



SNS COLLEGE OF TECHNOLOGY

**An Autonomous Institution
Coimbatore - 35**

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Approved by AICTE, New Delhi and Affiliated to Anna University, Chennai.

DEPARTMENT OF FOOD TECHNOLOGY

19FTT101 – FUDAMENTALS OF FOOD PROCESSING

I – YEAR II SEMESTER

UNIT 1 – PROCESSING OPERATION

TOPIC 1 – Water activity and its importance



INTRODUCTION



Water activity or A_w , is a ratio of the vapour pressure of water in a solution (P_s) as compared to the vapour pressure of pure water (P_w) at a given temperature.

Living tissues require sufficient levels of water to maintain turgor, and the A_w must be high. However, micro-organisms such as bacteria, mould and yeast multiply at high A_w . Because their growth must be controlled, prevention techniques against the spoilage these micro-organisms cause take into account the water activity of the food.

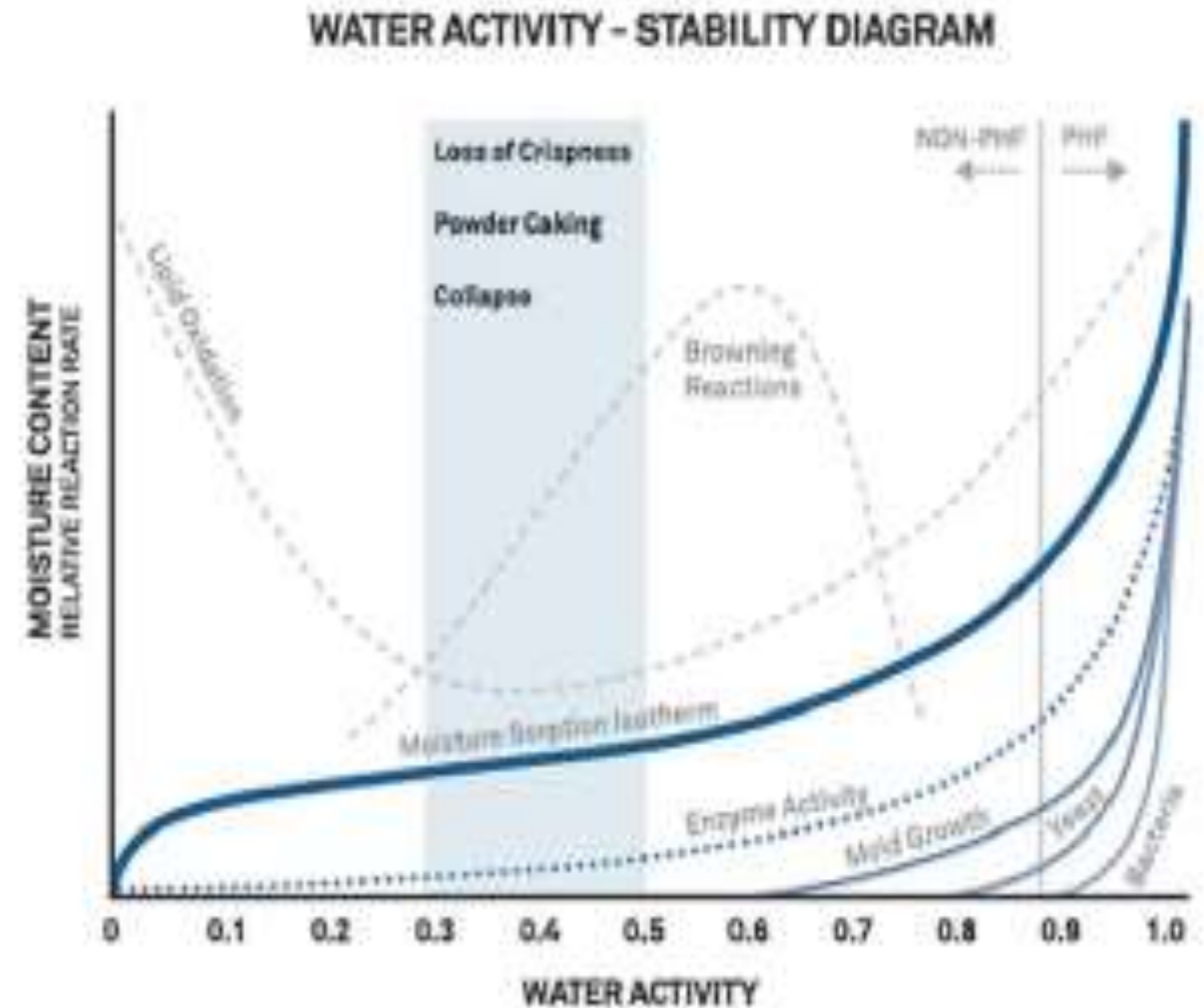
$$A_w = \frac{P_s}{P_w}$$



Predicting safety and stability



Water activity predicts safety and stability with respect to microbial growth, chemical and biochemical reaction rates, and physical properties. Figure shows stability in terms of microbial growth limits and rates of degradative reactions as a function of water activity.





Predicting safety and stability

By measuring and controlling the water activity, it is possible to:

- Predict which microorganisms will be potential sources of spoilage and infection
- Maintain the chemical stability of products
- Minimize nonenzymatic browning reactions and spontaneous autocatalytic lipid oxidization reactions
- Prolong the activity of enzymes and vitamins

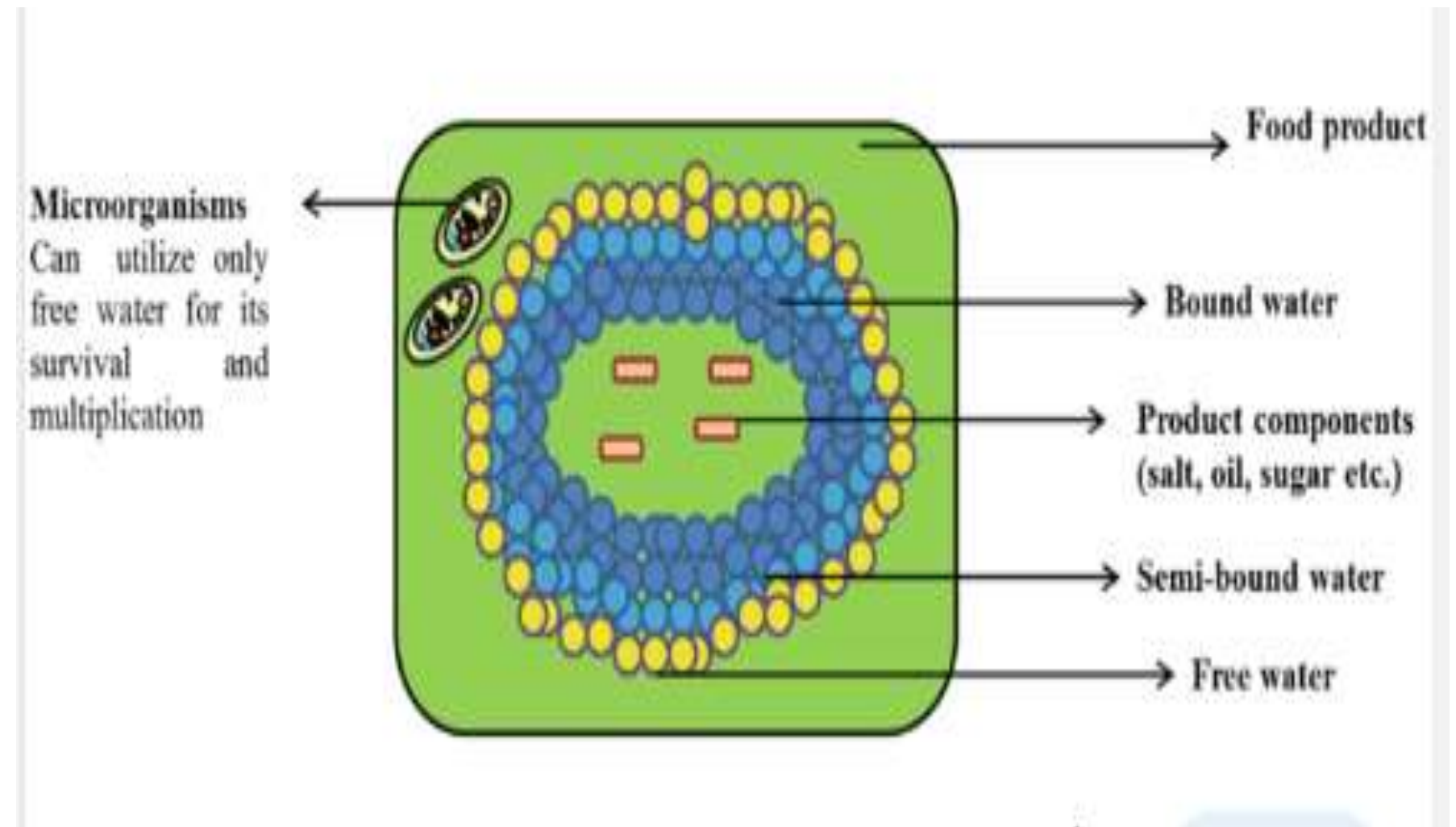
Optimize the physical properties of products for moisture migration, texture, and shelf life



Limiting microbial growth



Microorganisms have a limiting water activity level below which they will not grow. Water activity, not moisture content, determines the lower limit of “available” water for microbial growth. Since bacteria, yeast, and molds require a certain amount of “available” water to support growth, designing a product below a critical water activity level provides an effective means to control growth.

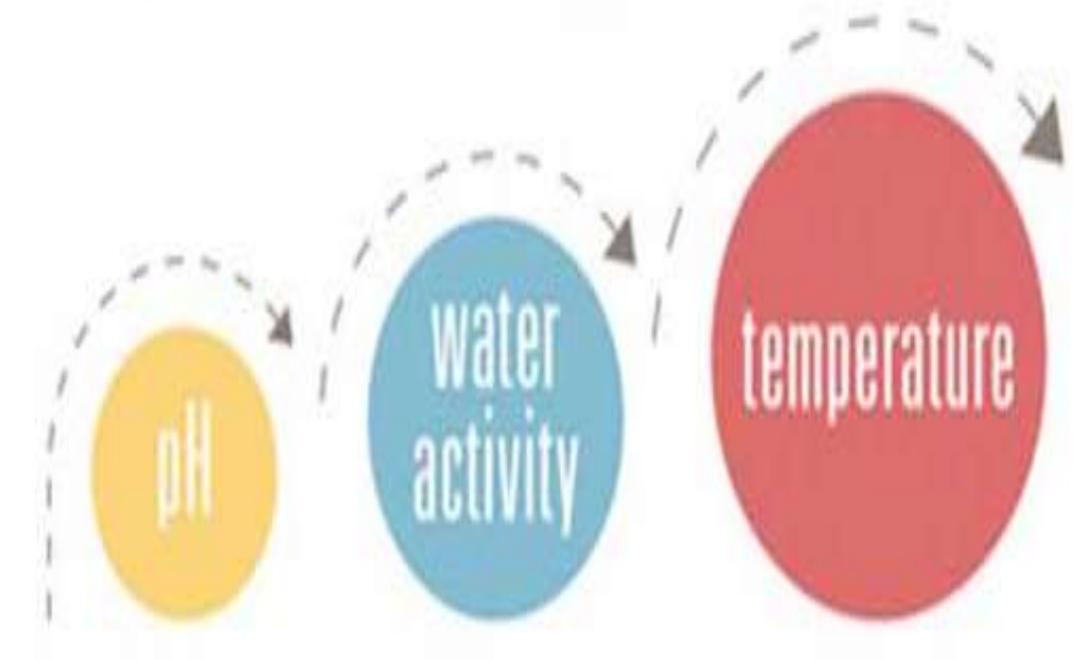




Hurdle technology

While temperature, pH, and several other factors can influence whether and how fast microorganisms will grow, water activity is often the most important factor. Water activity may be combined with other preservative factors (hurdles), such as temperature, pH, redox potential, etc., to establish conditions that inhibit microorganisms. The water activity level that limits the growth of the vast majority of pathogenic bacteria is 0.90a (0.70a for spoilage molds). The lower limit for all microorganisms is 0.60a .

Hurdle technology





THANKYOU