphosphorylé
inactif
Enzyme phosphorylé
actif
responsable des effets
biologiques
NH2
N
N
N
N
AMP cyclique
O – H2C
5'
O
3'
HO — P — O
O

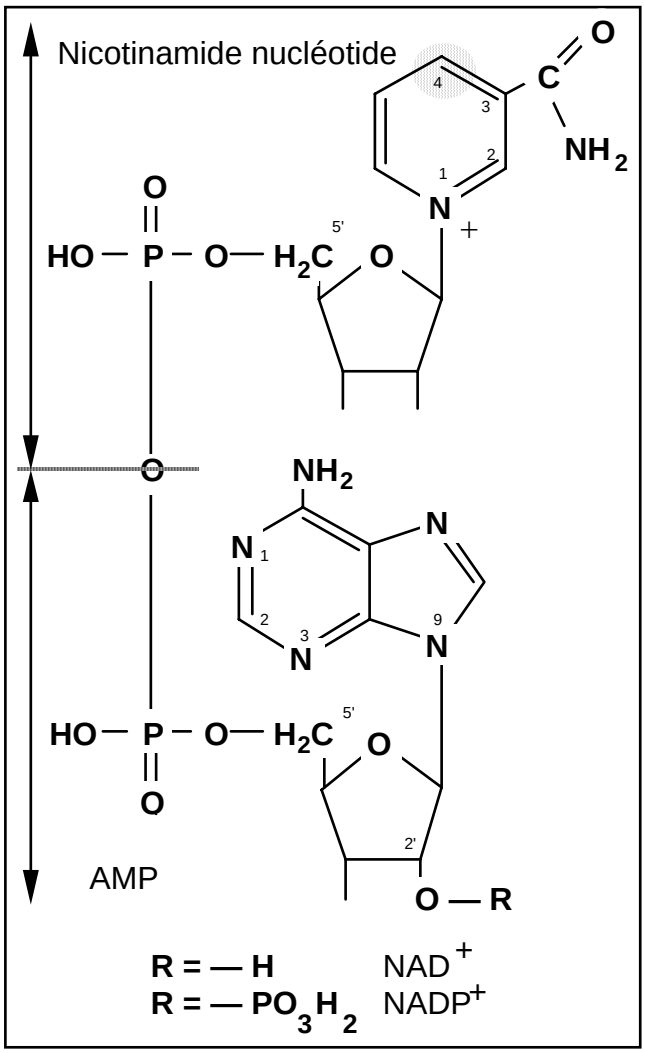
COENZYMES D'OXYDO-REDUCTION

1. COENZYMES NICOTINIQUES

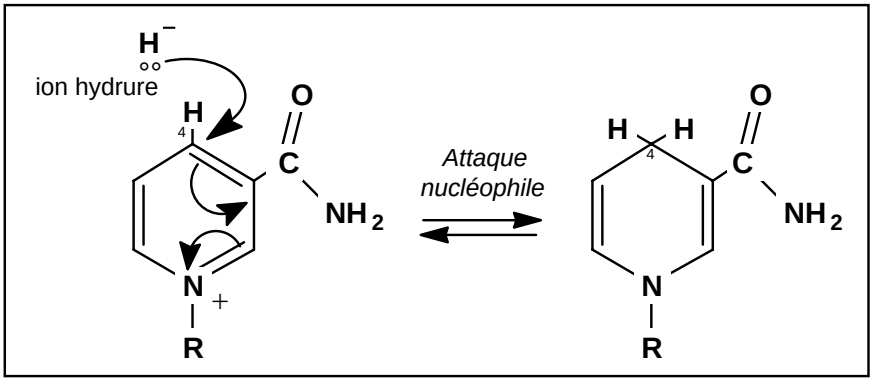
1.1. Structure

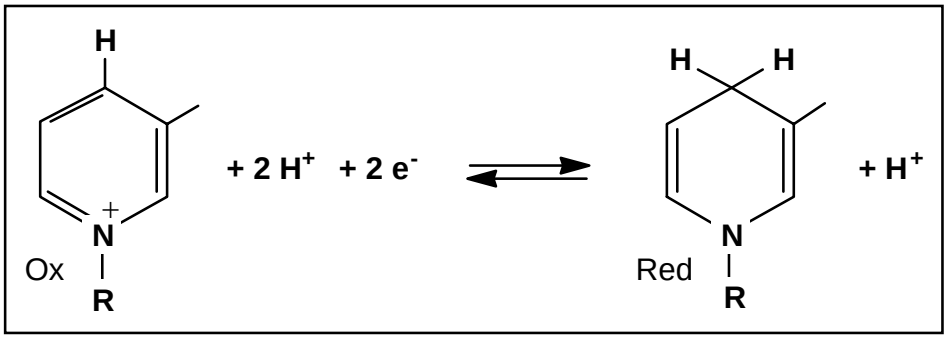


1.1.1. Nicotinamide adénine dinucléotide NAD^+



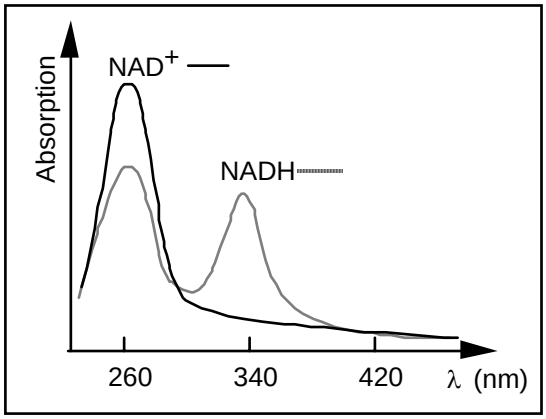
1.1.2. Le nicotinamide adénine dinucléotide phosphate $NADP^+$





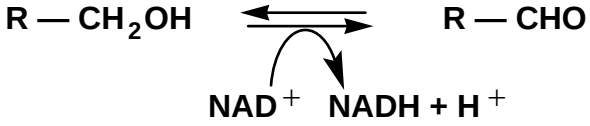
1.2. Sources

1.3. Propriétes optiques des coenzymes pyridiniques

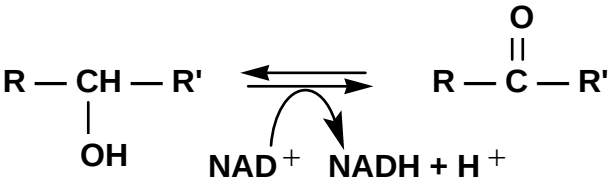


1.4. Principaux types de réactions catalysées par les coenzymes pyridiniques

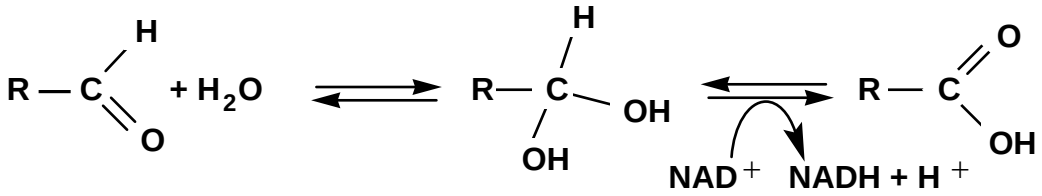
1.4.1. Oxydation d'alcools primaires



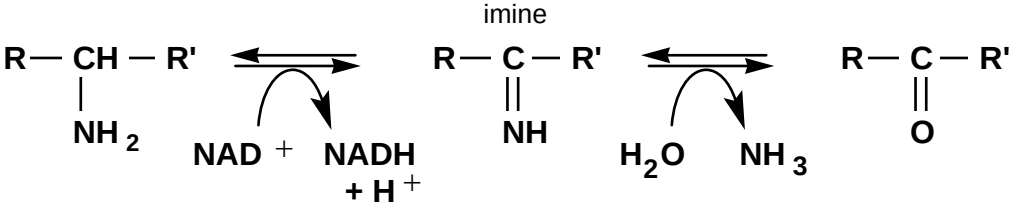
1.4.2. Oxydation d'alcools secondaires



1.4.3. Oxydation d'aldéhydes hydratés

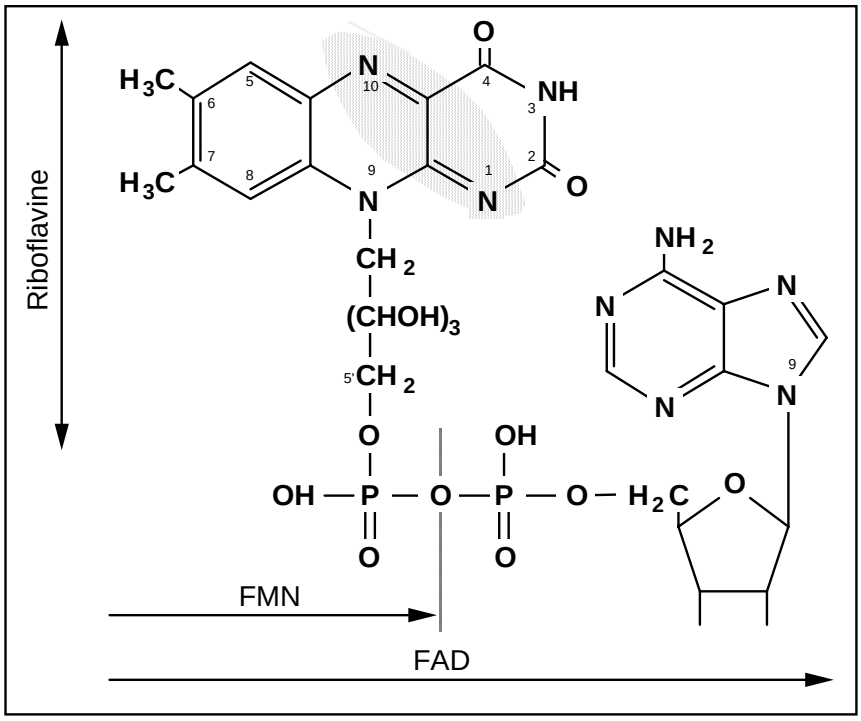


1.4.4. Transformation d'amines primaires en cétones



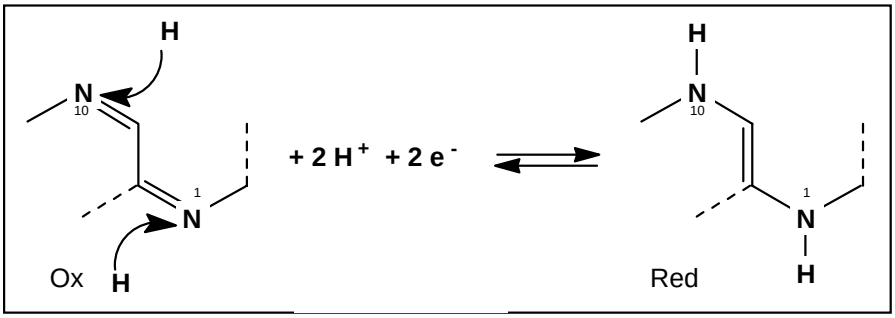
2. COENZYMES FLAVINIQUES

2.1. Structure

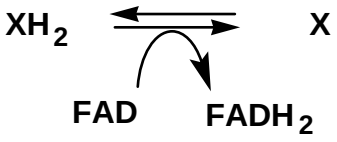


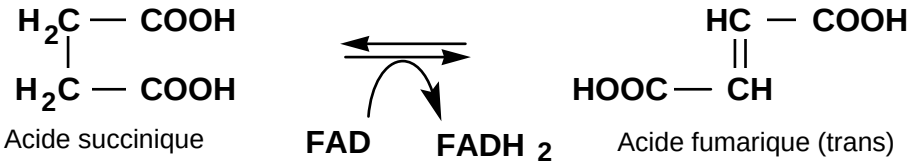
2.2. Sources

2.3. Réactions catalysées par les coenzymes flaviniques

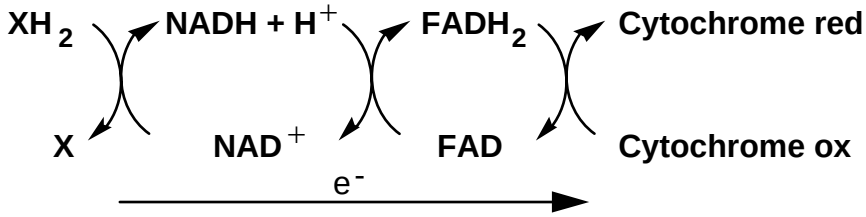


2.2.1. Hydrogènes provenant d'un substrat réduit XH_2

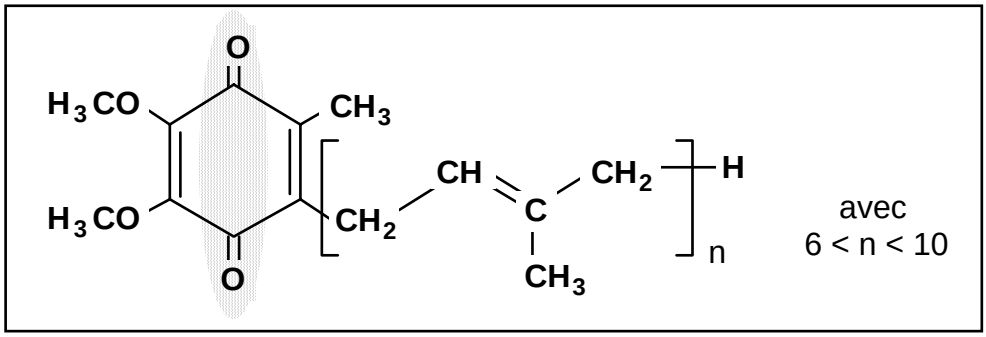


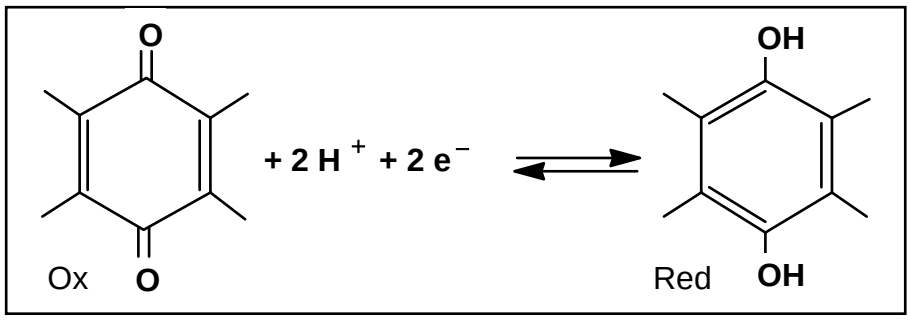


2.2.2. Hydrogènes issus de coenzymes nicotiniques réduits

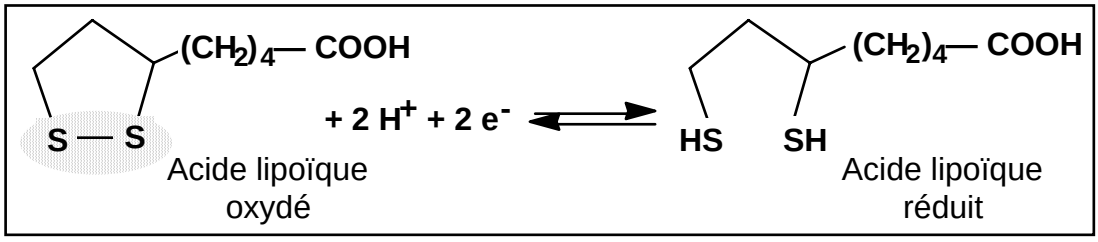


3. COENZYMES QUINONIQUES

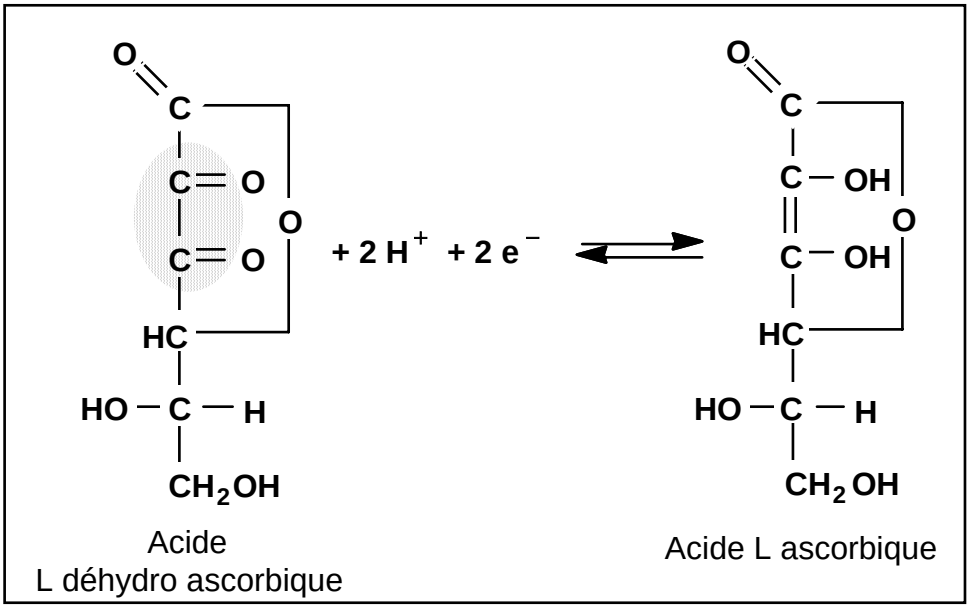




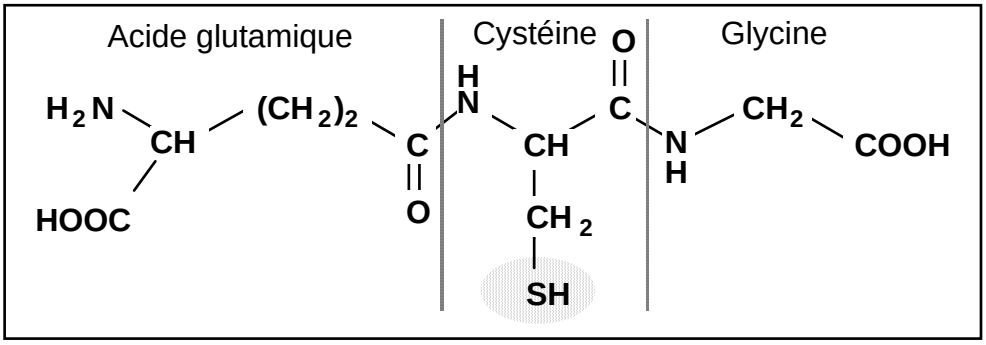
4. ACIDE LIPOIQUE



5. ACIDE ASCORBIQUE



6. LE GLUTATHION



$$G—S—S—G + 2\,H^+ + 2\,e^- \rightleftharpoons 2\,G—SH$$