
Summaries of Official Spectrophotometric Methods

2) Food analysis

Introduction

As introduced in Application Note 49, there are a wide range of spectrophotometric analyses designated as Official Analytical methods. The methods for foodstuffs cover virtually all sectors of the food industry and the attached listing includes these product areas:

- Beer, wine, spirits and other fermented drinks
- Cereal foods
- Coffee and tea
- Colour additives
- Fish products
- Food additives
- Fruit
- Fruit juices
- Meat products
- Milk and dairy products
- Oils and fats
- Preservatives
- Sugar products
- Vegetable products

These methods show an outline of the preparation procedure, indicating any specific reagents required. Measurement wavelengths are listed providing quick reference to the spectrophotometer requirements. Previously published Application Notes with relevant details for particular commodities are indicated. Spectrophotometers and Acquire software from the Biochrom Libra range are recommended for each method as appropriate. More details on instrument settings are shown in the user manuals and other application notes.



Summary of Analytical Methods - Food Analysis (Libra Application Note 50)

			RECOMMENDED INSTRUMENT					
COMMODITY ANALYSIS	OUTLINE OF METHOD	WAVELENGTHS nm	LIBRA S5	LIBRA S12	LIBRA S22	LIBRA S22 + ACQUIR	LIBRA S32	LIBRA S32FC
Acids in hops	Alkaline/methanol extr. Alpha acids(1)beta acids(2)	(1).d(-51.56A355+73.79A325-19.07A275). (2)d(55.57A355-47.59A325+510A275)				X	X	X
Adulteration of processed Florida orange juice	Ethanol extract + scan.	See Application Notes 19,20.				X	X	X
Antimony in food	HCl extract reacted with Rhodamine B	565		X	X		X	X
Azinphos-methyl/biphenyl pesticide residues in fruit	Steam distil extract/TLC/ethanol extract	248 & 300				X	X	X
Benzoic acid in nonsolid food and beverages	Saturated NaCl sol.+ HCl, ether ext	265-280		X	X		X	X
Betaine in orange juice	Cation exch col.H & OH forms.Sod reineckate ppt.Acetone soln.	525	X	X	X		X	X
Boric acid in caviar	React with curcurmin in acid ethanol giving complex.	555-700, compared with blank		X	X		X	X
Caffeine in nonalcoholic beverages	Oxidise with KMnO4, reduce with Na2SO3/KSCN. CHCl3 extract	276.5		X	X		X	X
Captan pesticide residues	Toluene extraction. React with resorcinol/acetic acid	425	X	X	X		X	X
Carotenes and xanthophylls in dried plant	Saponification/ads.column, hexane/acetone elution.	Carotenes 436.Xanthophylls, monohydroxypigments&DHP 469,479 (474)				X	X	X
Chlorogenic acid in green coffee	Boiling water extract into basic lead acetate	324		X	X		X	X
Cis,cis methylene interrupted pu fatty acids in oils	Saponify hexane extract. Enzymic digestion with lipoxidase	234		X	X		X	X
Color in spices	Acetone extract	465	X	X	X		X	X
Color of beer	De-gas	430 & 470				X	X	X
Color of distilled liquors	Measure	Colour=1000*abs at 525 or 10*abs at 430	X	X	X		X	X
Color of laboratory wort	Filter	430	X	X	X		X	X
Color of raw cane sugars	Boil, filter.	%T at 560	X	X	X		X	X
Coloring matter in distilled liquors	Measure	Colour unit = 1000 or 10*abs at 525 or 430	X	X	X		X	X
Colors (synthetic) in oils and fats	Pet ether extr followed by acid and alkali.	Scan 190-1100				X	X	X
Dehydroacetic acid in cheese	Extr with CHCl3 and alkali.	307		X	X		X	X
Dichlone pesticide residues (fresh fruit and vegetables)	Toluene extr, silica column	495	X	X	X		X	X
Dodine pesticide residues in fruits	Methanol/CHCl3 extr + bromocresol purple	590		X	X		X	X
Dyes in color additives	Measure against matched solvent	400-750				X	X	X
Esters in distilled liquors	Alk hydroxylamine:Hydroxamic acid+acidic ferric ions.	525	X	X	X		X	X
Formaldehyde in maple sirup	Distil. React with amm.molybdate/acetylacetone	415	X	X	X		X	X
Fusel oil in distilled liquors	Distil. React hydroxybenzaldehyde sulphonic acid.	445	X	X	X		X	X
Lyodin pesticide residues in fruits	Isopropanol extr. Mix with bromophenol blue.	415	X	X	X		X	X

Griseofulvin	Pet ether/CHCl ₃ extr followed by alumina column	290-320		X	X		X	X
Hydroxymethylfurfural in honey	Zn acetate/pot ferricyanide (Carrez) reaction.	284 & 336		X	X		X	X
Intermediates in FD&C No. 1	Adsorbed on cellulose.	246,251,252,270 & 274					X	X
Iron in flour	Ashed sample reacted with o-phenanthroline.	510	X	X	X		X	X
Lactic acid in milk and milk products	Ether extract + Ferric chloride soln.	Scan 350-600					X	X
Maleic hydrazide pesticide residues	Boiling alkali. Distil with Zn. Hydrazine + acid	430-460 (p-dimethylaminobenzaldehyde)					X	X
Mixed color, zinc in plants.	Dithizone reagent	525	X	X	X		X	X
Naphthyleneacetic acid pesticide residues in fruit/vegetables,	Adsorption chromatography/CHCl ₃ extract	230-350		X	X		X	X
Nicotine residues in fruit/vegetables	Acid extract	236,259 & 282		X	X		X	X
Phosphatase in casein	Casein incubated carbonate buffer. + dichloroquinonechloroamide	650	X	X	X		X	X
Phosphorus in color additives	Ashed sample reacted with molybdovanate.	400 or peak max	X	X	X		X	X
Phosphorus in fruits and fruit products	React with molybdovanadate.	400	X	X	X		X	X
Phosphorus in milk-based infant formula	Ashed sample reacted with molybdovanate.	400 or peak max	X	X	X		X	X
Phthallic acid dyes in colour additives	Dissolve in methanol	230,262 & 276		X	X		X	X
Pigment in flour	Extract with water saturated butanol + filter	435.8	X	X	X		X	X
Piperine in pepper preparations	Dichloroethane extract.	342-345		X	X		X	X
Piperonyl butoxide pesticide residues	CHCl ₃ extract + chromotropic acid	575	X	X	X		X	X
Polycyclic aromatic hydrocarbons and benzo(a)pyrene in food	Saponification + alk KOH. Ads.column/TLC, isooctane elution.	250-400 scan for characteristic spectra.					X	X
Polyunsaturated acids in oils and fats	Conjugated: spectra. Non-conjugated: saponification + spectra	Scan+ measure absorbance maxima 233-246	X	X	X		X	X
Preservatives in ground beef	Water extract.	Scan 250-255. Ascorbic acid see Application note 18					X	X
Protein-reducing substances in milk	Acetic acid extract + TCA ppt + pot ferricyanide.	610	X	X	X		X	X
Protein in milk	React directly with Acid Orange II	480	X	X	X		X	X
Protein in milk	React directly with Amido black 10B	620	X	X	X		X	X
Sorbic acid in dairy products	Ether extract direct and with pot permanganate oxidation	220-300					X	X
Sorbic acid in wines	Steam distil.	260		X	X		X	X
Tannin in distilled liquors	React with sod tungstate/phosphomolybdic acid.	760	X	X	X		X	X
Thiourea in frozen fruit	Extract with sod bisulphite.	610	X	X	X		X	X
Thiram pesticide residues	CHCl ₃ extract	270-283					X	X
Titanium in cheese	Ash in sulphuric acid solution	325-650 (max 408 as TiO ₂)					X	X
Uric acid (insect contamination) in flour	Acid extract. Sod borate + uricase	292		X	X		X	X
Vitamin A in margarine	Reaction with antimony trichloride	440 & 620	X	X	X		X	X
Zinc in plants	Ashed residue. Dithionate reacted with carbamate	535	X	X	X		X	X