



UNIVERSITY OF CHEMISTRY AND TECHNOLOGY, PRAGUE
Faculty of Food and Biochemical Technology
Department of Food Analysis and Nutrition

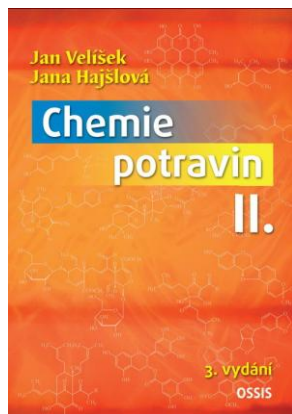
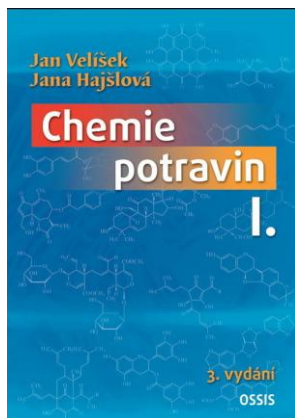
FOOD CHEMISTRY

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2016

Literature

- Velíšek J., Hajšlová J.: Chemie potravin, Osis, Tábor, 2009



The Chemistry of Food

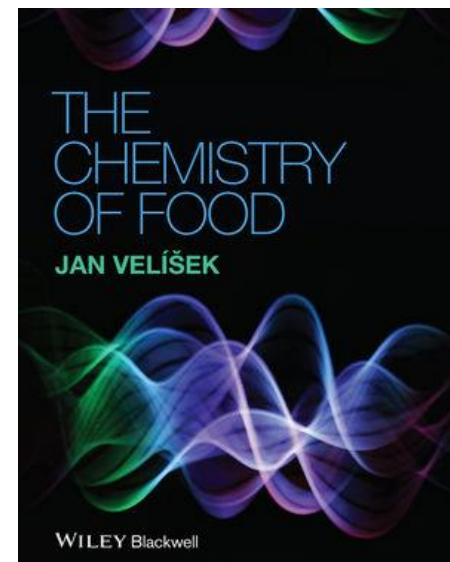
[Jan Velisek](#)

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1124 pages

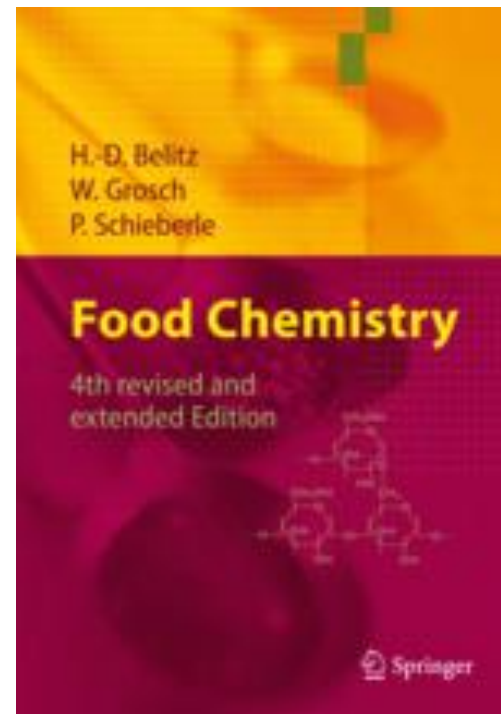
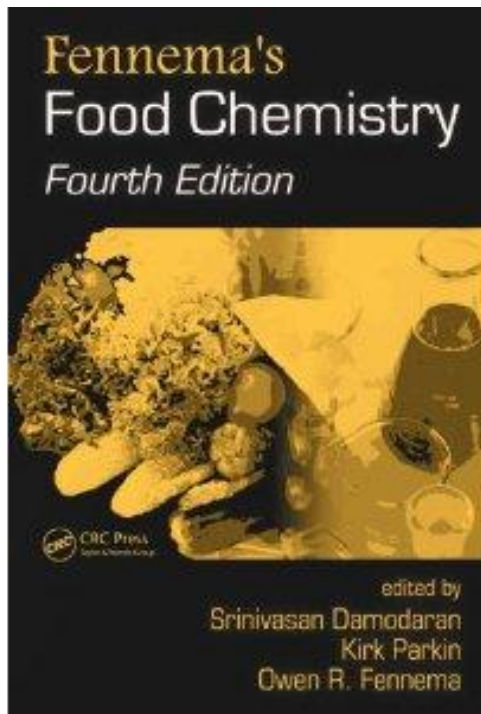
February 2014, ©2014, Wiley-Blackwell

Paperback € 71, E-book € 64



Damodaran S., Parkin, K.L., Fennema O.R.:
Fennema's Food Chemistry, 4th Edition, CRC Press, 2007

Belitz H.-D., Grosch W., Schieberle P.:
Food Chemistry, 4th Edition, Springer, 2009



Syllabuses

■ <http://web.vscht.cz/dolezala/>



Contents in 15 chapters in pdf files:

1. Introduction
2. Water
3. Minerals
4. Amino acids
5. Peptides, proteins
6. Lipids
7. Lipid reactions
8. Saccharides
9. Reactions of saccharides
10. Vitamins
11. Flavour-active compounds
12. Pigments and other colorants
13. Antinutritional, toxic and other other bioactive compounds
14. Food additives
15. Food contaminants

Introduction

food science

systematic summary of knowledge integrating some knowledge of natural, technical and social sciences

components

food chemistry (static and dynamic interpretation)

static part:

chemical composition

dynamic part:

reactions and changes

- **technology of food** processing, storage, distribution
- **microbiology**
- **nutrition**

Alternative forms of nutrition

- vegetarian diet
- macrobiotic diet
- organic foods

Basic types of vegetarianism

- lacto-ovo vegetarianism
- lacto vegetarianism
- ovo vegetarianism
- veganism

Improper nutrition

various forms of

- overeating
- starvation

Psychosomatic disorders (eating disorders)

- bulimia (overeating disease)
- anorexia nervosa (pathological denial of food)

Chemical composition of food

food chemistry

nutrients → dietary (nutritional) value (quality)
energy value

essential nutrients

- proteins
- fats (lipids)
- carbohydrates (sugars)

accessory nutrients (essential nutritional factors)

- vitamins
- minerals

water

nutraceuticals

probiotics, prebiotics, synbiotics

functional foods

“Omega Eggs“ - eggs with high amount of PUFA n-3 (Omega-3)

rate n-6/n-3 to 3:1

(ordinary eggs n-6/n-3 6-14 : 1)



Flora pro.activ

2.25g of phytosterols in 30g of margarine



nutritional value and energy value depends on:

- nutrient content
- utilization
- content of other substances
- dietary regime
- health and mental state

caloric value

energy intake 8 500-12 000 kJ/den

1 calory = 4,185 jouls

Caloric value of food components	kJ/g	kcal/g
Proteins	17	4
Lipids (triacylglycerols)	37	9
Saccharides	17	4
Polyols	10	2,4
Organic acids	13	3
Ethanol	29	7

The recommended daily amount of energy and nutrients by FoodDrinkEurope

Nutrients	Women	Men
Energy (kJ)	8 400	10 500
Energy (kcal)	2 000	2 500
Proteins (g)	50	60
Lipids (g)	70	80
saturated fats (g)	20	25
Saccharides (g)	270	340
....sugars (g)	90	110
Dietary fiber (g)	25	25

Nutrient	Unit	Cheese Eidam	Bread	Apple
		in 100g		
Water	g	41.6	36.7	83.9
Proteins	g	25.0	8.2	0.2
Lipids	g	27.8	3.6	0.4
Saccharides	g	1.4	49.5	15.3
Dietary fiber	g	0.0	2.3	2.7
Ash	g	4.2	1.9	0.3
Energy	kJ	1492	1117	247

other food components

sensorially active compounds

organoleptic properties  sensoric value (quality)

sensory perception

olfactory	aroma	aroma compounds
gustative	<u>taste</u>	<u>gustatory compounds</u>
	flavour	flavour compounds
visual	colour	coloured compounds (pigments)
		the appearance, shape (geometric aspects)
haptic	texture	
		consistency (mechanical aspects)
auditory	sounds	

antinutritive compounds (factors)

natural toxic compounds

non-natural compounds

- additives
- contaminants
 - exogenous
 - endogenous (technological, process)

hygienic-toxicological value (quality)

need to meet legislative requirements = food safety

Nutrients and nutritional factors always beneficial?

Some exhibit antinutritional or even toxic effects

proteins	lectins (phytohemagglutinin), fungal toxins
peptides	bacterial toxins, fungal toxins
aminoacids	phenylketonuria and Phe, lathyrogens in legumes, mushroom toxins
lipids	lipid oxidation products, unusual fatty acids (hydroxy-, epoxy-, alicyclic), unusual accompanying substances
saccharides	lactose intolerance, α -galaktosides of legumes
vitamins	tissue calcification and vitamin D
minerals	toxic elements Pb, Cd, Hg, As, (Sn, Al, Cr, Cu, Ni, Zn, Fe), toxic anions (NO_2^- , NO_3^- , CN^-)