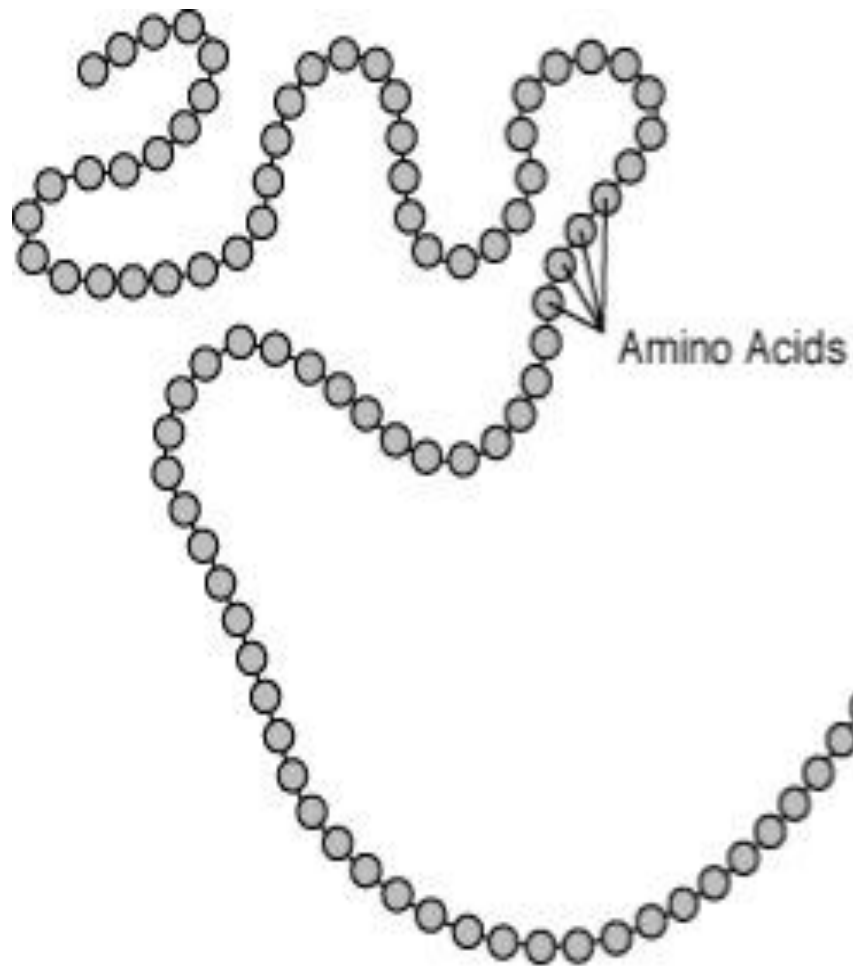


# General Proteins Color Tests

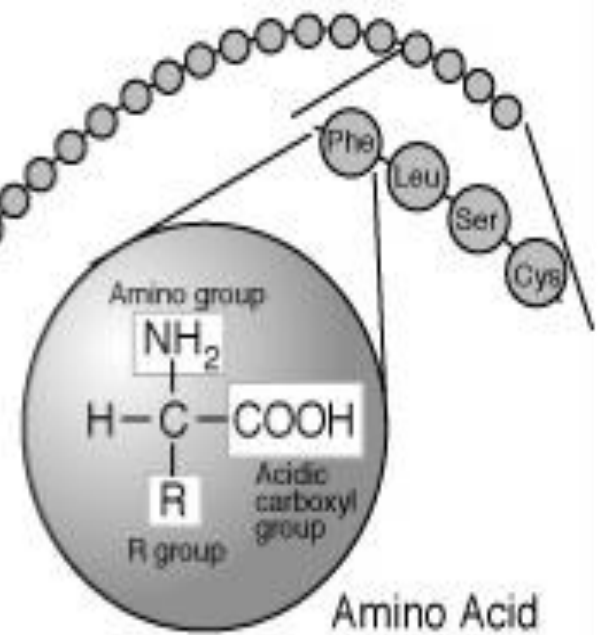
Done by :Sahar AL-subaie

# protein structure

**Proteins are polymers of amino acids covalently linked through peptide bonds into a chain.**



Primary protein structure  
is sequence of a chain of amino acids

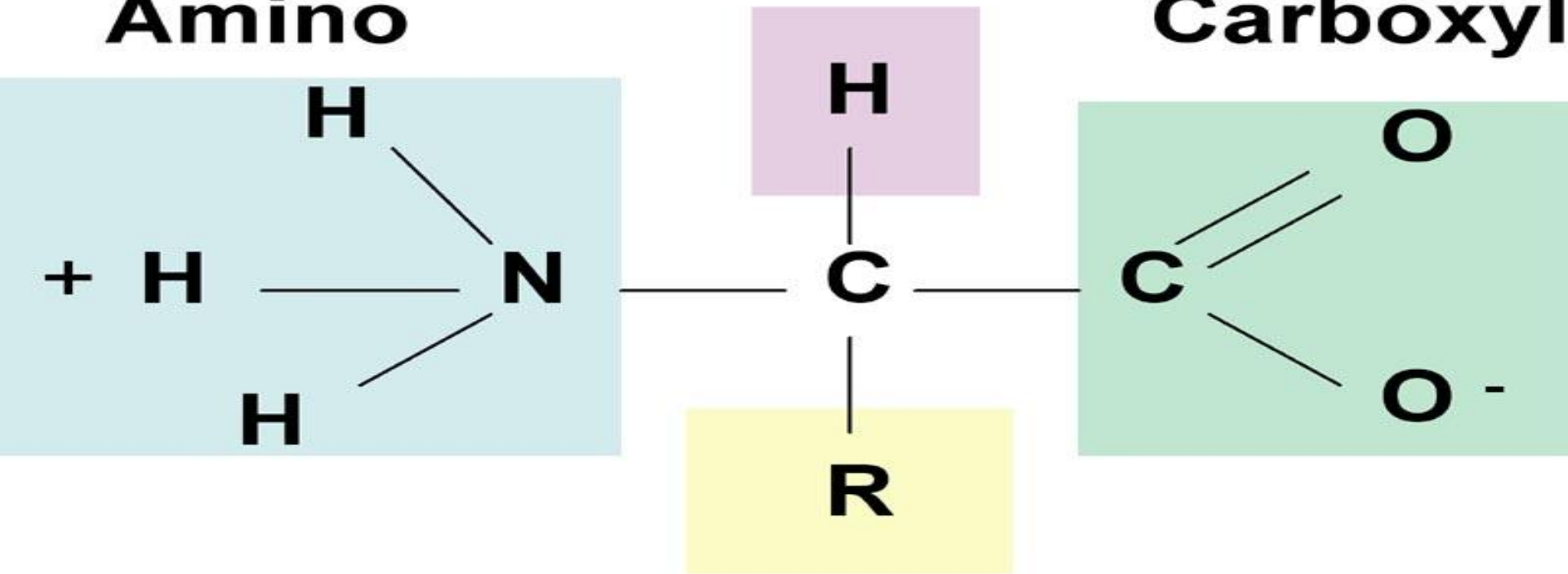


# Amino Acid Structure

Hydrogen

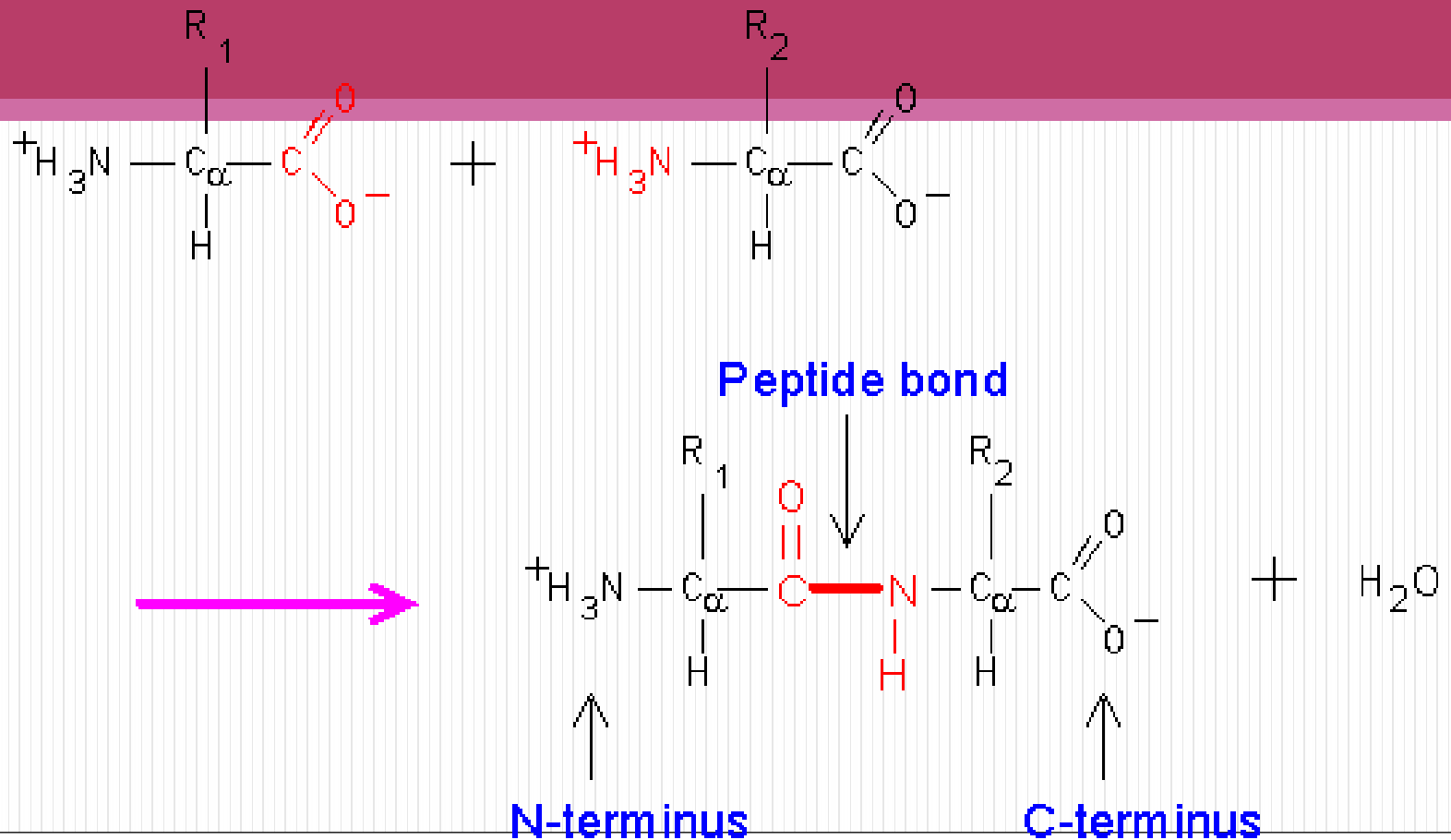
Amino

Carboxyl



R-group  
(variant)

# Peptide bond



# General Proteins Color Tests

- ❖ **Biuret Test**
- ❖ **Ninhydrin Test**
- ❖ **Xanthoproteic Test**

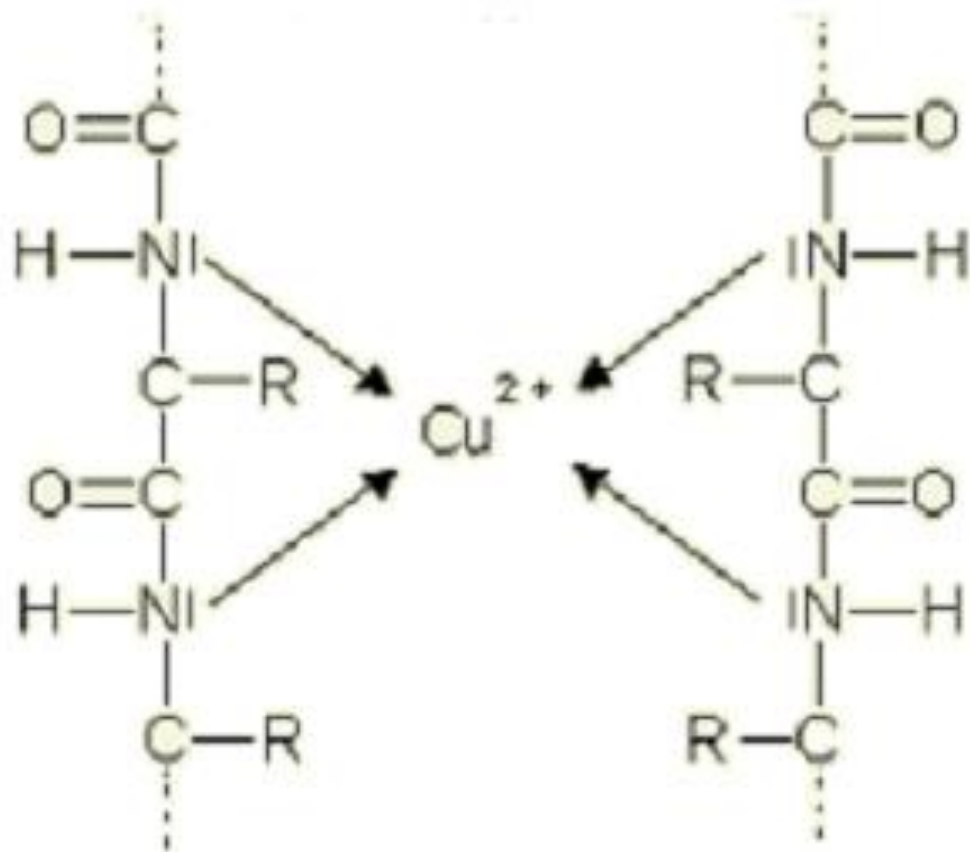
# Biuret Test

It is a general test used for detecting the presence of proteins and peptides.

# Principle:

$(\text{Cu}^{++}) + \text{peptide bonds } (\text{CO-NH}) \xrightarrow{\text{alkaline solution}}$   
pink-violet colored complex





at least two peptide bonds are required  
for a positive test.



- 1) Do amino acids answer the test?
- 2) What is the smallest size of peptides that can answer the test?

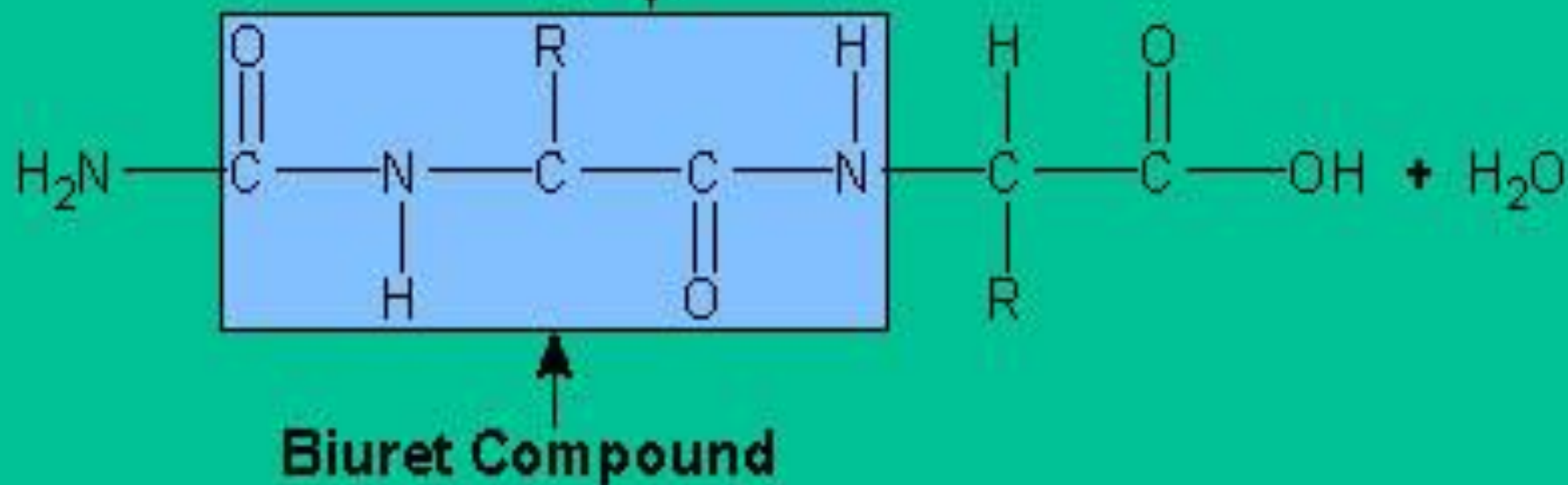
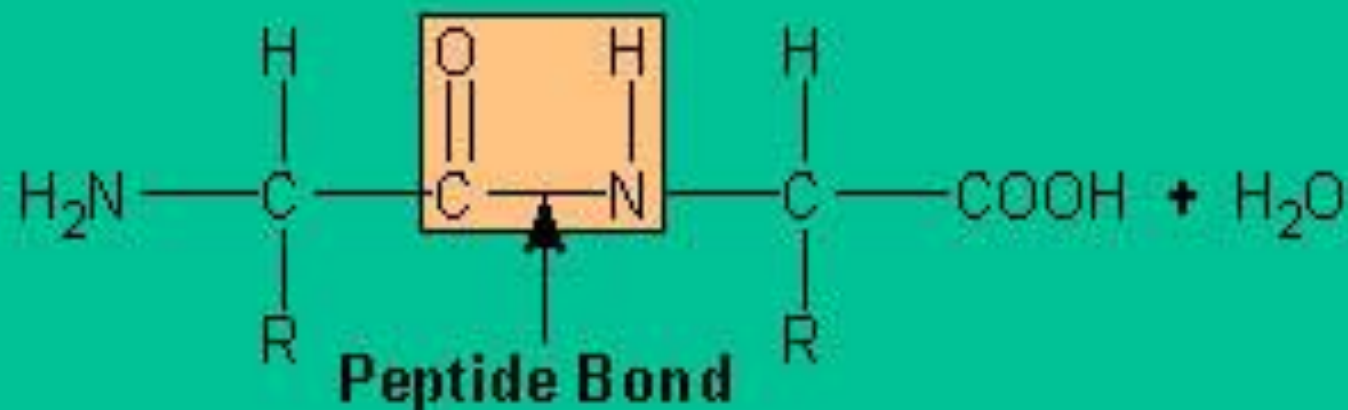
(some students can act as amino acids and make peptide bonds by holding their hands like this



to answer the 2<sup>nd</sup> question)

# Answers:

- 1) The free amino acids lack the peptide bonds ,so they do not answer this test.
- 2) Tripeptid = 3 amino acids or 2 peptide bonds



Procedure:

1% casein	1% glucose	1% sucrose	1% alanine	1% egg albumin	H <sub>2</sub> O
1 ml	1 ml	1 ml	1 ml	1 ml	1 ml
10% NaOH					
1 ml	1 ml	1 ml	1 ml	1 ml	1 ml
0.1% CuSO <sub>4</sub>					
5 drops	5 drops	5 drops	5 drops	5 drops	5 drops



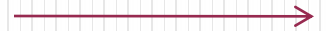
# Ninhydrin Test

It is a general test used for detecting the presence of proteins and peptides and amino acids.

# principle

$\alpha$ -amino group (in amino acids)+ninhydrin

blue colored complex (liberate  $\text{NH}_3$  with ninhydrin).



Ninhydrin is used to locate the  $\alpha$ -amino acid in paper chromatography as a blue to purple spots.

Melamine

Melamine

Histidine

Tryptophan

Cyanuric Acid

Cyanuric Acid

Glycine

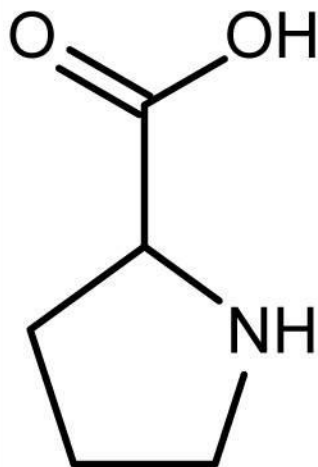
Fingerprint





It also permits the quantitative estimation  
of  $\alpha$ -amino acid and peptides in  
column chromatography

Proline give yellow color due to lack of  $\alpha$ -amino group



# Xanthoproteic Test

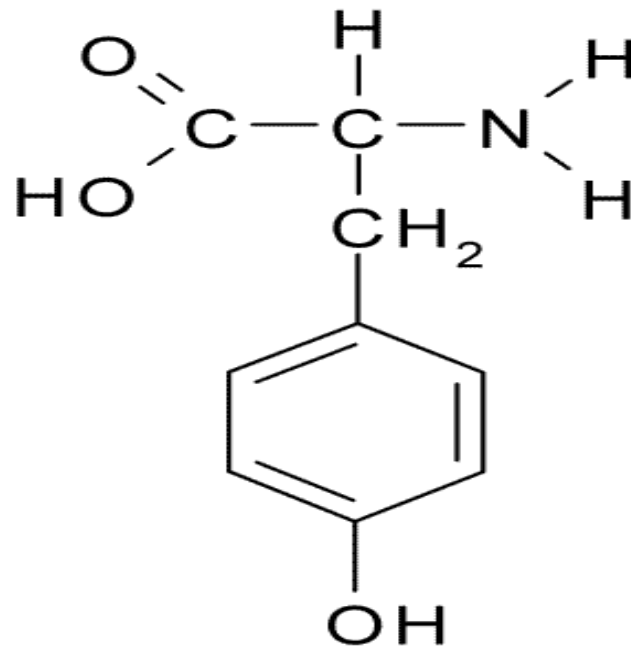
It is a general test for proteins depending on the presence of 2 amino acids (tyrosine & tryptophan)



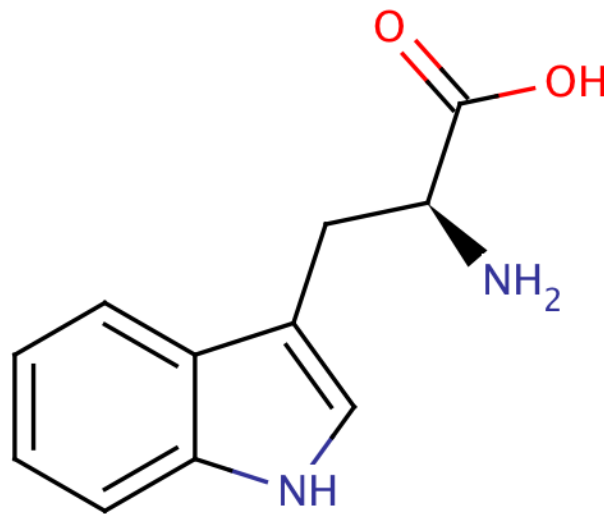
# Principle:

Tyrosine or Tryptophan + con.HNO<sub>3</sub>  $\xrightarrow{\text{heat}}$  Yellow color

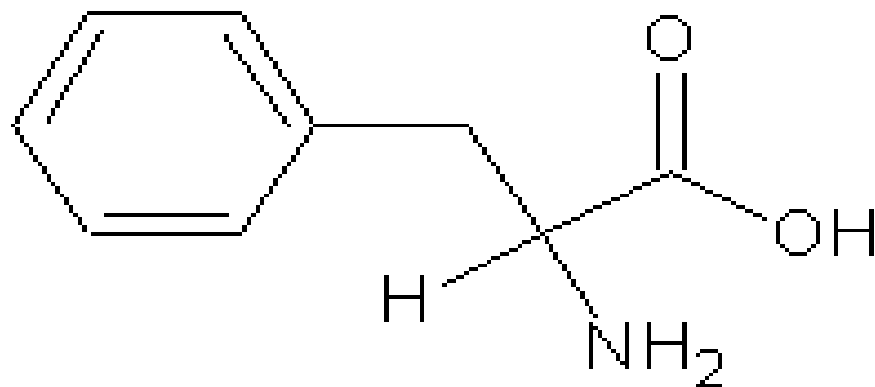
# Tyrosine structure:



# Tryptophan structure:



Phenylalanine does not produce the color because the benzene ring is not activated for nitration.



**Phenylalanine**

I thank  
you!

