



French Agricultural Research Centre For International Development

CHARACTERIZATION OF COTTONSEED RAW MATERIALS

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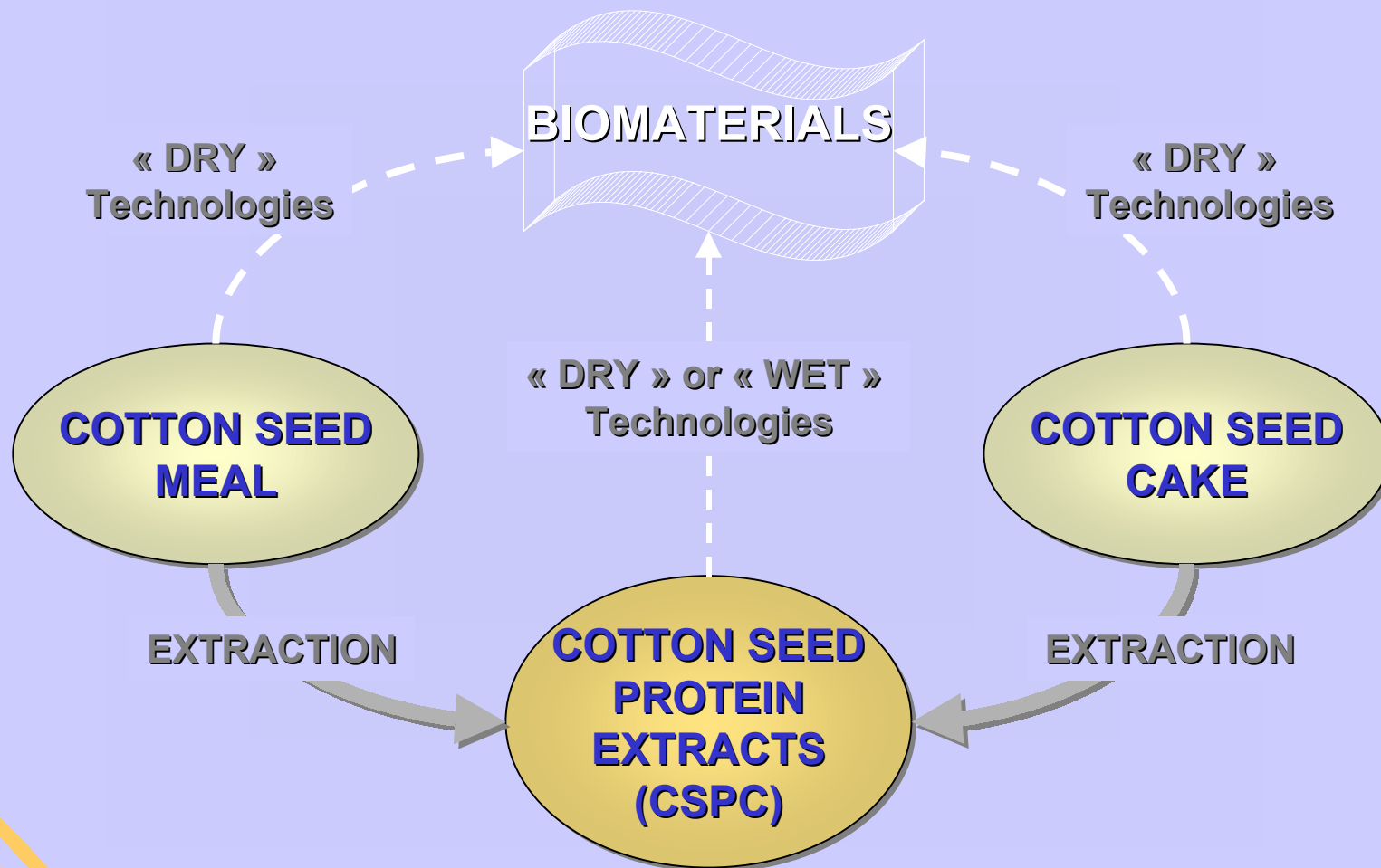
COTONBIOMAT PROJECT

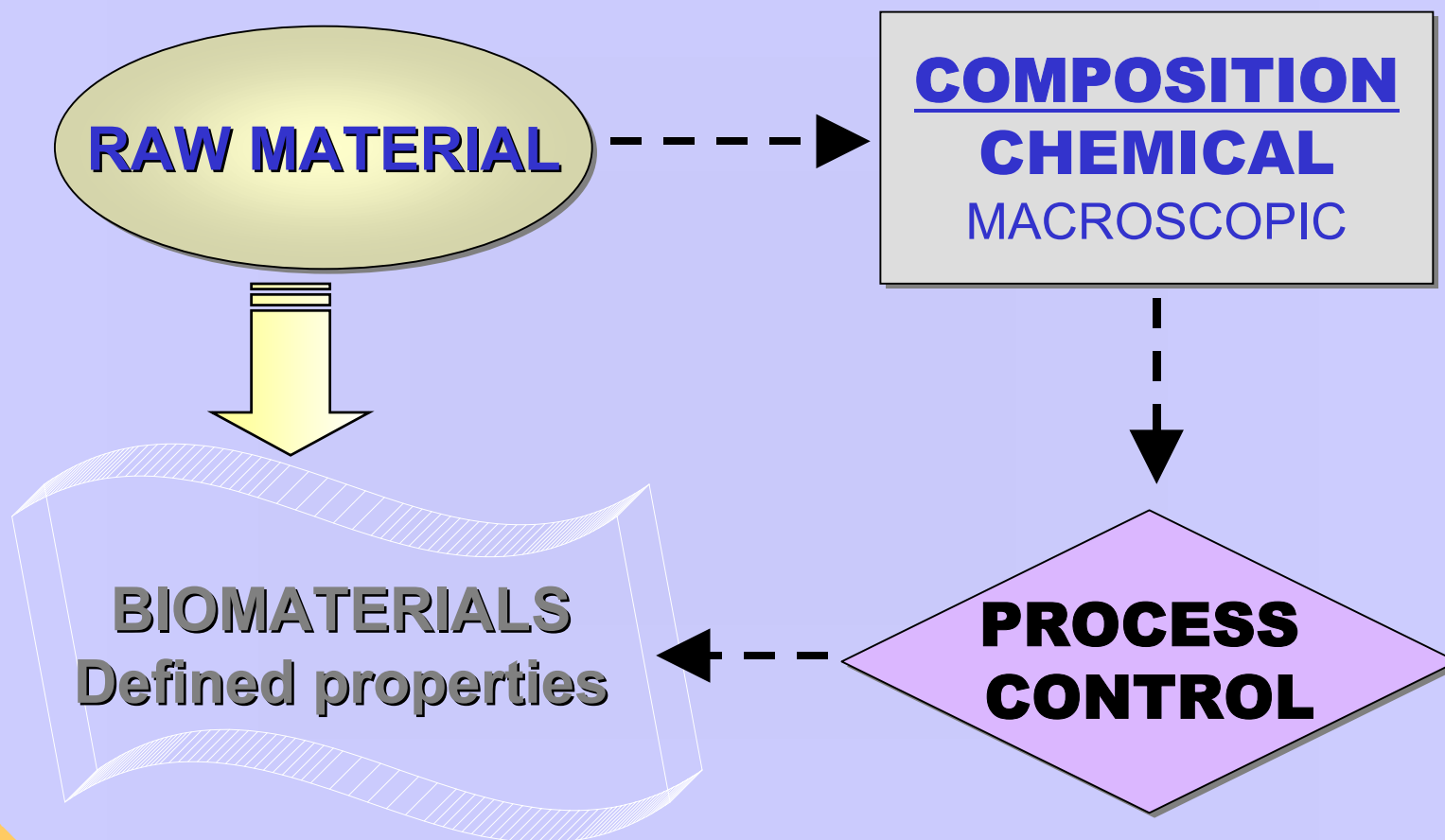
FINAL WORKSHOP October 20th – 21st, 2005

Hotel Gloria

Rio de Janeiro, Brazil







PROTEINS :

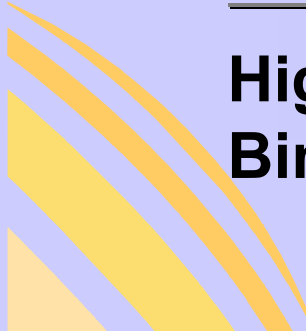
**Constituent elements of material structure.
Coexistence of several species which act on
physico-chemical properties of solution and films**

FATS (oil) :

**Hydrophobic components.
Influence on emulsion behaviour of solution and
barrier properties of films**

GOSSYPOL (Free or Bound) :

**Highly reactive terpenoid. Give color.
Binds to protein and acts as a natural crosslinker.**

Decorative graphic element consisting of several curved, overlapping lines in shades of yellow and orange, located in the bottom left corner of the slide.

REACTIVE LYSINE :

Lysine with free ϵ -amino group.

The most amino-acid involved in crosslinking reactions.

AMINO-ACIDS :

Influence of transformation processes on amino-acid profile.

SUGARS :

Hydrophilic components. Could act as plasticizers or react with Proteins through Maillard like reaction

FIBERS (cellulose, hemicelluloses, lignin) :

Lower the protein fraction.

Influence on mechanical properties of films

A decorative graphic consisting of several overlapping diagonal stripes in shades of yellow and orange is located in the bottom left corner of the slide.

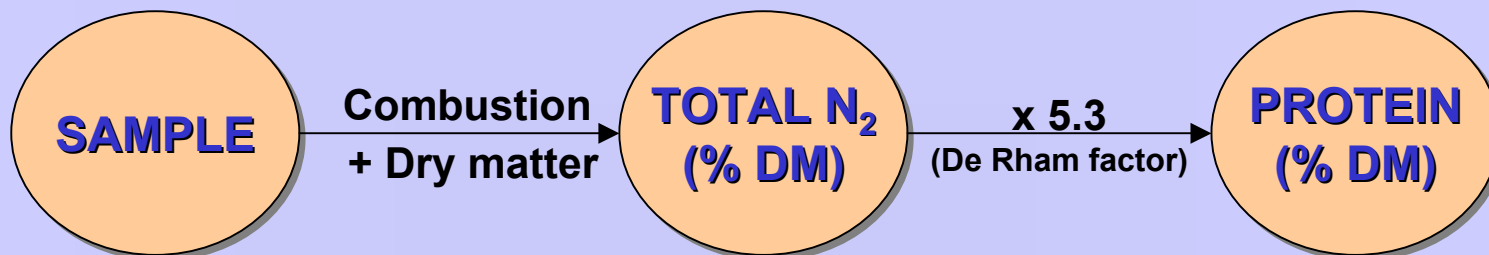


CRUDE PROTEIN CONTENT

**Elementary analysis of nitrogen : internal procedure N° PS0931.
Conversion factor according to De Rham, 1982.**



DETERMINATION OF THE PROTEIN CONTENT



PROTEIN CONTENT OF RAW MATERIALS (dry basis)

Cotton seed meal :	28 – 35 % [36 %]*	* Glandless cottonseed sample
Cotton seed cake :	33 – 46 % [56 %]*	
Protein concentrate :	50 – 60 % (from meals) 45 – 56 % (from cakes)	
Freeze-dried Protein isolate :	85%	



FATS CONTENT

From Bourély, J.

"COTON ET FIBRES TROPICALES ", 1982, Vol 37, fasc.2, 183-195



DETERMINATION OF FAT CONTENT



FATS CONTENT OF RAW MATERIALS (dry basis)

Cotton seed meal :	28 – 36 % [38 %]*
Cotton seed cake :	4 – 10% [1 %]*
Protein concentrate :	2 – 10% (from meals) 4 – 20% (from cakes)
Freeze-dried Protein isolate :	N

* Glandless
cottonseed
sample

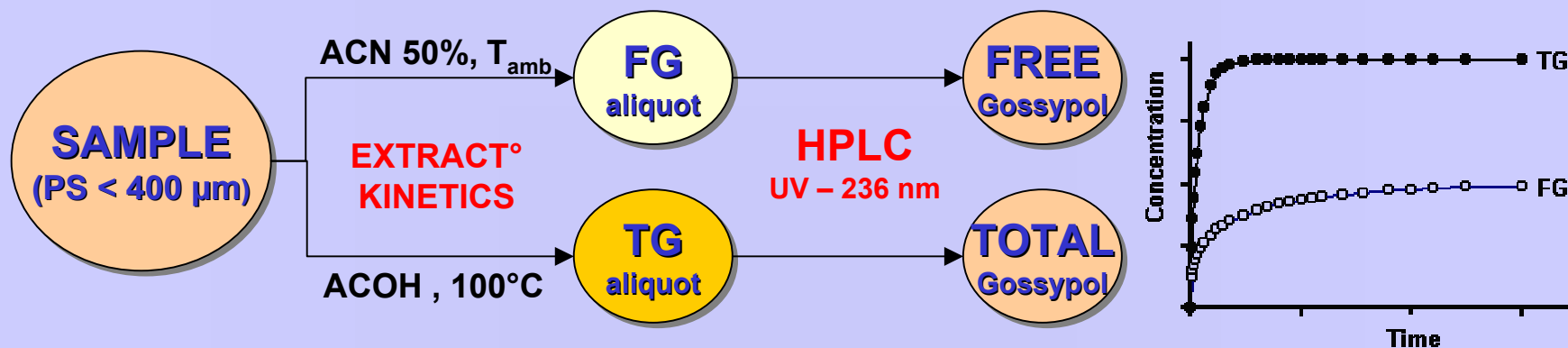


FREE and TOTAL GOSSYPOL CONTENT

**Adaptation of the method of Marquié, C. and Bourély, J.
In "COTON ET FIBRES TROPICALES " 1991, Vol 46, fasc.1, 33-55**



DETERMINATION OF GOSSYPOL CONTENT



GOSSYPOL CONTENT OF RAW MATERIALS (dry basis)

	<u>FREE</u>	<u>TOTAL</u>
Cotton seed meal :	0.4 – 1.3 %	0.9 – 1.7 %
Cotton seed cake :	Neglig.	0.3 – 1.1 %
Protein concentrate :	Neglig. Neglig.	1.9 – 3.2 % (from meals) 0.2 – 1.5 % (from cakes)

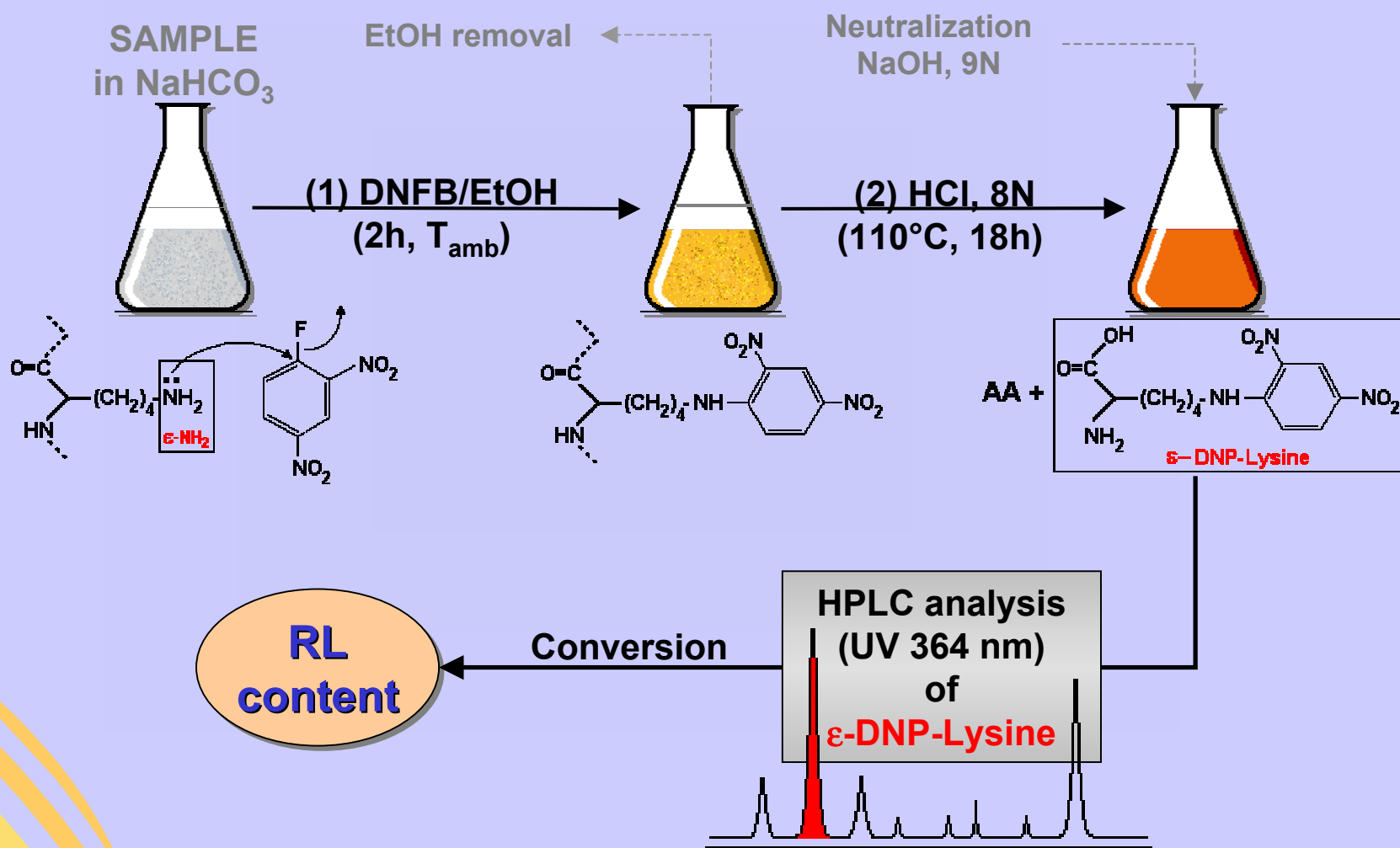


REACTIVE LYSINE CONTENT

**Adaptation of the method of Marquié C., Tessier A. M., Aymard C., Guilbert S.
in J. Agric. Food Chem. 1997, 45, 922-926.**



PROCEDURE OF REACTIVE LYSINE (RL) DETERMINATION



RL CONTENT OF RAW MATERIALS (dry basis)

Cotton seed meal :	0.9 – 1.4 % [1.5%]*
Cotton seed cake :	0.7 – 0.9 % [2.14%]*
Protein concentrate :	1.7 – 2.3 % (from meals) 0.8 – 1.4 % (from cakes)
Freeze-dried Protein isolate :	2.7 – 3.2 %

*** Glandless
cottonseed
sample**



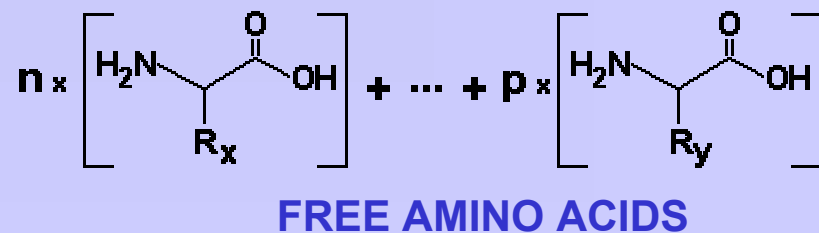
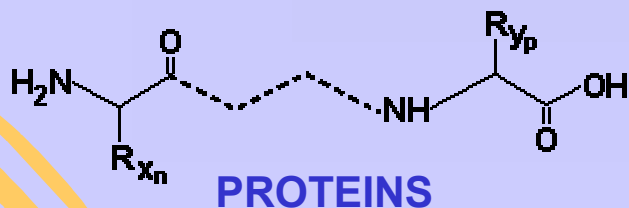
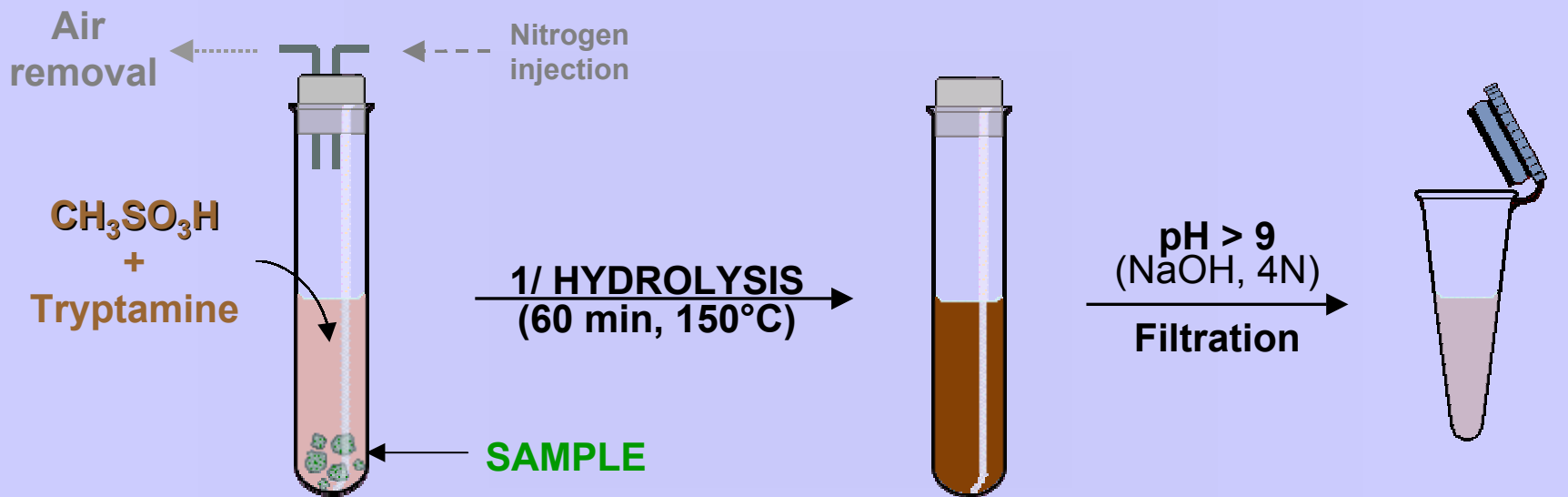


AMINO ACIDS COMPOSITION

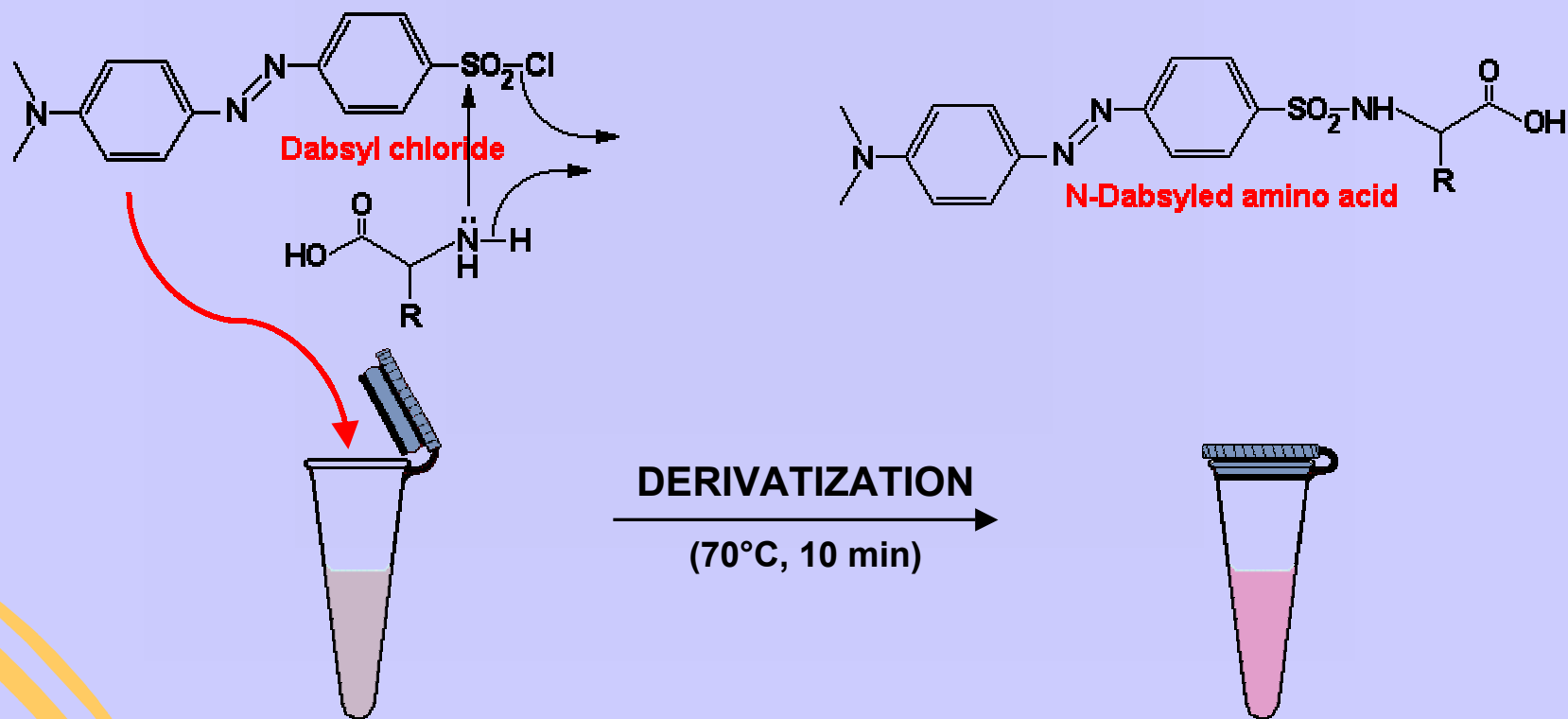
(Internal procedure)



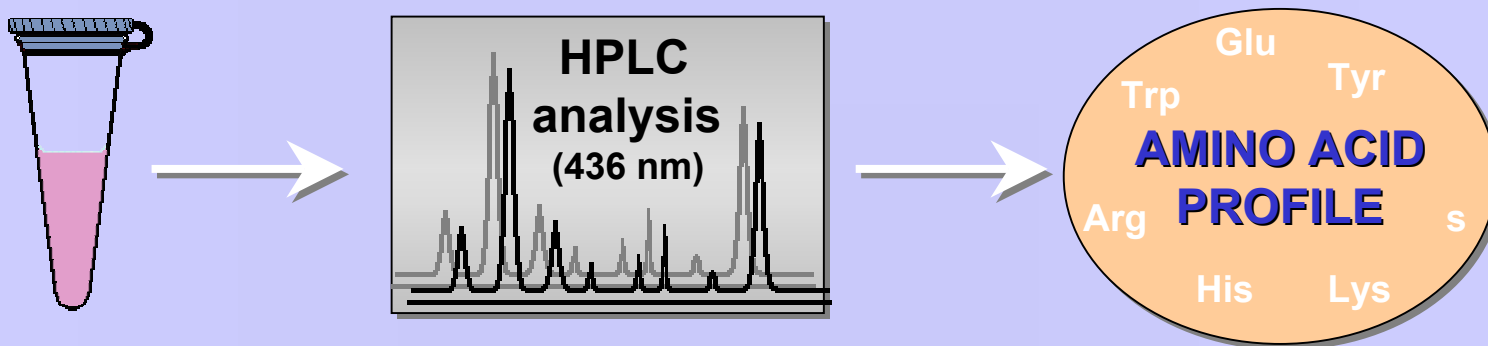
PROCEDURE OF AMINO-ACIDS PROFILE DETERMINATION



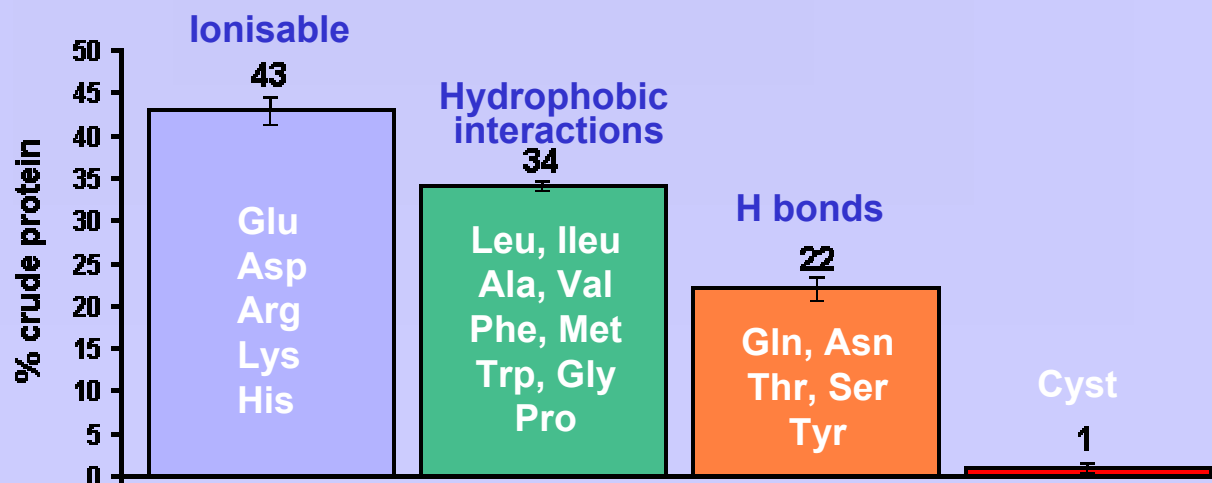
PROCEDURE OF AMINO-ACIDS PROFILE DETERMINATION



PROCEDURE OF AMINO-ACIDS PROFILE DETERMINATION



AMINO-ACIDS COMPOSITION OF RAW MATERIALS



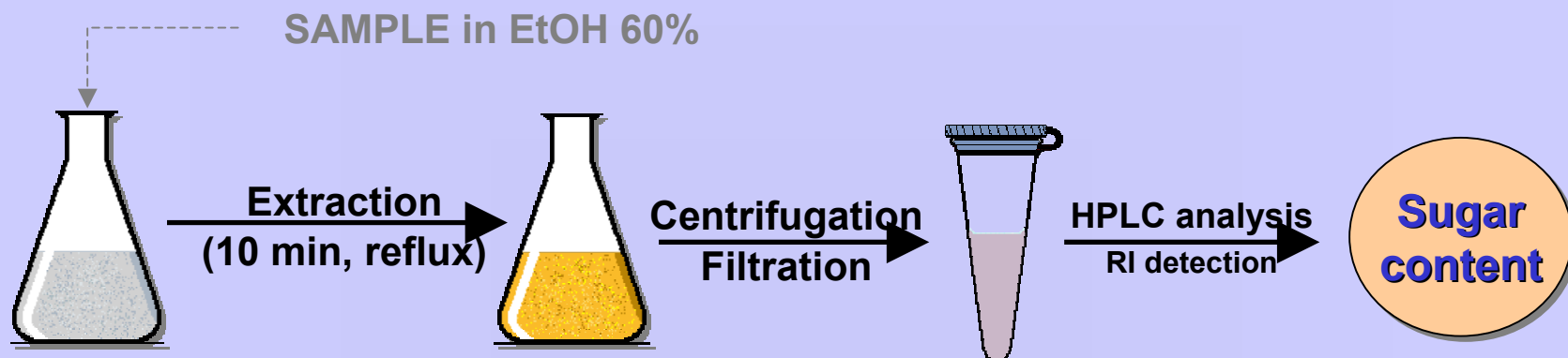


SUGAR CONTENT

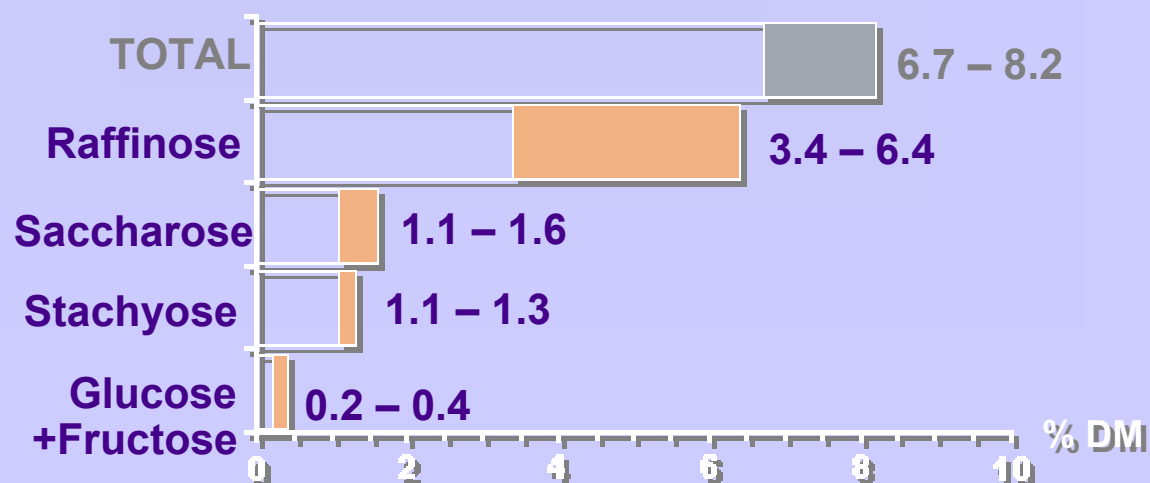
(Internal procedure)



DETERMINATION OF THE SUGAR CONTENT



SUGAR COMPOSITION OF RAW MATERIALS (dry basis)





French Agricultural Research Centre For International Development

CRUDE CELLULOSE CONTENT

(NF V 03-040 - 1993)



DETERMINATION **OF CRUDE CELLULOSE CONTENT**

Insoluble fibre fraction after
***acidic* (H_2SO_4 , 0.26M)**
***alkaline* (KOH, 0.23M) treatments**
***enzyme action* (amylase)**

CELLULOSE CONTENT **OF RAW MATERIALS (dry basis)**

14 - 23%

Great influence of
shells fragments and linters (short cellulosic fibers)
and grinding/sieving operations



CONCLUSIONS

**Great heterogeneity of raw materials
with highly variable chemical composition
depending on :**

- Nature and past of starting RM (cakes)**
- Fractionation steps (crushing, sieving)**
- intermediary processes (Protein conc./isolate)**

**...with crucial influence
on final material properties**



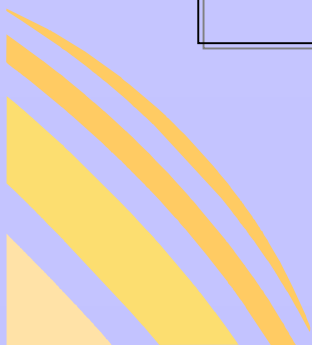


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**THANK YOU FOR
YOUR ATTENTION**

