# Scientific Gastronomy and Food Chemistry

Gastronomy · Answer Key · 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 dextrins
**C) Swelling and loss of crystallinity**
D) Condensation into amylopectin