

Scientific Gastronomy and Food Chemistry

Gastronomy · Practice Test · 15 Questions

1. Which chemical compound is responsible for the 'hot' sensation of capsaicin binding to TRPV1 receptors, and what is its chemical structure classification?

- A) Alkaloid
- B) Phenolic amide
- C) Terpenoid
- D) Glycoside

2. During the Maillard reaction, which specific sugar-amino acid interactions are primary precursors for the formation of melanoidins?

- A) Glucose and proline
- B) Fructose and glycine
- C) Ribose and lysine
- D) Sucrose and valine

3. In the context of meat science, what is the primary structural protein that undergoes gelatinization when cooked at temperatures exceeding 65°C for extended periods?

- A) Actin
- B) Myosin
- C) Collagen
- D) Elastin

4. What is the specific physical process known as 'spherification' in molecular gastronomy, and which substance acts as the gelling agent?

- A) Thermal denaturation; Agar-agar
- B) Calcium-induced polymerization; Sodium alginate
- C) Protein coagulation; Gelatin
- D) Enzymatic cross-linking; Transglutaminase

5. The 'umami' taste is primarily triggered by the binding of L-glutamate to which specific G protein-coupled receptor?

- A) T1R1/T1R3
- B) T1R2/T1R3
- C) T2R
- D) CD36

6. What chemical process occurs when chlorophyll loses its central magnesium atom and replaces it with hydrogen during prolonged heating in acidic conditions?

- A) Oxidation to pheophytin
- B) Reduction to chlorophyllide
- C) Hydrolysis to carotenoids
- D) Isomerization to lutein

7. In emulsification, what is the 'HLB value' a measure of, and what does it determine?

- A) Heat Load Balance; thermal stability
- B) Hydrophilic-Lipophilic Balance; surfactant efficiency
- C) Hydration Level Buffer; moisture retention
- D) Hydrogen Lattice Bond; protein viscosity

8. Which specific enzyme is responsible for the enzymatic browning process in fruits like apples and pears when the cell structure is disrupted?

- A) Polyphenol oxidase
- B) Lipoxygenase
- C) Amylase
- D) Peroxidase

9. What is the scientific term for the 'weeping' or release of liquid from a gel structure, often caused by the contraction of the polymer network?

- A) Syneresis
- B) Coalescence
- C) Flocculation
- D) Ostwald ripening

10. In chocolate tempering, which crystalline form (polymorph) of cocoa butter is desired for its optimal snap, shine, and melting point?

- A) Form III
- B) Form IV
- C) Form V
- D) Form VI

11. Which fatty acid is the primary substrate for the volatile compound 'hexanal', which contributes to the characteristic 'grassy' aroma in vegetable oils?

- A) Linoleic acid
- B) Oleic acid
- C) Stearic acid
- D) Palmitic acid

12. Why does the addition of salt to water increase the boiling point, a phenomenon known as boiling-point elevation?

- A) Increase in vapor pressure
- B) Reduction of the chemical potential of the solvent
- C) Formation of covalent bonds with water
- D) Increase in the latent heat of vaporization

13. What is the role of 'transglutaminase' in meat processing, specifically regarding protein chemistry?

- A) Hydrolysis of peptide bonds
- B) Covalent cross-linking of lysine and glutamine residues
- C) Denaturation of sarcoplasmic proteins
- D) Solubilization of myofibrillar fat

14. Which phenomenon describes the migration of water molecules from a higher concentration to a lower concentration through a semi-permeable membrane, crucial in brining?

- A) Diffusion
- B) Osmosis
- C) Adsorption
- D) Absorption

15. What happens to the molecular structure of starch when it undergoes gelatinization?

- A) Hydrolysis into glucose
- B) Fragmentation into dextrans
- C) Swelling and loss of crystallinity
- D) Condensation into amylopectin