

# I – Les protéines

## 1- Les acides aminés

- A- Structure générale
- B- Propriétés acido-basiques et optiques

## 2- Les peptides

- A- Définitions
- B- Structure primaire
- C- La liaison peptidique
- D- Exemples de peptides

## 3- La structure des protéines

# II – Les Enzymes

## 1 - Introduction – Définitions

## 2 - Les cofacteurs enzymatiques

- A - biotine (ou vitamine B8)
- B - Nicotinamide Adénine Dinucléotide ( $\text{NAD}^+$ )

## 3 - La réaction enzymatique

- A - réaction non-catalysée
- B - catalyse enzymatique
- C - notion de site actif
- D - introduction à la cinétique enzymatique
- E – mesures enzymatiques : quantification d'une biomolécule

# III – Techniques de Purification et d'Analyse

## 1 - Solubilisation – extraction des protéines

## 2 - Précipitation différentielle

- A - précipitation isoélectrique
- B - précipitation par des sels

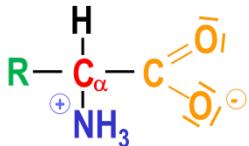
## 3 - Techniques chromatographiques

- A - échange d'ions
- B - exclusion / diffusion
- C - affinité

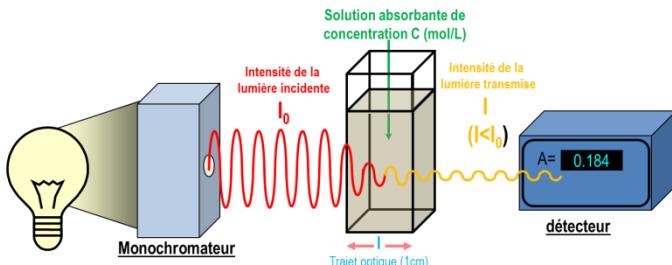
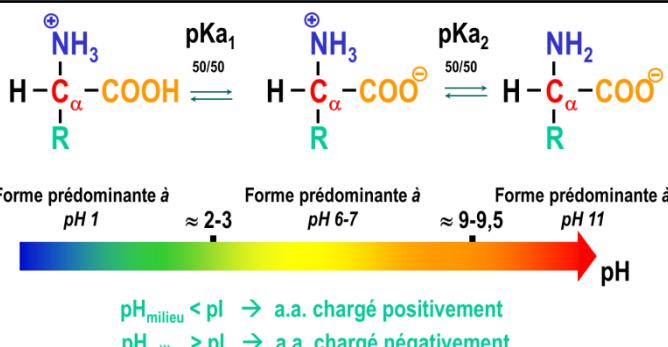
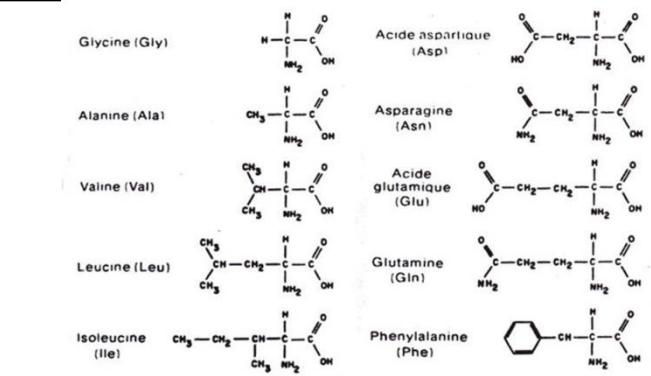
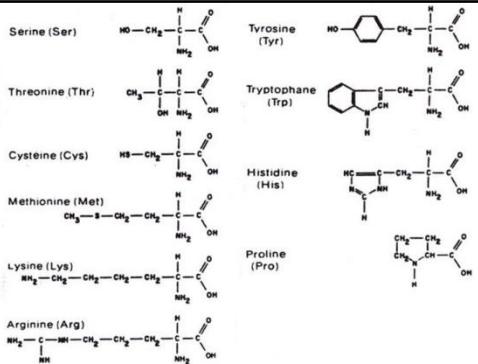
## 4 - Techniques électrophorétiques

- A - électrophorèse sur papier
- B - électrophorèse sur gel de polyacrylamide

## 5 - Technique immunoenzymatiques

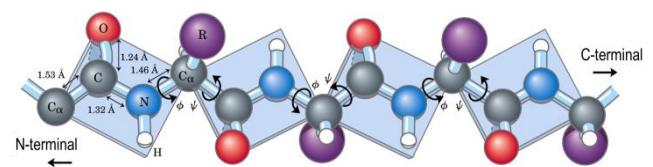
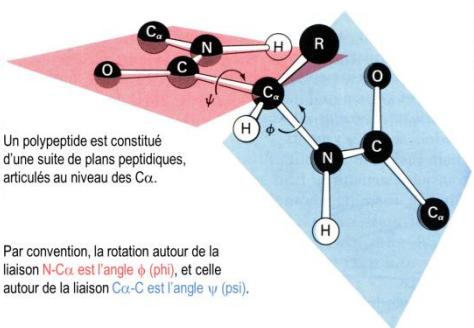
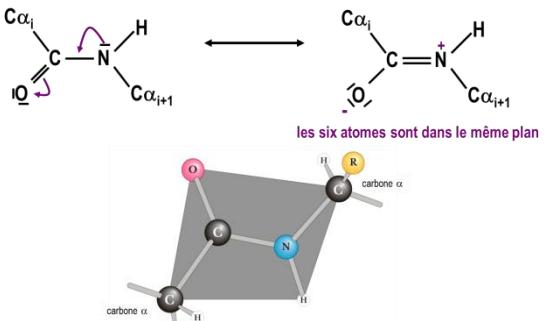
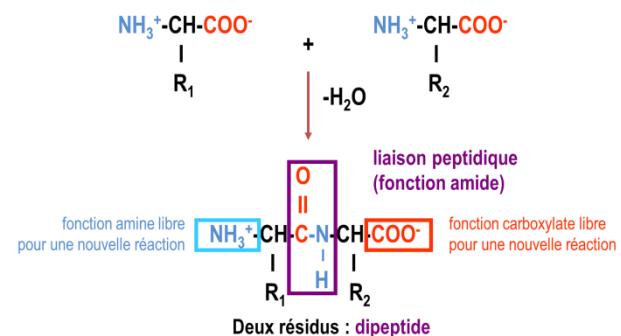
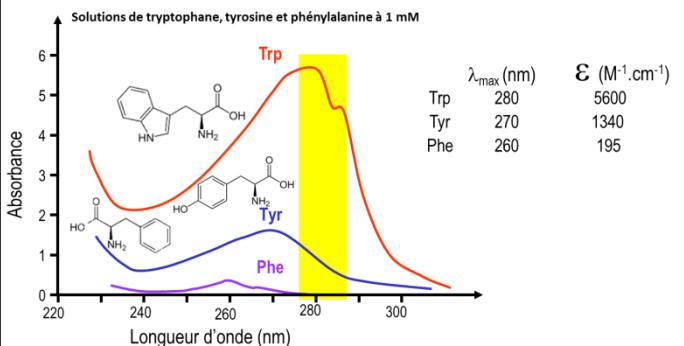


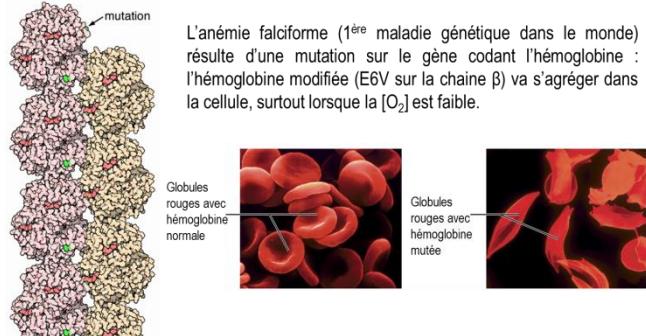
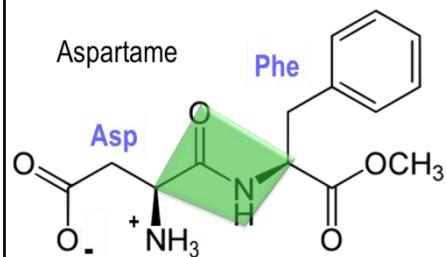
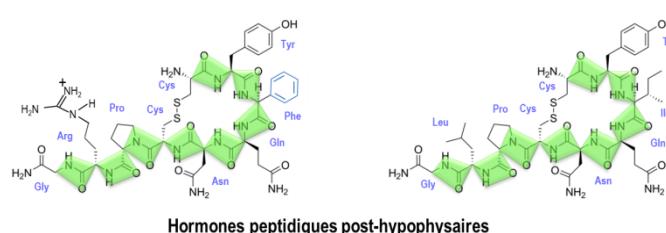
Symbole	Code 3 lettres	Nom
A	Ala	Alanine
C	Cys	Cystéine
D	Asp	Aspartate
E	Glu	Glutamate
F	Phe	Phénylalanine
G	Gly	Glycine
H	His	Histidine
I	Ile	Isoleucine
K	Lys	Lysine
L	Leu	Leucine
M	Met	Méthionine
N	Asn	Asparagine
P	Pro	Proline
Q	Gln	Glutamine
R	Arg	Arginine
S	Ser	Sérine
T	Thr	Thréonine
V	Val	Valine
W	Trp	Tryptophane
Y	Tyr	Tyrosine



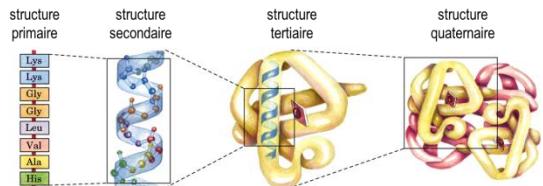
- La fraction de la lumière absorbée par une solution à une longueur d'onde donnée dépend :

- 1- de l'épaisseur de la solution que la lumière doit traverser (trajet optique)
- 2- de la concentration de la solution en espèces absorbantes

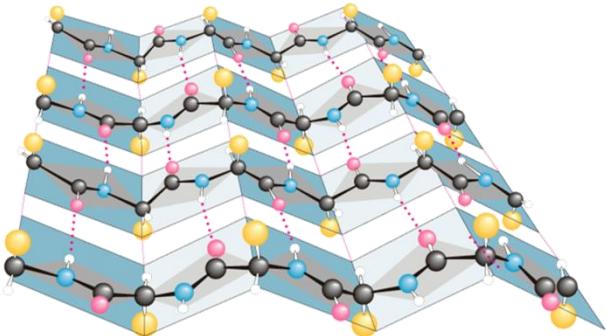
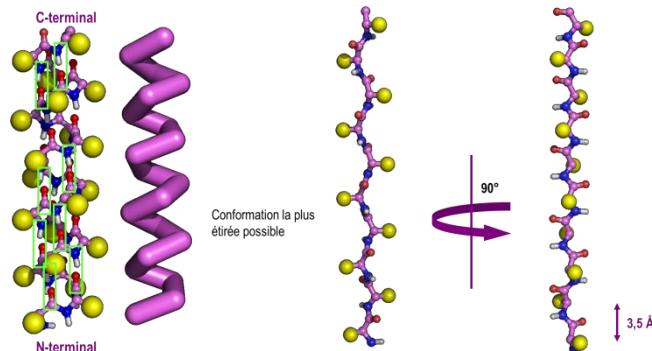




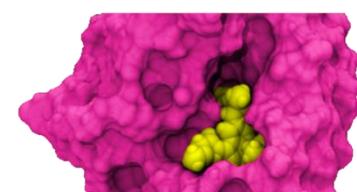
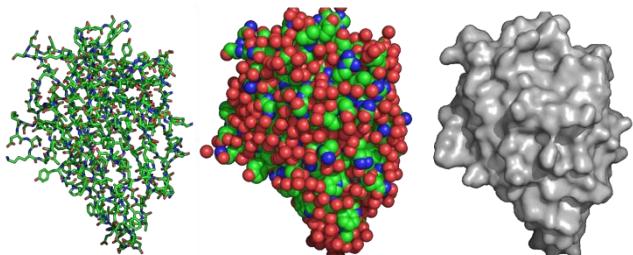
### Différents niveaux de structuration pour une protéine



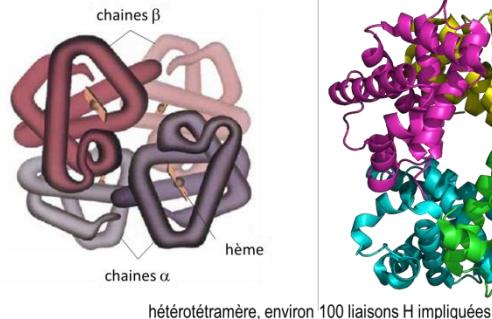
Structure primaire : enchaînement des acides aminés (séquence)  
 Structure secondaire : repliement local de la chaîne polypeptidique  
 Structure tertiaire : repliement global de la chaîne polypeptidique  
 Structure quaternaire : assemblage de plusieurs chaînes polypeptidiques



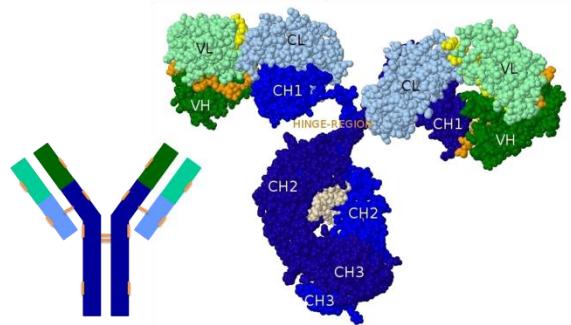
### La concanavaline A

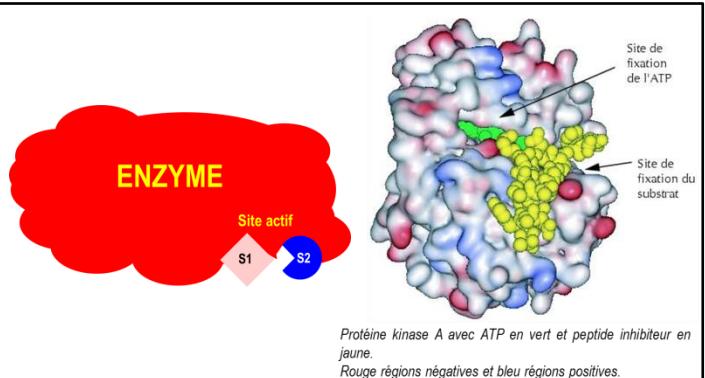
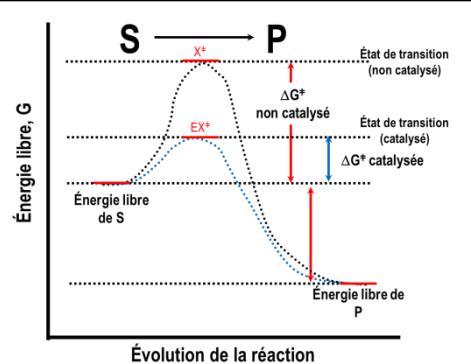
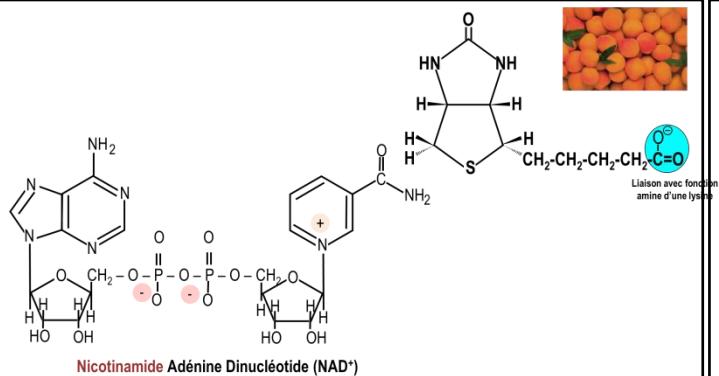


### L'hémoglobine



### Les immunoglobulines

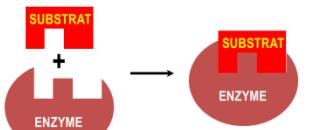




1894 MODELE DE FISCHER : CLE-SERRURE



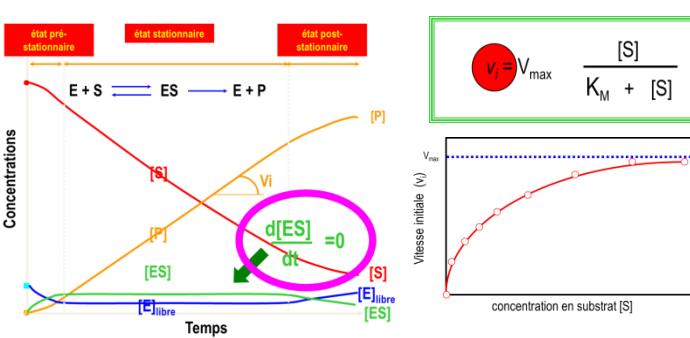
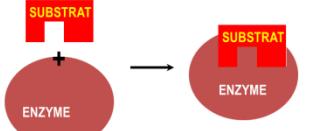
Hermann Emil Fischer



1958 MODELE DE KOSHLAND : AJUSTEMENT INDUIT

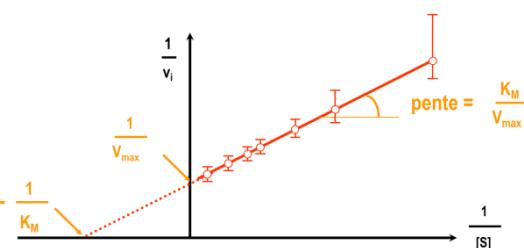


Daniel Koshland Jr.



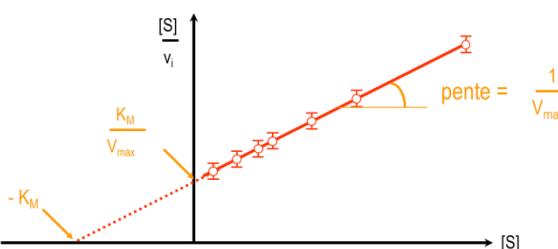
Lineweaver - Burk

$$\frac{1}{V_i} = \frac{K_M}{V_{max}} \times \frac{1}{[S]} + \frac{1}{V_{max}}$$



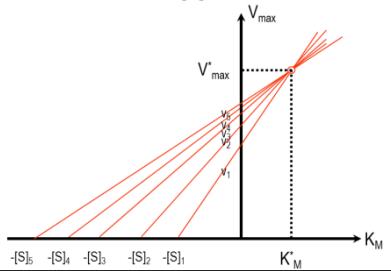
Hanes

$$\frac{[S]}{V_i} = \frac{K_M}{V_{max}} + \frac{1}{V_{max}} \times [S]$$



Eisenthal - Cornish-Bowden

$$\frac{V_{max}}{[S]} = V_i + \frac{V_i}{V_{max}} \times K_M$$



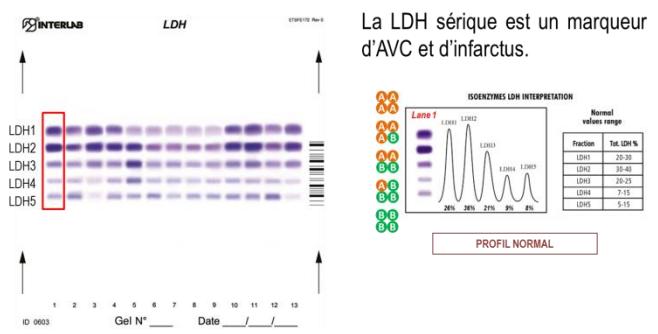
CHOLESTÉROL  
Méthode CHOD-PAP

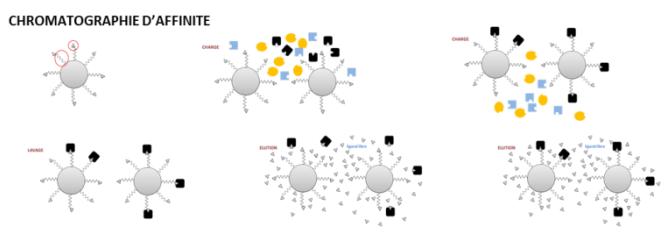
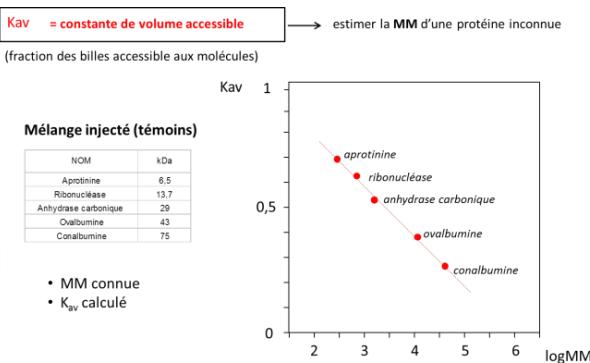
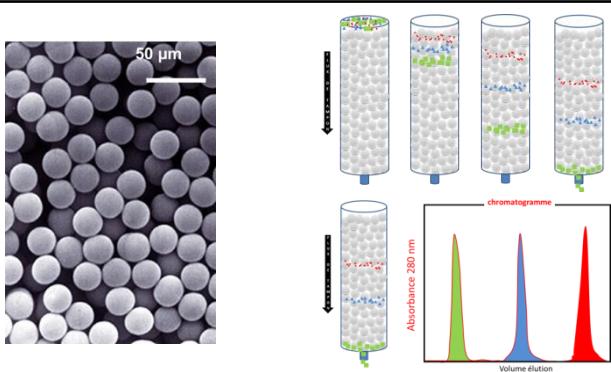
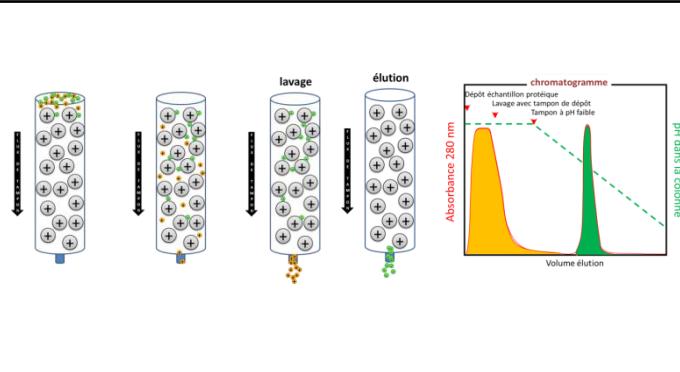
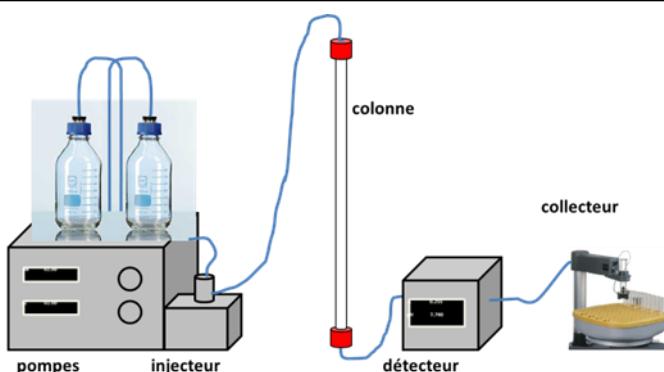
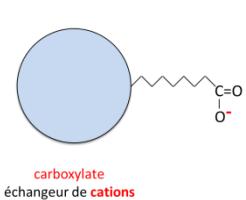
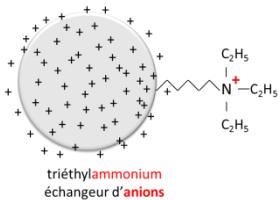
Réactif pour le dosage quantitatif  
du cholestérol total dans le plasma ou le sérum humains

Cholestérol estérifié → Cholestérol + acides gras libres

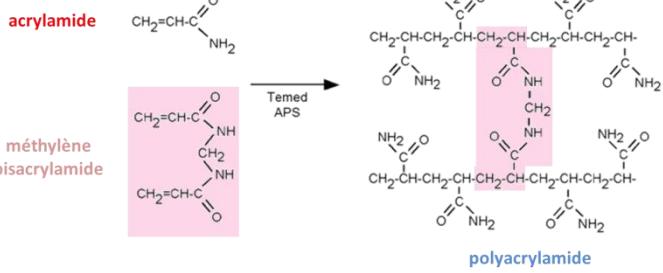
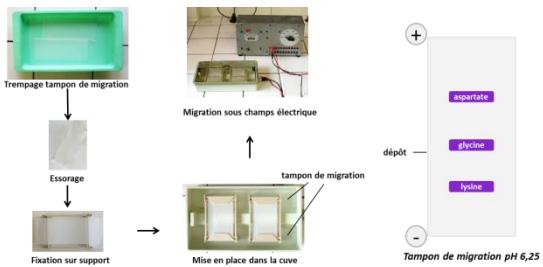
Cholestérol + O<sub>2</sub> → Cholesten 4 one 3 + H<sub>2</sub>O<sub>2</sub>

2 H<sub>2</sub>O<sub>2</sub> + Phénol + PAP → Quinonéimine (rose) + 4 H<sub>2</sub>O

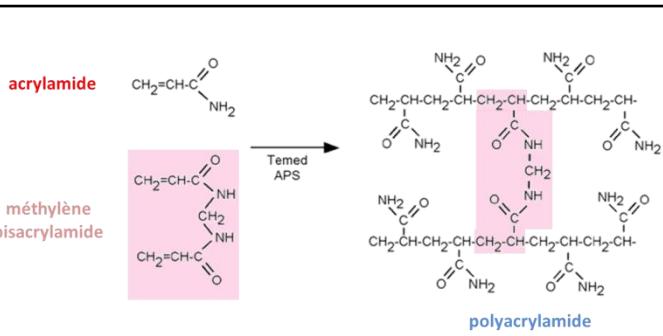
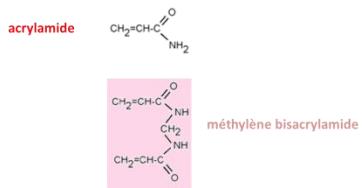




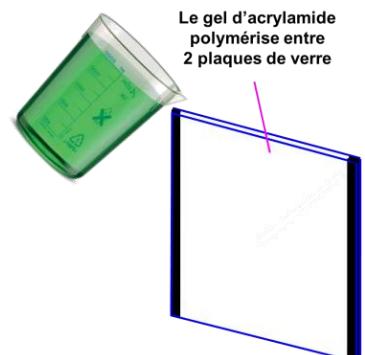
## ELECTROPHORESE SUR PAPIER

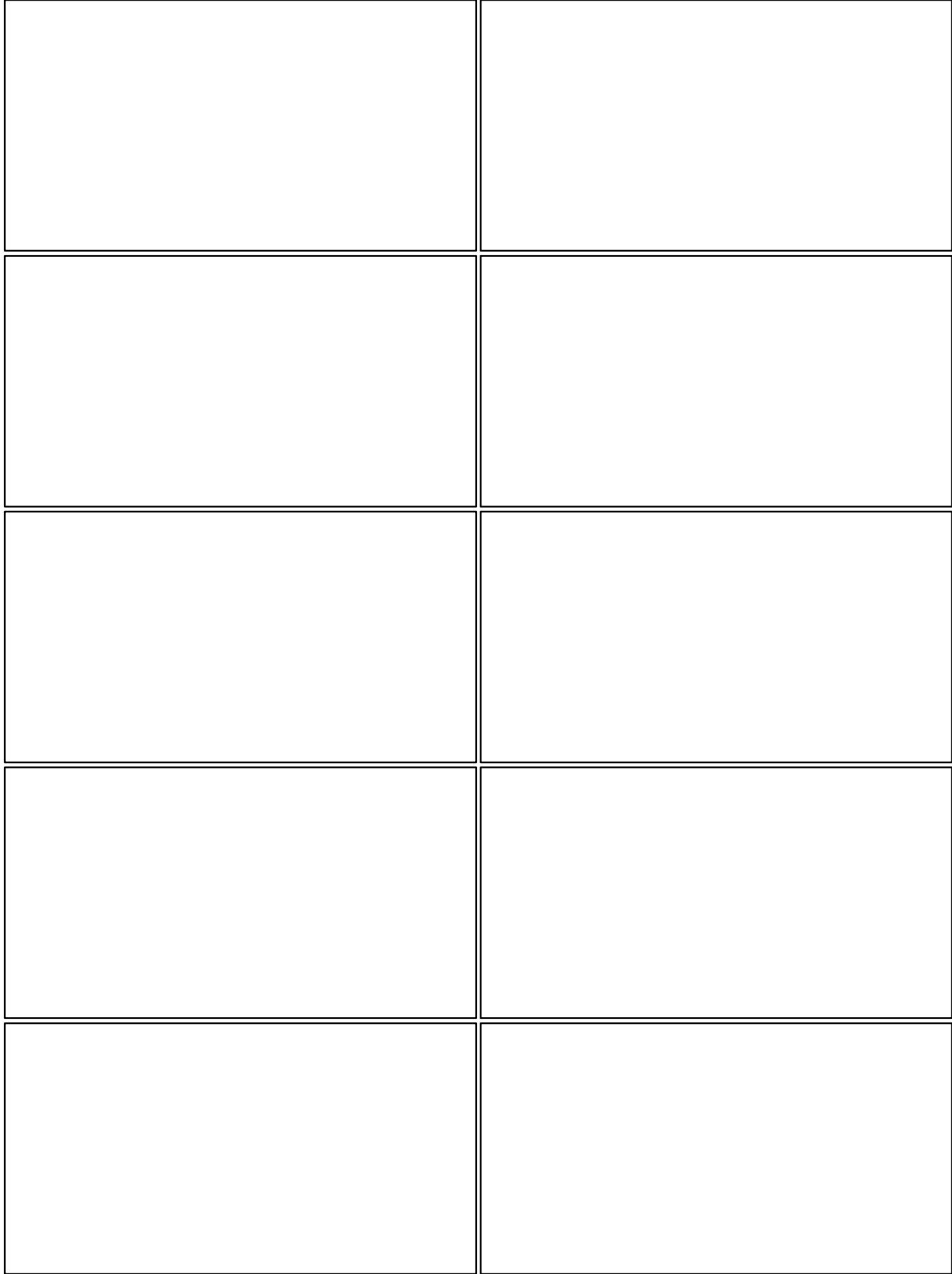


## ELECTROPHORESE SUR GEL ACRYLAMIDE



Acrylamide/bisacrylamide  
Tampon Tris pH6,8 ou 8,8  
SDS  
Persulfate d'ammonium  
**TEMED**





## Préparation des échantillons protéiques

Les protéines sont incubées en présence de :

- détergent anionique (SDS : sodium dodécylique sulfate)

$\text{CH}_2\text{-SH}$  | - agent réducteur ( $\beta$  mercaptoéthanol) : rompt les ponts disulfure

- tampon de haute densité (glycérol) / colorant bleu

- tampon de haute t.

