Chemistry of Food Flavors and Colourants

CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course title & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical /Practice		
Chemistry of Food Flavors and Colourants	**2**	**1**	**0**	**1**	**Class XII with Science**	NIL

Learning Objectives:

The learning objectives of this course are as follows:

- To provide introduction to quality attributes of food such as appearance and flavour.
- To impart an understanding of the chemistry of the flavour as well as colour constituents of foods.

Learning Outcomes:

By the end of the course, the students will be able to:

- Describe mechanisms of flavor perception
- Demonstrate various mechanisms of flavor formation
- Discuss the chemical dimension of flavour.
- Recognize off-flavor defects in foods and strategies to control it.

SYLLABUS

Unit 1: Flavors **9 hours**

Introduction and importance of flavors in food.
Taste & Odour: Structure and physiology of taste organs- tongue, papillae, taste buds, salivary glands, Mechanism of taste and odour perception
Basic Types of taste : Salty, Sweet, Bitter, Sour, Umami taste, Chemical dimensions of basic tastes (sweet, salt, sour, bitter and umami), odour and other sensations (like astringency, coolness, pungency/pungency), Non-nutritive and nutritive sweeteners (including structures of aspartame, saccharin, sucralose, Stevioside), Molecular Theory of Sweetness, Taste Inhibition and enhancement, Chemical dimension of Flavors (peppers, peppermint, coriander, cinnamon, onion), Chemistry of food flavorings: Maillard browning, enzymic browning reactions, caramelisation browning, Off-Flavour in Food (Rancidity in Fats/Oils, Non Enzymic Browning), Control of enzymic browning (acidulants, chelating agents, heat treatment etc)

Unit 2: Food Colours **6 hours**

Introduction, importance, classification: Natural food colourants (Anthocyanins, Carotenoids, Chlorophyll), Examples of Pigments in common food (turmeric, tomato, carrot, orange); Nature-identical colourants (β-Carotene, Canthaxanthin and Riboflavin); Artificial/synthetic colourants: Azo dyes (e.g. amaranth dye, tatrazine, citrous red); Quinoline (e.g. quinoline yellow); Phthalein (e.g. erythrosine); Triarylmethanes and indigoid (e.g. indigo carmine), FD&C Dyes and Lakes.

Practicals/Hands-on-Training **30 hours**

1. Determination of the taste threshold for the different sensations – sweet, salty, sour.
2. Extraction of limonene from orange peels using supercritical carbon dioxide.
3. Quantitative determination of food dyes in powdered drink mixes by spectrophotometric method.
4. Extraction and separation of pigments present in spinach by Thin Layer Chromatography (TLC).
5. Experiment to demonstrate the enzymic browning and its prevention.
6. Determination of rancidity of edible oils by Kriess Test.
7. Estimation of carotenoids in sample by colorimetric method.

Essential readings:

Theory:

- DeMan, J.M., Finley, J.W., Hurst, W.J., Lee, C.Y. (2018), **Principles of Food Chemistry**,4th Edition, Springer.
- Msagati, T.A.M. (2013), **Chemistry of Food Additives and Preservatives**, Wiley-Blackwell.
- Fennema, O.R. (2017), **Food Chemistry**, 5th Edition, CRC Press.
- Attokaran, M. (2017), **Natural Food Flavors and Colorants**, 2nd Ed., Wiley-Blackwell.
- Potter, N.N., Hotchkiss, J.H, (1995) **Food Science,** 5th Ed., Chapman & Hall.
- Brannen, D., Davidsin, P.M., Salminen, T. Thorngate III, J.H. (2002), **Food Additives**, 2nd Edition, CRC Press.
- Coultate, T. (2016), **Food: The Chemistry of its Components**, 6th Edn., Royal Society of Chemistry.
- Belitz, H. D.; Grosch, W. (2009), **Food Chemistry**, Springer.
- Course: FOOD CHEMISTRY (iasri.res.in)

Practicals:

- Ranganna, S. (2017). **Handbook of analysis and quality control for fruits and vegetable products**, 2nd Edn., McGraw Hill Education
- Sawhney, S.K., Singh, R. (2001), **Introductory Practical Biochemistry**, Narosa Publishing House

Examination scheme and mode:

Evaluation scheme and mode will be as per the guidelines notified by the University of Delhi.