

ANNEX 2

LIST OF ADDRESSES

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Most countries have directories of their manufacturers, exporters and importers which can be consulted in most embassies and consulates. They are the best source of information, particularly for neighbouring countries or those with which your country has special trade relationships or with which trade is easier or transport costs are lower. Also, many international suppliers or manufacturers have branch offices which are closer than their headquarters. Purchases from these offices may be easier, cheaper and/or quicker.

The following list of addresses does not represent any endorsement of the products of the listed companies or organizations nor any recommendation, nor can any responsibility be taken for changes in addresses, phone or fax numbers etc. The list is also not complete and only represents a very small

selection of suppliers, manufacturers, organizations etc. active in these respective fields. Selection of those listed represents no judgement or comparison to other non-listed manufacturers or suppliers.

1. Industrial Equipment Suppliers

1.1 Cosmetics

CO.M.ER. s.r.l.

Via Brescia 10

200636 Cernusco S/N (Milano), Italy

Tel: 39-2-9240445; Fax: 39-2-9249252

- cosmetic and pharmaceutical equipment

Mambretti & Co.

Via Bertola da Novate 11

20157 Milano, Italy

Tel: 39-2-306937; Telex: 321497; Fax: 39-2-66982979

- cosmetic and pharmaceutical equipment

Pressindustria Chemical Equipment s.p.a.

Via Porta d'Arnolfo 43

20046 Biassono (Milano), Italy

Tel: 39-39-49831; Fax: 39-39-2753330; Telex: 333322 P IND 1

- emulsifiers, mixers, whole plants for cosmetic, pharmaceutical and food industries

SOTECO Export s.r.l.

Via Tosarelli 184

40055 Bologna, Italy

Tel: 39-51-785151; Fax: 39-51-784422

- automatic bottling or packaging machines for the pharmaceutical, cosmetic and food industry

1.2 Lyophilization - freeze drying

Cole-Parmer (registered trade mark) International

7425 North Oak Park Avenue

Niles, Illinois 60714, USA

Tel.:1-708-647 7600; Fax.: 1-708-647 9600

Telex: 28-9405; Cable: 'COLEPARMER"; Easylink: 6293 9214

- laboratory freeze driers, 4.5 to 18 litre models with 2 to 12 litre drying capacity per day, and many other laboratory equipments.

Costruzioni Meccaniche Terruzzi S.r.l.

Via Ernesto Breda 176

20126 Milano, Italy

Tel.: 39-2-2572391

- industrial freeze driers

Kohlensa~urewerk Deutschland GmbH

5462 Bad Hoenningen, Germany

- industrial freeze driers

Edwards High Vacuum Ltd

Manor Royal

Crawley W Sussex RH102LW, United Kingdom

Tel.: 44-1293-28844

- industrial freeze driers

1.3 Food processing

Alberto Bertuzzi S.p.a.

Viale Europa 11

20047 Brugheno (Milano), Italy

Tel: 39-39-870553; Fax: 39-39-883205

- machines or whole plants for the processing of fruits and vegetables but also honey, mead, jams and sweets

For honey and pollen processing equipment see also beekeeping suppliers

1.4 Capsule fillers

MACOFAR CEM S.p.a.

Via Nazionale 55

40067 Rastignano (Bologna), Italy

Tel.: 39-51-743350; Fax: 39-51-744255

- encapsulation equipment of industrial and artisanal capacity

MG2 S.p.a.

Via del Savena 18,

40065 Pianoro (Bologna), Italy

Tel.: 39-51-777043; Fax: 39-51-777521

- encapsulation equipment of industrial and artisanal capacity

Nuova Zanasi S.p.a.

Via 1 maggio 14

40064 Ozzano Emilia (Bologna) Italy

Tel.: 39-51-799431; Fax: 39-51-799348

- encapsulation equipment of industrial and artisanal capacity

S.L. Sanderson & Co.

Star Route 104N

(173 Sandy Springs Lane)

Berry Creek, CA 95916, USA

- makes "Cap M Quick", very small hand operated trays for encapsulation

Feton International
Chaussee de Louvain 799
Steenweg of Leuven
1140 Bruxelles
Tel: 32-2-734 5295

- Capsule filler, small ones for 5000 to 7000 BFr.

1.5 Elaboration and manufacture for others

RP Scherer S.p.A.
04011 Aprilia (Latina), italy
Tel: 39-6-9205431
Fax: 39-6-9205435

- production of gelatinous capsules, encapsulation and other pharmaceutical forms (pills) for third parties.

Pharmagel S.p.A.
Viale Europa 3
20075 Lodi (Milano), Italy

Tel: 39-371-36041

- production of gelatinous capsules, encapsulation and other pharmaceutical forms (pills) for third parties

Ghimas S.p.A.

Via Fucini 2

40033 Casalecchio di Reno (Bologna), Italy

Tel: 39-51-575353

- freeze drying in contract for third parties

Piana Apicoltura

Via G.P. Piana 1450

40024 Castel San Pietro Terme (BO), Italy

Tel: 39-51-941205

Fax: 39-51-944652

Telex: 512447 APIS I

- manufacture of cosmetics and complete line of beekeeping products and value-added products

Apicoltura Marcolini & C.sas

Via G. Gastianelli 61

00133 Roma, Italy

Tel: 39-6-7232131 or 2050316

- bee cosmetics and soaps in contract for third parties

1.6 Beekeeping

Directory of beekeeping suppliers, published in 1982 by IBRA.

Dadant & Sons, Inc.

51 South 2nd St

Hamilton, Illinois 62341, USA

Tel: 1-217-847 3324; Fax: 1-217-847 3660

- equipment for beekeeping and elaboration of beekeeping products,
publishers of Amer. Bee Journal and Hive and the Honey Bee, plus other
books

Lega S.r.l., Costruzioni apistiche

Via de Crescenzi 18

48018 Faenza (Ravenna), Italy

Tel: 39-546-26834; Fax: 39-546-28279

- equipment for beekeeping and elaboration of beekeeping products

Apicoltura Vangelisti

Viale Roma 82

52017 Stia (AR), Italy

Tel: 39-575-582150

- equipment for beekeeping and complete line of beekeeping products and value added products

Thomas

86 Rue Abbe Thomas

45450 Fay aux Loges France

Tel: 33-38595620; Fax: 33-38592828

- equipment for beekeeping and elaboration of beekeeping products

Herzog

Postfach 146

7230 Schramberg, Germany

Tel: 49-7422-4240

- equipment for beekeeping and elaboration of beekeeping products

E.H. Thorne Ltd.

Beehive Works

Wragby, Lincoln LN3 5LA, UK

Tel: 44-1673-858555

- honey presses as commonly used in East Africa and other beekeeping equipment

SONY EZ-Label Printer from any SONY dealer or through

FAI, Federazione Apicoltori Italiani

Corso Vittono Emmanuelle 101

00186 Rome, Italy

Tel: 39-6-6877175 or 6852276; Fax: 39-6-6548578

- sells label printer, many other information and Italian beekeeping industry contacts

Cylindro Alveolador Apic. Ltva.

Cristiansen Hordao

CX Postal 455, R. Bernardino di Maraes 1467

Belo Horizonte, MG, Brazil

Tel: 55-31-2262190

- manufactures cheap, plastic foundation rollers (US\$100) for hand operated press

More expensive foundation rollers and complete manufacturing lines can be obtained from all major beekeeping suppliers.

Centre Laboratories

35 Channel Dr.

Port Washington, NY 1 10Sf), USA

Fax: 1-516-767 4229

- makes and distributes "Epipen", emergency injection pen/syringe for treatment against allergic reactions to bee stings

Honeystix

1443 45th Ave. N.E.

Salem, OR 97301, USA

Tel: 503-581 5805

- Marketing and processing honey filled straws. Sale of straw filling machines

2. Raw materials

2.1 Cosmetics

Desert King Corporation

3802 Miami Street

Chula Vista, CA 92011, USA

Tel: 1-619-4277121; Telex: 857267 Desert King

- producer of and information on Jojoba oil

Chemetics Laboratories Inc.

2954 Congressman Lane

Dallas, TX 75220, USA

Tel: 1-214-3512434; Fax: 1-214-3580426; Telex: 734037 Chemetics

- produces aloe vera based products, raw materials

Meer Corporation

9500 Railroad Ave.

P.O. Box 9006

North Bergen, NJ 07047, USA

Tel: 1-201-861 9500; Telex: 219130

- produces aloe vera in various preparations and consistencies
Active Organics Inc.

Corporate Office

11230 Grader Street

Dallas, TX 75238, USA

Tel: 1-214-3482015; Fax: 1-214-3481557

- produces non-preserved botanical extracts

Henkel (Suppliers)

140 Germantown Pyke

Suite 150

Plymouth Meeting, PA 19462, USA

Fax: 1-215-9411185 or

Henkel (Suppliers)

Henkelstrasse 67

P.O. Box 1100

4000 Du~sseldorf 1, Germany

Tel: 49-211-7970; Telex: 85817144

- all kinds of soap bases and other cosmetic ingredients

Koster Keunen, Inc.

P.O. Box 383

Sayville, NY 11782, USA

Tel: 1-516-589 0456; Telex: 645946

- large wax buyer, processor and seller of wax related cosmetic ingredients

British Wax Refining Co.

29 St. John's Road

Redhill

Surrey RHi 6DT

- wax refining mostly

2.2 Pigments and dyes

Warner Jenkinson Europe

Oldmedow Road, Kings Lynn

Norfolk PE30 4JJ, United Kingdom

Tel: 44-1553-763236 and 770550; Fax: 44-1553-766891/ 770707

Telex: 817144 WJEUR G

- cosmetic colours

Mallinckrodt Inc.

P.O. Box 5439

St. Louis, Missouri 63147, USA

- cosmetic pigments

The Mearl Corporation

41 East 42nd Street

New York, NY 10017, USA

Tel: 1-212-573 8500; Fax: 1-212-557 0742; Telex: 421 841

- cosmetic pigments

Sun Chemical Corporation

Pigments Division

441 Tompkins Avenue

Staten Island, NY 10305, USA

Tel: 1-718-9811600; Telex: 125063; Fax: 1-718-720 6480

- cosmetic pigments

Kingfisher Colours LTD

124/6 Cardiff Road

Reading, Berkshire, RG1 8NH, UK

Tel: 44-1734-588661; Telex: 849054 Fishing

- cosmetic pigments

2.3 Food additives

Kelco International
Westminster Tower
3 Albert Embankment
London SE1 7RZ, UK

Tel: 44-171-735 0333; Fax: 44-171-735 1363

- various food additives, colours, gums etc., but also cosmetic and pharmaceutical ingredients and products

2.4 Others

Candle Makers Supplies
28 Blythe Road
London W14, UK

- candle making supplies

Association of German Candle Manufacturers
Karlstrasse 21

6000 Frankfurt/Main, Germany

- information on producers and suppliers, market etc.

Bee Health Ltd
1 Racecourse Road
East Ayton
Scarborough
North Yorkshire YO13 9HT, UK
Tel: 44-1723 864001
FAX: 44-1723 862 455
- Propolis buyer, processor

3. Information sources

3.1 Organizations

3.1.1 Beekeeping

Directory of institutions and organizations in developing countries concerned with beekeeping published in 1980 by IBRA (98 pp.).

National Honey Board

422 21st Street, Suite 203

Longmont CO 80501-1421, USA

Tel: 1-303-776 2337; Fax: 1-303-776 1177

- provides information and technical assistance to industrial users of honey,
small and large scale

or

National Honey Board

c/o TJP Market Development

500 Airport Blvd., Suite 336

Burlingame, CA 94010 USA

Bees for Development

N. Bradbear, edit.

Troy, Monmouth ND54AB, UK

Tel: 44-1600-713648; Fax: 44-1600-716167; E-mail:

100410.2631@compuserve.com

- publishes newsletter "Bees and Development", other information on tropical

beekeeping, books, consultations, etc.

IBRA, International Bee Research Association

18 North Road

Cardiff CF1 3DY, UK

Tel: 44-1222-372409; FAX: 44-1222-665522; E-mail: MUNNPA@Cardiff.AC.UK

- largest beekeeping library, publishes several scientific journals and technical information, book sales, can make copies of articles, consultations.

Wicwas Press

P.O.Box 817

Cheshire, CT 06410-0817, USA

Tel: 1-203-250 7575; Fax: 1-203-621 7325

- distributor and publisher of beekeeping books, videos, slide series etc., also publishes Beescience

ICON Development

Viale Regina Margherita 239

00198 Rome, Italy

Tel & Fax: 39-6-4402802

- general information, consultancy services, project formulations, execution, management and evaluation especially in beekeeping and tropical environmental issues

Apimondia

Vittono Emmanuelle 101

00186 Rome, Italy

Tel.: 39-6-6868465

- international beekeeping organization, information, publications, congresses, published volumes on apitherapy

Peace Corps

Office of Training and Program Support, or Information Collection and Exchange

1990 K St, NW

Washington, DC 20526, USA

- publishes beekeeping manual with very simple techniques and

illustrations, (Gentry, 1988), other information and assistance

GATE, GTZ

Dag Hammarskjöld Weg 1-2

6236 Eschborn, Germany

Tel: 49-6196-790; Fax: 49-6196-794820; Telex: 407501-0 GTZD

- variety of appropriate or alternative technology information, including beekeeping and some of the processing techniques, solar as well as regular publications

ITDG, Intermediate Technologies Development Group

Myson House, Railway Terrace

Rugby CV21 3HT, UK

Tel: 44-1788-560631; Fax: 44-1788-540270

- regular journals (intermediate technologies, a.o.) and many books as publisher and distributor also on beekeeping, candle making, other hive products

American Wax Importers and Refiners Association

225 West 34th St
New York, NY 10001, USA

A description of wax standards and testing methods as prepared by the American Wax Importers and Refiners Association of the USA in 1968 can also be found in the ITC Unctad/Gatt publication on "The World Market for Beeswax" (1978).

BeeNet, an electronic network from which information can be retrieved or requested by computer through electronic networks such as Internet - commercially available in a growing number of countries. A publication "Electronic Delivery of Apicultural Information" (Bee Science 3(1): 10-15, 1993) gives detailed information. Reprints can be obtained from one of the authors:

T.M. Sanford
Bldg 970, Box 110620
University of Florida, Gainesville, FL, 32611-0620, USA
Tel: 1-904-392 1801, ext. 143
Fax: 904-392 0190

E-Mail (Internet): [MTS@GNV. IFAS . UFL. EDU](mailto:MTS@GNV.IFAS.UFL.EDU)

Regularly, updated information on electronically accessible beekeeping, bee research and related topics can be obtained from IBRA or at the WWW site:

[http://www cardiff. ac .uk/ibra/index. html](http://www.cardiff.ac.uk/ibra/index.html)

3.1.2 Apitherapy

American Apitherapy Society

P.O. Box 74

North Hartland, VT 05052, USA

Tel & Fax: 1-802-295 8764

- publishes "BeeWell" newsletter (subscription and membership US\$30) and collects case histories, scientific publications, organizes workshops and training, proceedings of annual apitherapy meetings, bibliographies, promotes apitherapy, etc.

Ho Shin, Nihon-Yoho-shinbun

Chuou 2-chome, 1-8 Matsumoto-shi

Nagano-ken, 390, Japan

- Api-acupuncture society of Japan, for information, research, training etc.

Chinese Beekeeping Institute

Sihai Agricultural Techniques Development Research Institute

30 A Baishiqiao Road

Beijing 100081, China

Tel: 86-1-831 4433 and 831 2997

FAX: 86-1-831 6545; Telex: 222720 CAAS CN

- for further information on apitherapy in China and about specialized institutes and research hospitales etc.

3.1.3 Cosmetics

Facolta' di Medicina e Chirurgia, Univ. Cattolica del Sacro Cuore

Largo Francesco Vito 1

00168 Rome, Italy

Tel: 39-6-33051

three year course (in Italian) for cosmetic technician (minimum requirement: secondary school diploma)

In many countries cosmetic technicians and beauticians can study in evening courses.

Asociación Argentina de Químicos Cosméticos

Thames 265

1414 Buenos Aires, Argentina

- publishes "Cosmética - Revista de ciencia y tecnología cosmética", a technical and scientific publication on raw materials and formulations

I.F.S.C.C. Secretariat

Delaporte House

57 Guildford Street

Luton, Bedfordshire, LU1 2NL, United Kingdom

Tel: 44-1582 26661; Fax: 44-1582 405217 information about cosmetic study courses, schools and journals

Japan Cosmetics Industry Assoc.

17 Mishikuba - Akefunecho

Minato-ku, Tokyo, Japan

McCutcheon' 5 Division

McPublishing Company

175 Rock Road

Glen Rock, NJ 07452, USA

Tel: 1-201-652 2655; Fax: 1-201-652 3419; Telex: 130559

- journals and manuals on emulsifiers, detergents and functional materials.

CTFA, The Cosmetic, Toiletry and Fragrance Association

110117th Street, N.W., Suite 30

Washington, DC 20036, USA

- publishes International Cosmetic Ingredient Dictionary, information on approval and safety of various cosmetic ingredients, source for further information sources and industry referrals

Toilet Preparations Federation Ltd.

35 Soho Square
London W1V 5DG, UK

Cosmetic Industry Buyers and Suppliers
c/o James Feigin Almay, Inc.
562 Fifth Avenue
New York, NY 10036, USA

Association of Manufacturers of Cosmetics, Toiletries and Soap
Karlstrasse 21
6000 Frankfurt/Main, Germany

3.1.4 Food processing standards

Joint FAO/WHO Expert Committee on Food Additives (JEFCA)
Via delle Terme di Caracalla
00100 Rome, Italy
Tel: 39-6-52251

- information on status (approval), safety etc. of all food additives, colours

etc. on international level

Scientific Committee for Food (SCF)

European Community

200 Rue de la Loi

1049 Bruxelles, Belgium

- information on safety and approval of food ingredients and additives

United States Food and Drug Administration (US FDA)

5600 Fishers Lane

Rockville, MD 20857, USA

Tel: 1-301-443 1544

- information on approval and safety of ingredients and additives for drugs, cosmetics, food etc.

Director, Beekeeping Extension Service

Ministry of Agriculture, Land and Marine Resources

St. Clair Circle

Port of Spain, Trinidad and Tobago, West Indies

- information on rules, standards and hygienic conditions of honey processing rooms, etc.

3.1.5 Others

UNCTAD/GATT

International Trade Centre

Palais de Nation

1211 Geneva 10, Switzerland

- trade statistics, market surveys, directories, bibliographies, laws and other trade related information

US Dept. of Trade and Commerce

Patent and Trademark Office

Washington, DC 20231, USA

- information on US registered patents

Third General Directorate

European Community

200 Rue de la Loi

1049 Bruxelles, Belgium

- information on patents registered for the European Community

WIPO, World Property Organization

34 Chemin de Colombettes

CH - 1211 Geneva 20, Switzerland

Tel: 41-22-730 9111, Telex: 412912

Fax: 41-22-733 5428

- national patents can be registered, information on international patents is available **if patent numbers are known**

European Patent Offices in:

P.O.Box 5818

Patentlaan 2

2280 H Rijsvijk, NL

Tel: 70-340 2040

Fax: 70-340 3016

- for registration and information on various patents

or

Erhard Str. 27

D-80331 München, FRG

Tel: 089-23990

Fax: 089-23994465

- for registration and information on various patents

CBI

P.O. Box 30009

3001 DA Rotterdam, NL

Tel: 31-10-413-0787; Fax: 31-10-411 4081; Telex: 27151

- information for import development (into EEC) from developing countries,
training and also as intermediary

3.2 Publications

3.2.1 Periodicals

World wide list of beekeeping journals, published in 1983 by IBRA

See also "Bees for development" under Beekeeping

Soap, Perfumery and Cosmetics (SPC)

Wilmington House, Church Hill

Wilmington, Dartford, Kent DA2 7EF, United Kingdom

Tel: 44-1322-277788; Fax: 44-1322-27674

- technical journal

Euredit S.A.

9, Avenue de Friedland

75008 Paris, France

Tel: 33-1-42893466; Fax: 33-1-42893473

- publishes EUROPAGES, annual of European industrial suppliers

Gruppo Editoriale Faenza Editrice S. p. a.

P.O. Box 68

48018 Faenza (Ravenna), Italy

Tel: 39-546-663488; Fax: 39-546-660440

- publishes "1MB Catalogue guide to the Italian packaging industry, producers of equipment and machines for the manufacture of package material and packing, bottling plants for the food, pharmaceutical and cosmetic industry

Chiriotti Editore S.p.a.

Viale Rimembranza 60

10064 Pinerolo (Torino), Italy

Tel: 39-121-794493; Fax: 39-121-794480

- Italian Journal of Food Science and other technical publications.

Allured Publishing Corporation

2100 Manchester Rd.

Building C, Suite 1600

P.O.Box 318

Wheaton, IL 60189-0318, USA

Tel: 1-708-653 2155; Fax: 1-708-653 2192

- special documentary and formulary issues, also bimonthly "Cosmetics & Toiletries" and other journals, Who's Who of cosmetic research and

development laboratories, etc.

3.2.2 Catalogues and directories

Beekeeping

The "Bibliographie d'apiculture de langue française", published in 1983 (106 pp.) by C. de Casteljou lists 1607 books and is available from IBRA.

A rather old review of US and Canadian books on beekeeping lists 613 books and 689 Federal and State publications and was published in 1972 by T.S.K and M.P. Johansson (104 pp.).

IBRA has probably the most complete library of beekeeping related publications and can provide copies as well as catalogues of available books and journals.

Much information can be obtained by writing to national research institutes; some contact addresses can be obtained from IBRA.

Cosmetics

Cosmetic Bench Reference (US\$ 95,- + 20, for shipping)

Allured Publishing Corporation

P.O.Box 318

Wheaton, IL 60189-0318, USA

Tel: 1-708-653 2155; Fax: 1-708-653 2192

- Over 6000 chemical names, CTFA names, trade names and synonyms of raw materials, supplier lists etc.

Guide International de la Parfumerie (350,- FF)

Editions Publi-Guide,

195 Quai de la Gourdine

77400 Lagny, France

Fax: 33-1-64024881

- Biennial directory of companies producing raw materials, packaging or components, plus manufacturing and chemical assistance laboratories and list of suppliers of perfumes, cosmetics, toiletries for consumer and beauty salons.

Emulsifiers & Detergents, Functional Materials

MC Publishing Company

175 Rock Road

Glen Rod, NJ 07452, USA

Tel: 1-201-652 2655; Fax: 1-201-652 3419; Telex: 130559

International Cosmetic Ingredient Dictionary, see 3.1.3 CTFA

Books

References given in the text can be found in the bibliography. For purchase of mamny of the books check also with IBRA, Bees for Development or Wichlas Press. For copies of articles check with IBRA.

Electronic Information see also 3.1.1

"Browsing" on the Internet with programmes such as Netscape or Mosaic, allows searches for certain keywords. The available information is developing rapidly and commercial suppliers of access to the Internet are now operating

in many countries.

WWW pages are information documents available to anybody with proper Internet access and one of the above programmes. One such example is a WWW page on various recipes using all kinds of insects:

<http://www.public.instate.edu/entomology/insectsasfood.html>

or

<http://www.atd/ncar.edu/rdp/gfc/mead/mead.html>

for mead makers, who also have an electronic discussion group at meadrequest@talisman.com. Subscription requests can be sent via E-mail by typing: `subscrib mead-request firstname.lastname`.

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ANNEX 3

WEIGHT AND VOLUME CONVERSIONS

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Most recipes in this book contain measures given in parts by weight or volume, in order to avoid problems with conversion from one measuring system to another. In order to convert volume measures to weight measures the specific weight of a substance has to be known. This is very difficult for powdered substances, but generally, the finer a powder is, the smaller is its volume for a defined weight.

The volume ratios in the recipes are usually based on the ratios of teaspoons or tablespoons to cups in the US system.

1 cup (US) = 235 ml = 8 fl. ounces = 16 tablespoons = 48 teaspoons

1 cup (UK) = 284 ml

1 kg 0 2.2 lbs. (US) = 35.2 oz.

(US)

1 lb (US) = 454 g = 16 ounces

1 cup honey (18% moisture) = approx. 335 g = 0.74 lbs.

1 cup sugar = approx. 227 g = 0.50 lbs.

1 cup flour = approx. 114 g = 0.25 lbs.

1 cup oil (veget.) = approx. 227 g = 0.50 lbs.

To convert $^{\circ}\text{C}$ into $^{\circ}\text{F}$: Multiply by 9, divide by 5 and add 32.To convert $^{\circ}\text{F}$ into $^{\circ}\text{C}$: Subtract 32, multiply by 5 and divide by 9.

	$^{\circ}\text{F}$	$^{\circ}\text{C}$
Freezer temp.	0	-17
Water freezes	32	0
Best storage temp. (honey, cosmetics)	41	5
Best crystallization temp.	57	14

Liquid storage of honey (min. temp.)	77	25
Max. temp. For honey treatment w/out flash heating and cooling	108	42
Pasteurization, wax melts	149	65
Water boils (sea level)	212	100

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ANNEX 4

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**Joint FAO/WHO Food Standards Programme
Codex Alimentarius Commission
Codex Standards for Sugars (Honey), Second Edition**

Volume 11, 1994

EXPLANATORY NOTES

This section contains the Codex World-Wide Standard for Honey adopted by the 17th Session of the Codex Alimentarius Commission. The World-Wide Standard supersedes the European Regional Codex Standard for Honey (Ref. CODEX STAN 12-1981) contained in Volume III of the Codex Alimentarius, First Edition (Ref. CAC/VOL. III-Ed. 1).

Methods of Analysis and Samplin~

The methods of analysis included in Codex Standards are of three types: "Defirnng" (Type I), !!Reference!! (Type II) and 'Alternative approved" (Type III). The nature and purpose of these types of Codex methods of analysis and the obligations falling on Governments in accepting Codex Standards with respect to methods of analysis has been clarified by the Codex Alimentarius Commission (See General Principles for the Establishment of Codex Methods of Analysis, Procedural Manual of the Codex Alimentarius Commission, 6th

Edition; report of the 17th Session of the Commission, para 139, ALINORN 87/39; and report of the 8th Session of the Codex Committee on General Principles, para 22 and Appendix IV, ALINORM 87/33).

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CODEX STANDARD FOR HONEY (World-wide standard)⁵

1. SCOPE

1.1 This standard applies to all honeys produced by honeybees and covers all

styles of honey presentation which are offered for direct consumption.

1.2 The standard also covers honey which is packed in non-retail (bulk) containers and is intended for re-packing into retail packs.

2. DEFINITION

2.1 Definition of Honey

Honey is the natural sweet substance produced by honeybees from the nectar of blossoms or from secretions of living parts of plants or excretions of plant sucking insects on the living parts of plants, which honeybees collect, transform and combine with specific substances of their own, store and leave in the honey comb to ripen and mature.

2.2 Description

Honey consists essentially of different sugars predominantly glucose and fructose. The colour of honey varies from nearly colourless to dark brown.

The consistency can be fluid, viscous or partly to entirely crystallized. The flavour and aroma vary, but usually derive from the plant origin.

2.3 Subsidiary Definitions and Designations

2.3.1 Origin

2.3.1.1 Blossom Honey or Nectar Honey is the honey which comes from nectaries of flowers.

2.3.1.2 Honeydew Honey is the honey which comes mainly from secretions of living parts of plants or excretions of plant sucking insects on the living parts of plants. Its colour various from very light brown or greenish to dark brown.

2.3.2 Methods of Processing

2.3.2.1 Extracted Honey is honey only obtained by centrifuging decapped broodless combs.

2.3.2.2 Pressed Honey is honey obtained by pressing broodless combs with or

without the application of moderate heat.

2.3.2.3 Drained Honey is honey obtained by draining decapped broodless combs.

2.3.3 Styles - Honey which meets all the compositional and quality criteria of Section 3 of this standard may be presented as follows:

(a) Honey which is honey in liquid or crystalline state or a mixture of the two;

(b) Comb Honey which is honey stored by bees in the cells of freshly built broodless combs and which is sold in sealed whole combs or sections of such combs

(c) Chunk Honey which is honey containing one or more pieces of comb honey;

(d) Crystallized or Granulated Honey which is honey that has undergone a natural process of solidification as a result of glucose crystallization;

(e) Creamed (or creamy or set) Honey is honey which has a fine crystalline structure and which may have undergone a physical process to give it that structure and to make it easy to spread.

3. ESSENTIAL COMPOSITION AND QUALITY FACTORS

3.1 Honey shall not have any objectionable flavour, aroma, or taint absorbed from foreign matter during its processing and storage. The honey shall not have begun to ferment or effervesce.

3.2 Honey shall not be heated to such an extent that its essential composition and quality is impaired.

3.3 Apparent reducing sugar content, calculated as invert sugar:

- | | | |
|----------------------------|---|-------------------|
| (a) Honey not listed below | - | Not less than 65% |
| (b) Honeydew honey | - | Not less than 60% |
| (c) Blackboy (Xanthorrhoea | - | Not less than 53% |

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3.4 Moisture Content

- | | | |
|------------------------------|---|-------------------|
| (a) Honeys not listed below | - | Not more than 21% |
| (b) Heather honey (Calluna) | - | Not more than 23% |
| (c) Clover honey (Trifolium) | - | Not more than 23% |

3.5 Apparent Sucrose Content

- | | | |
|---|---|-------------------|
| (a) Honeys not listed below | - | Not more than 5% |
| (b) Honeydew honey, blends of honeydew honey and blossom honey, Robinia, Lavender, Citrus, Alfalfa, Sweet-clover, Red Gum (Eucalyptus | - | Not more than 10% |

Camaldulensis), Acacia,
leatherwood (Eucryphia
Lucinda), Menzies Banksia
(Banksia menziesii)

- (c) Red Bell (Calothamnus - Not more than 15%
sanguineus), White stringy
bark (Eucalyptus scabra),
Grand Banksia (Banksia
grandis), Blackboy
(Xanthorrhoea preissi)

3.6 Water Insoluble Solids Contents

- (a) For honeys other than pressed - Not more than 0.1%
honey
- (b) Pressed honey - Not more than 0.5%

3.7 Mineral Content (ash)

- (a) Honeys not listed below - Not more than 0.6%
- (b) Honeydew honey or a mixture of honeydew honey and blossom honey - Not more than 1.0%

3.8 Acidity

- Not more than 40 milliequivalents acid per 1000 grammes

3.9 Diastase Activity

Determined after processing and blending in accordance with Section 7.7

- Not more than 3

3.10 Hydroxymethylfurfural Content - Not more than 80 mg/kg

4. FOOD ADDITIVES

4.1 None permitted.

5. HYGIENE

5.1 It is recommended that the product covered by the provisions of this standard be prepared in accordance with the appropriate sections of the General Principles of Food Hygiene recommended by the Codex Alimentarius Commission (Ref. No. CACIRCP 1-1969, Rev. 2 (1985)).

5.2 Honey should be free from visible mould and, as far as practicable, be free from inorganic or organic matters foreign to its composition, such as, insects, insect debris, brood or grains of sand, when the honey appears in retail trade or is used in any product for human consumption.

5.3 Honey shall not contain toxic substances arising from microorganisms or plants in an amount which may constitute a hazard to health.

6. LABELLING

In addition to Sections 2, 3, 7 and 8 of the General Standard for Labelling or Prepackaged Foods (CODEX STAN 1~1985) the following specific provisions apply:

6.1 The Name of the Food

6.1.1 Subject to the provisions of 6.1.4 products conforming to the standard shall be designated "honey".

6.1.2 No honey may be designated by any of the designations in Section 2.3 unless it conforms to the appropriate description contained therein. The Styles in 2.3.3 (a), (c), (d) and (e) shall be declared.

6.1.3 Honey may be designated by the name of the geographical or

topographical region if the honey was produced exclusively within the area referred to in the designation.

6.1.4 Honey may be designated according to floral or plant source if it comes wholly or mainly from that particular source and has the organoleptic, physicochemical and microscopic properties corresponding with that origin.

6.1.5 Honey complying with Sections 3.3(b) and (c), 3.4(b) and 3.5(b) and (c) shall have in close proximity to the word YY~~~yl the common name or the botanical name of the floral source or sources.

6.2 Labelling of Non-Retail Containers

In addition to Sections 2, 3 and 8.1.3 of the General Standard the following specific provisions applies:

6.2.1 Information on labelling as specified in this Section shall be given either on the container or in accompanying documents, except that the name of the product, lot identification, and the name and address of the manufacturer or

packer shall appear on the container.

6.2.2 Lot identification, and the name and address of the manufacturer or packer may be replaced by an identification mark provided that such a mark is clearly identifiable with the accompanying documents.

6.2.3 Outer containers holding prepackaged foods in small units (see Section 6 of the General Standard) shall be fully labelled.

7. METHODS OF ANALYSIS AND SAMPLING

7.1 Determination of reducing sugar content (Type I Method)

7.1.1 Principle of method

The method is a modification of the Lane and Bynon (1923) procedure involving the reduction of Soxhlet's modification of Fehling's solution by titration at boiling point against a solution of reducing sugars in honey using methylene blue as an internal indicator.

The maximum accuracy for this type of determination is attained by ensuring that the reduction of the Fehling' 5 solution during the standardization step and in the determination of the reducing sugars in the honey solution are carried out at constant volume. A preliminary titration is, therefore, essential to determine the volume of water to be added before the determinations are carried out to satisfy this requirement.

7.1.2 Reagents

7.1.2.1 Soxhlet's Modification of Fehling's Solution

Solution A: Dissolve 69.28 g copper sulphate pentahydrate ($\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$; MW + 249.71) with distilled water to 1 litre. Keep one day before titration.

Solution B: Dissolve 346 g sodium potassium tartrate ($\text{C}_4\text{H}_4\text{K NaO}_6 \cdot 4\text{H}_2\text{O}$; MW + 282.23) and 100 g sodium hydroxide (NaOH) with distilled water to 1 litre. Filter through prepared asbestos.

7.1.2.2 Standard Invert Sugar Solution (10 g/L)

Weigh accurately 9.5 g pure sucrose, add 5 mL hydrochloric acid ca. 36.5 percent w/w pure HCl) and dilute with water to about 100 mL, store this acidified solution for several days at room temperature (ca. 7 days at 120 to 15°C, or 3 days at 200 to 25°C), and then dilute to 1 litre. (N.B. Acidified 1.0 percent invert sugar remains stable for several months). Neutralize a suitable volume of this solution with 1M sodium hydroxide solution (40 g/L) immediately before use and dilute to the required concentration (2 g/L) for the standardization.

7.1.2.3 Methylene Blue Solution

Dissolve 2 g in distilled water and dilute to 1 litre.

7.1.2.4 Alumina Cream

Prepare cold saturated solution of alum ($K_2SO_4 \cdot Al_2(SO_4)_3 \cdot 24H_2O$) in water. Add ammonium hydroxide with constant stirring until solution is alkaline to litmus, let precipitate settle and wash by decantation with water until wash-water gives only slight test for sulphate with barium chloride solution. Pour

off excess water and store residual cream in stoppered bottle.

7.1.3 Sampling

7.1.3.1 Liquid or Strained Honey

If sample is free from granulation, mix thoroughly by stirring or shaking; if granulated, place closed container in water-bath without submerging, and heat 30 mm. at 60⁰C; then if necessary heat at 65⁰C until liquefied. Occasional shaking is essential. Mix thoroughly and cool rapidly as soon as sample liquefies. Do not heat honey intended for hydroxymethylfurfural or diastatic determination. If foreign matter, such as wax, sticks, bees, particles of comb, etc., is present, heat sample to 40⁰C in water-bath and strain through cheesecloth in hot-water-funnel before sampling.

7.1.3.2 Comb Honey

Cut top of comb, if sealed, and separate completely from comb by straining through a sieve the meshes of which are made by so weaving wire as to form

square opening of 0.500 mm by 0.500 mm⁷ when portions of comb or wax pass through sieve, heat sample as in 7.1.3.1 and strain through cheesecloth. If honey is granulated in comb, heat until wax is liquefied; stir, cool and remove wax.

7.1.4 Procedure

7.1.4.1 Preparation of Test Sample - First Procedure (applicable to honeys which may contain sediment)

(a) Transfer an accurately weighed sample of approximately 25 g (W_1) from the homogenized honey to 100 mL volumetric flask, add 5 mL alumina cream (7.1.2.4) dilute to volume with water at 20⁰C and filter.

(b) Dilute 10 mL of this solution to 500 mL with distilled water (diluted honey solution).

OR

7.1.4.2 Preparation of Test Sample - Second Procedure

(a) Weigh accurately a representative quantity of about 2 g (W_2) of the homogeneous honey sample, dissolve in distilled water and dilute to 200 mL in a calibrated flask (honey solution).

(b) Dilute 50 ml of the honey solution to 100 mL using distilled water (diluted honey solution).

7.1.4.3 Standardization of the Modified Fehling's Solution

Standardize the modified Fehling's solution A so that exactly 5 mL (pipette), when mixed with approximately 5 mL of Fehling's solution B, will react completely with 0.050 g invert sugar added as 25 mL dilute invert sugar solution (2 g/L).

7.1.4.4 Preliminary Titration

The total volume of the added reactants at the completion of the reduction

titration must be 35 mL. This is made up by the addition of a suitable volume of water before the titration commences. Since the compositional criteria of the honey standard specify that there should be more than 60 percent reducing sugars (calculated as invert sugar) a preliminary titration is necessary to establish the volume of water to be added to a given sample to ensure the reduction is carried out at constant volume. This volume of water to be added is calculated by subtracting the volume of diluted honey solution consumed in the preliminary titration (c mL) from 25 mL.

Pipette 5 mL Fehling's solution A into a 250 mL Erlenmeyer flask and add approximately 5 mL Fehling's solution B. Add 7 mL distilled water, a little powdered pumice or other suitable antibumping agent, followed by about 15 mL diluted honey solution from a burette. Heat the cold mixture by boiling over a wire gauze, and maintain moderate ebullition for 2 mm. Add 1 mL 0.2 percent aqueous methylene blue solution whilst still boiling and complete the titration within a total boiling time of 3 minutes, by repeated small additions of diluted honey solution until the indicator is decolorized. It is the colour of the supernatant liquid that must be observed. Note the total volume of diluted honey solution used (x mL).

7.1.4.5 Determination

Calculate the amount of added water necessary to bring the total volume of the reactants at the completion of the titration to 35 mL by subtracting the preliminary titration (x mL) from 25 mL.

Pipette 5 mL Fehling's solution A into a 250 mL Erlenmeyer flask and add approximately 5 mL Fehling's solution B.

Add (25-x) mL distilled water, a little powdered pumice or other suitable antibumping agent and, from a burette, all but 1.5 mL of the diluted honey solution volume determined in the preliminary titration. Heat the cold mixture to boiling over a wire gauze and maintain moderate ebullition for 2 mm. Add 1.0 mL 0.2 percent methylene blue solution whilst still boiling and complete the titration within a total boiling time of 3 mm. by repeated small additions of diluted honey solution until the indicator is decolorized. Note the total volume of diluted honey solution (y mL). Duplicate titrations should agree within 0.1 mL.

7.1.5 Calculation and Expression of Results

7.1.5 Calculation and Expression of Results

Where the First Procedure (7.1.4.1) has been used:

$$C = \frac{W_1}{W_2} \times \frac{100}{W_1}$$

Where the Second Procedure (7.1.4.2) has been used:

$$C = \frac{W_1}{W_2} \times \frac{100}{W_1}$$

Where C = g invert sugar per 100 g honey

W_1 = weight (g) of honey sample taken according to subsection

W_2 = weight (g) of honey sample taken according to sub-

section 7.1.4.2

Y_1 = volume (mL) of diluted honey solution consumed in the determination carried out according to the First Procedure (7.1.4.1)

Y_2 = volume (mL) of diluted honey solution consumed in the determination carried out according to the Second Procedure (7.1.4.2)

7.1.6 Notes on the Procedure

It is essential to the accuracy and repeatability of the determination that the volume of water necessary to bring the reactant mixture to a total volume of 35 mL be determined for each individual sample; the following table gives typical volumes which may be encountered at the preliminary titration stage for the incremental contents of invert sugar shown, assuming the test sample (7.1.4.1) weighs about 25 g or test sample (7.1.4.2) weighs about 2 g.

Invert Sugar content

Volume of Distilled Water to be

%	Added mL
60	8.3
65	9.6
70	10.7
75	11.6

7.2 Determination of Apparent Sucrose Content (Type I Method)

7.2.1 Principle of the Method

Based on the Walker (1917) inversion method.

7.2.2 Reagents

7.2.2.1 Soxhlet modification of Fehling's solution (7.1.2.1)

7.2.2.2 Standard invert sugar solution (7.1.2.2)

7.2.2.3 Hydrochloric acid (6.34 M aqueous)

7.2.2.4 Sodium hydroxide solution 2 gll litre (7.1.2.3)

7.2.2.5 Methylene blue solution 2 gll litre (7.1.2.3)

7.2.3 Sampling

The honey is prepared for sampling as in 7.1.3

7.2.4 Procedure

7.2.4.1 Preparation of test sample

Prepare the honey sample as in 7.1.4.1(a). Dilute 10 mL of this solution to 250 mL with distilled water: honey solution (for sucrose determination) OR prepare the honey solution as in 7.1.4.2(a).

7.2.4.2 Hydrolysis of the test sample

The honey solution (50 mL) is placed in a 100 mL graduated flask, together with 25 mL distilled water; heat the test sample to 65 °C over a boiling water-bath. The flask is then removed from the water-bath and 10 mL of 6.34 M hydrochloric acid added. The solution is allowed to cool naturally for 15 minutes, and then brought to 20 °C and neutralizing with 5 M sodium hydroxide, using litmus paper as indicator, cooled again, and the volume adjusted to 100 mL (diluted honey solution).

7.2.4.3 Titration

As in 7.1.4.4 and 7.1.4.5.

7.2.5 Calculation and expression of results

Calculate percent invert sugar (g invert sugar per 100 g honey) after inversion using the appropriate formula as percent invert sugar before inversion in 7.1.5.

$$\text{Apparent sucrose content} = (\text{invert sugar content after inversion} - \text{invert sugar content before inversion}) \times 0.95$$

The result is expressed as g apparent sucrose/100 g honey.

7.3 Determination of Moisture Content (Type I Method)

7.3.1 Principle of Method

Based on the refractometric method of Chataway (1932), revised by Wedmore (1955).

7.3.2 Apparatus

Refractometer

7.3.3 Sampling

The honey is prepared for sampling as in 7.1.3.

7.3.4 Procedure

7.3.4.1 Determination of the Refractive Index

Determine the refractive index of the test sample using a refractometer at a constant temperature near 20⁰C. Convert the reading to moisture content (percent mim) using the table given below. If the determination is made at a temperature other than 20⁰C, convert the reading to standard temperature of 20⁰C, according to the temperature corrections quoted. The method used is to be noted in the test report.

TABLE FOR THE ESTIMATION OF MOISTURE CONTENT

Refractive Index (20⁰C)	Moisture Content (percent)	Refractive Index (20⁰)	Moisture Content (percent)	Refractive Index (20⁰C)	Moisture Content (percent)
---	---	--	---	---	---

1.5044	13.0	1.4935	17.2	1.4830	21.4
1.5038	13.2	1.4930	17.4	1.4825	21.6
1.5033	13.4	1.4925	17.6	1.4820	21.8
1.5028	13.6	1.4920	17.8	1.4815	22.0
1.5023	13.8	1.4915	18.0	1.4810	22.2
1.5018	14.0	1.4910	18.2	1.4805	22.4
1.5012	14.2	1.4905	18.4	1.4800	22.6
1.5007	14.4	1.4900	18.6	1.4795	22.8
1.5002	14.6	1.4895	18.8	1.4790	23.0
1.4997	14.8	1.4890	19.0	1.4785	23.2

1.4992	15.0	1.4885	19.2	1.4780	23.4
1.4987	15.2	1.4880	19.4	1.4775	23.6
1.4982	15.4	1.4875	19.6	1.4770	23.8
1.4976	15.6	1.4870	19.8	1.4765	24.0
1.4971	15.8	1.4865	20.0	1.4760	24.2
1.4966	16.0	1.4860	20.2	1.4755	24.4
1.4961	16.2	1.4855	20.4	1.4750	24.6
1.4956	16.4	1.4850	20.6	1.4745	24.8
1.4951	16.6	1.4845	20.8	1.4740	25.0
1.4946	16.8	1.4840	21.0		

1.4940	17.0	1.4835	21.2		
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7.3.4.2 Temperature Corrections - Refractive Index:

Temperatures above 20°C - Add 0.00023 per °C

Temperatures below 20°C - Subtract 0.00023 per °C

7.4 Gravimetric Determination of Water-insoluble Solids Content (Type II Method)

7.4.1 Sampling

The honey is prepared for sampling as in 7.1.3.

7.4.2 Procedure

7.4.2.1 Preparation of Test Sample

Honey (20 g) is weighed to the nearest centigram (10 mg) and dissolved in a

suitable quantity of distilled water at 80⁰C and mixed well.

7.4.2.2 Gravimetric Determination

The test sample is filtered through a previously dried and weighed fine sintered glass crucible (pore size 15.40 ~m) and washed thoroughly with hot water (80⁰C) until free from sugars (Mohr test). The crucible is dried for one hour at 135⁰C, cooled and weighed to 0.1 mg.

7.4.3 Expression of Results

The result is expressed as percent water-insoluble solids (m/m).

7.5 D~ination of Mineral Content ash (Type I Method)

7.5.1 Sampling

Honey is prepared for sampling as in 7.1.3.

7.5.2 Procedure

7.5.2.1 Determination of the Honey

Honey (5010 g) is weighed accurately into an ignited and pre-weighed platinum or silica dish and gently heated in a muffle furnace until the sample is black and dry and there is no danger of loss by foaming and overflowing. An infra-red lamp can also be used to char the sample before inserting into the furnace. If necessary, a few drops of olive oil may be added to prevent frothing. The sample is then ignited at 600⁰C to constant weight. The sample is cooled before weighing.

7.5.3 Expression of Results

The result is expressed as percent ash (*mim*).

7.6 Determination of Acidity (Type II Method)

7.6.1 Sampling

The honey is prepared for sampling as in 7.1.3.

7.6.2 Reagents

7.6.2.1 Sodiumhydroxide0.1N (carbonate-free)

7.6.2.2 Phenolnhthalein indicator 1 percent (*m/v*) in ethanol, neutralized.

7.6.2.3 Distilled Water made carbon dioxide free by boiling and subsequent cooling.

7.6.3 Procedure

7.6.3.1 Preparation of Test Sample

Honey (10.0 g) is weighed accurately and dissolved in 75 mL distilled water (7.6.2.3).

7.6.3.2 Titration

The test sample is titrated against carbonate-free 0.1 M sodium hydroxide solution using 4-5 drops of neutralized phenolphthalein indicator. The end-point colour should persist for 10 seconds. For darkly coloured samples, a smaller weight should be taken. As an alternative, a pH meter may be used and the sample titrated to pH 8.3.

7.6.4 Calculation and Expression of Results

The result is expressed as millival (milli-equivalents acid/kg honey and is calculated as follows:

$$\text{Acidity} = 10 v$$

where v = the number of mL 0.1 M NaOH used in the neutralization of 10 g honey.

7.7 Determination of Diastase Activit (Type I Method)

7.7.1 Principle of the Method

Based on the method of Schade et al., (1985) modified by White et al., (1959) and Hadorn (1961).

7.7.2 Reagents

7.7.2.1 Iodine Stock Solution:

Dissolve 8.8 g of iodine analytical grade, in 30-40 mL water containing' 22 g potassium iodine, analytical grade, and dilute to 1 litre with water.

7.7.2.2 Iodine solution 0.0007 N:

Dissolve 20 g potassium iodine, analytical grade, in 30-40 mL water in a 500-mL volumetric flask. Add 5.0 mL iodine stock solution and make up to volume. Make up a fresh solution every second day.

7.7.2.3 Acetate Buffer - pH 5.3 (1.59M):

Dissolve 87 g sodium acetate.3H₂O in 400 mL water, add about 10.5 mL glacial

acetic acid in a little water and make up to 500 ml. Adjust the pH to 5.3 with sodium acetate or acetic acid as necessary, using a pH meter.

7.7.2.4 Sodium Chloride Solution 0.5M:

Dissolve 14.5 g sodium chloride, analytical grade, in ;boiled-out distilled water and make up to 500 mL. The keeping time is limited by mould growth.

7.7.2.5 Starch Solution:

(a) Preparation of soluble starch

In a conical flask immersed in a water-bath and fitted with a reflux condenser, boil 20 g of potato starch for one hour in the presence of a mixture of 100 mL of 95 percent ethanol and 7 mL of 1 M hydrochloric acid. Cool, filter through a filtering crucible (pore size 90 - 150 ~m) and wash with water until the wash/water ceases to give any chloride reaction. Drain thoroughly and dry the starch in air at 35 °C. The soluble starch must be stored in a well stoppered flask.

(b) Determination of moisture content of soluble starch

Accurately weigh a quantity of approximately 2 g of soluble starch and spread in a thin layer over the bottom of a weighing bottle (diameter 5 cm). Dry for one and a half hours at 130⁰C. Allow to cool in a dessicator and re-weigh. The weight loss with respect to 100 g represents the moisture content. The moisture content of such starch should be 7-8% m/m depending on the humidity of the air in which the sample has been dried.

(c) Preparation of starch solution

Use a starch with a blue value between 0.5-0.55 using a 1 cm cell, as determined by the method below. Weigh out the amount of starch which is equivalent to 2.0 g anhydrous starch. Mix with 90 mL of water in a 250 mL conical flask. Bring rapidly to the boil, swirling the solution as much as possible, heating over a thick wire gauze preferably with an asbestos centre. Boil gently for 3 min., cover and allow to cool spontaneously to room temperature. Transfer to a 100 mL volumetric flask, place in a water bath at

40⁰C to attain this temperature and make up to volume at 40⁰C.

Method for determining blue value of starch

The amount of starch equivalent to 1 g anhydrous starch is dissolved by the above method, cooled and 2.5 mL acetate buffer added before making up to 100 mL in a volumetric flask.

To a 100 mL volumetric flask add 75 mL water, 1 mL M hydrochloric acid and 1.5 mL of 0.02 N iodine solution. Then add 0.5 mL of the starch solution and make up to volume with water. Allow to stand for one hour in the dark and read in 1 cm cell using a spectrophotometer at 660 nm against a blank containing all the ingredients except the starch solution. Reading on the absorbance scale = Blue value.

7.7.3 Apparatus

7.7.3.1 Water-bath at 40 ± 0.2⁰C.

7.7.3.2 Spectrophotometer to read at 660 nm.

7.7.4 Sampling

The honey sample is prepared as in 7.1.3 without any heating.

7.7.5 Procedure

7.7.5.1 Preparation of test samples

Honey solution: 10.0 g honey is weighed into a 50 mL beaker and 5.0 mL acetate buffer solution is added, together with 20 mL water to dissolve the sample. The sample is completely dissolved by stirring the cold solution. 3.0 mL sodium chloride solution is added to a 50 mL volumetric flask and the dissolved honey sample is transferred to this and the volume adjusted to 50 mL.

N.B.: It is essential that the honey should be buffered before ;coming into contact with sodium chloride.

Standardization of the starch solution

The starch solution is warmed to 40°C and 5 mL pipetted into 10 mL of water at 40°C and mixed well. 1 mL of this solution is pipetted into 10 mL 0.0007 N iodine solution, diluted with 35 mL of water and mixed well. The colour is read at 660 nm against a water blank using a 1 cm cell.

The absorbance should be 0.760 ± 0.020 . If necessary the volume of added water is adjusted to obtain the correct absorbance.

7.7.5.2 Absorbance determination

Pipette 10 mL honey solution into 50 mL graduated cylinder and place in $400 \pm 2^{\circ}\text{C}$ water-bath with flask containing starch solution. After 15 minutes, pipette 5 starch solution into the honey solution, mix, and start stop-watch. At 5 minutes intervals remove 1 mL aliquots and add to 10.00 mL 0.0007 N iodine solution. Mix and dilute to standard volume (see 6.7.5.1). Determine absorbance at 660 nm in spectrophotometer immediately using 1 cm cell. Continue taking 1 mL aliquots at intervals until absorbance of less than 0.235 is reached.

7.7.6 Calculation and expression of results

The absorbance is plotted against time (mm) on a rectilinear paper. A straight line is drawn through at least the last three points on the graph to determine the time when the reaction mixture reaches an absorbance of 0.235. Divide 300 by the time in minutes to obtain the diastase number (DN). This number expresses the diastase activity as ml 1 percent starch solution hydrolysed by the enzyme in 1 g of honey in 1 h at 40⁰C. This diastase number corresponds with the Gothe-scale number.

Diastase activity = DN = ml starch solution 1 percent)/g honey/h at 40⁰C.

7.8 Spectrophotometric determination of hydroxymethylfurfural (HMF) content (Type II Method)⁸

According to the AOAC method (AOAC, 14th Ed., 1984, Hydroxymethylfurfural in Honey, Spectrophotometric Method, 31.153).

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⁵ Supersedes the Codex European Regional Standard for Honey (CODEX STAN 12-1981).

⁶ Hereafter referred to as "The General Standard"

⁷ Ref. ISO 565-1983. Such sieve could be replaced by U.S. sieve with No.40 Standard screen (size of opening 0.420 mm).

⁸ Adopted by the 17 Session of the Commission.

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