

Course : Food Biochemistry

Chapter 03 & 04 : Lipids & Carbohydrates in Food

Speciality: Agronomy

## Lipids & Carbohydrates in Food

### Exercise 01: Developing a creamy and stable spread

You work for a food company that wants to launch a new hazelnut and cocoa spread. The product must be:

- Creamy and easy to spread at room temperature (20°C)
- Stable for 6 months without turning rancid or changing texture
- Free of hydrogenated oil (to avoid *trans* fatty acids)

**Current problem:** The prototype separates into two phases (oil rising to the top) after a few weeks and develops a rancid taste after 2 months.

#### **Technical data**

- Main ingredients: roasted hazelnuts, sugar, cocoa, vegetable oil, lecithin.
- The vegetable oil used is sunflower oil rich in linoleic acid (C18:2).
- Packaging: clear glass jar, stored on shelf under ambient light.

#### Questions

**1. Identified problems: what is the likely cause of :**

- Phase separation (oil rising to the top) ?
- Rancid taste after 2 months ?

**2. Fat selection: To improve texture (creaminess and stability), would you recommend:**

- An oil rich in saturated fatty acids (e.g., palm oil)
- An oil rich in monounsaturated fatty acids (e.g., hazelnut or olive oil)
- A blend of the two?

**Justify your choice based on melting points and oxidative stability.**

**3. Preservation: Suggest 3 simple modifications to delay rancidity (oxidation).**

- 4. Packaging : Is the current packaging (clear glass jar) suitable? What would you propose?**

**Exercise 02: Fruit yogurt with stable texture**

**You work for a company that produces fruit yogurts. Consumers are complaining that:**

- Water separates and forms a puddle at the bottom of the cup
- The texture is too soft, not creamy enough
- The fruit pieces all sink to the bottom

**The production manager asks you to solve these problems by adding one or more polysaccharides.**

**Technical Data**

- Yogurt pH: 4.2–4.5 (acidic)
- Current ingredients: milk, fruit, sugar, lactic ferments
- No stabilizers are currently added

**Questions**

- 1. What are the three main problems and what is their likely cause ?**
- 2. Among these polysaccharides, which would you choose to solve each problem?**
  - Corn starch
  - LM Pectin (Low Methoxyl Pectin)
  - Xanthan gum
  - Microcrystalline cellulose
- 3. How would you incorporate LM Pectin into the yogurt? Describe the simple steps.**
- 4. How would you verify that the water separation problem is solved?**