

GENERAL NOTICES

Introduction

Hong Kong Chinese Materia Medica Standards, abbreviated as HKCMM Standards provides recommendations and references regarding the safety and quality standards for a number of Chinese herbal medicines commonly used in Hong Kong. The term 'CMM' has very general connotation covering not only herbal materials, but also animal and mineral materials. The HKCMM Standards accords priority to the safety and quality control of herbal materials in the present stage of development. Under the General Notices, basic guidelines for proper interpretation and application of the provisional standards are set out. Proper interpretation of measurement results under tests, extractives and assay, including measurement uncertainty, may take reference to any accepted general guidelines, for example, Eurachem/CITAC guide QUAM : 2012 and Protocol for uncertainty evaluation from validation data (LGC/UK).

Arrangement and Interpretation of Monograph

The monograph for each CMM is arranged in the following order: names, source, description, identification, tests, extractives, assay and chemical structure.

- (a) **Names** – referring to the names of a CMM which include the official name, Chinese name and Chinese phonetic name.
- (b) **Source** – referring to the botanical origin and family name of the medicinal plant, the used part of the plant and its condition. The time for collection, the preliminary on-the-spot treatment upon collection and other relevant information are included. The species of CMM listed are currently available in Hong Kong market.
- (c) **Description** – referring to the macroscopic and organoleptic characteristics including form, size, colour, texture, fracture, gross internal structures, odour/smell, taste, and other relevant information of a CMM. The description focuses on the whole and dried CMM. Special characteristic features of a given CMM are also described. For the CMM with multiple sources, the descriptions of the species are consolidated if there is no significant difference among their characteristic features; otherwise, the characteristics of the principal species shall be described in details and the differences between the principal species and the other species supplemented.
- (d) **Identification** – referring to the verification of a CMM by means of microscopic examinations of cross sections and powders, physical and chemical tests and chromatographic analysis.

- (e) **Tests** – referring to the qualitative and quantitative detection of heavy metals, pesticide residues, mycotoxins (aflatoxins), sulphur dioxide residues, foreign matter, ash, water content and other chemical components in the CMM which should be monitored.
- (f) **Extractives** – referring to the soluble contents of a CMM as extracted by water, ethanol or other suitable solvents.
- (g) **Assay** – referring to the quantitative determination of the active ingredients or markers present in a CMM.
- (h) **Chemical Structure** – referring to the structure(s) of marker compounds and chemical reference substances which are employed in the Thin Layer Chromatographic Identification, High-Performance Liquid Chromatographic Fingerprinting, Ultra-High Performance Liquid Chromatographic Fingerprinting, Gas Chromatographic Fingerprinting and Assay to determine the presence of the markers in a CMM.

Specification and Requirements

- (a) **Apparatus** – Appropriate apparatus must be used to ensure the accuracy of measurement. Volumetric glassware used for quantitative measurements must comply with Class A requirements of the national or international standards such as ISO Standards published by ISO.
- (b) **Atomic weights** – The atomic weights adopted for the calculation of the molecular weights and the conversion factors are the values recommended in the International Table of Relative Atomic Weights published by the International Union of Pure and Applied Chemistry in 1997.
- (c) **‘Calculated with reference to the dried substance’** – The weight of CMM is adjusted by subtracting the amount of water content which is determined by toluene distillation method or oven dried method.
- (d) **Centrifugation** – conditions of centrifugation is defined by reference to the acceleration due to gravity (g); $g = 9.80665 \text{ ms}^{-2}$.
- (e) **Constant weight** – Constant weight, in the process of ignition, means that two consecutive weightings do not differ by more than 0.5 mg, the second weighting is made after an additional period of ignition under the specified conditions appropriate to the nature and quantity of the residue (30 min is usually suitable).
- (f) **Expression of concentrations** – In expressing the concentration of a solution, percent designated by the symbol % is used with the following expressions –
- (% , w/w) expresses grams of solute in 100 g of product.
 - (% , w/v) expresses grams of solute in 100 mL of product.

- (% v/v) expresses millilitres of solute in 100 mL of product.
- (% v/w) expresses millilitres of solute in 100 g of product.

When the concentration of a solution is expressed in molarity designated by the symbol M, it denotes the number of moles of the stated solute contained in sufficient purified water (unless otherwise stated) to produce one litre of solution. The liquid mixture indicated as (10:1, v/v) or (5:3:1, v/v) denotes the mixture of 10 and 1 volumes of liquids, or the mixture of 5, 3 and 1 volumes of liquids, respectively.

- (g) **LC solvent gradient programme** – In describing the linear gradient used in the LC system, “100→70” denotes the change of a particular component in the mobile phase from 100 to 70%.
- (h) **pH** – The acidity or alkalinity of a solution, unless otherwise specified, is determined by blue or red litmus paper. To indicate this property more precisely, pH value is used.
- (i) **Precision of measurement** – The quantities and volumes of the materials and reagents used in the tests are measured with adequate precision as follows –

A value of: 20 means not less than 19.5 and not more than 20.5
2.0 means not less than 1.95 and not more than 2.05
0.20 means not less than 0.195 and not more than 0.205

- (j) **Reagents and solvents** – The reagents or solvents used should be of analytical grade or above, unless otherwise specified. For Assay, the solvents used should be of HPLC grade or above.
- (k) **Safety Precautions in handling carcinogenic substances** – Adopting and observing the following safety requirements:
- Perform all manipulations inside fume hood to avoid inhalation of fine powder of carcinogenic substances.
 - Wear goggles, disposable gloves and protective clothing while handling carcinogenic substances.
 - Pipetting by mouth is strictly forbidden. Mechanical pipetting aids or disposable pipetting tips should be used.
 - In case of accident and feeling unwell, seek medical advice immediately (show container or label).
 - The carcinogenic substances should be labelled with a carcinogen warning and the name of the substance.
 - Keep proper records of carcinogenic substances delivered, stored, and used.
 - Warning signs should be located on the door of the work area where carcinogens are used (e.g. Caution – Limited access. Carcinogenic chemicals in use).

- Regular housekeeping of bench areas should be performed to prevent contamination from spreading to other areas within the workplace.
- Dispose carcinogenic substances in accordance to the Waste Disposal (Chemical Waste) (General) Regulation 1992.
- Wash hands and arms after handling carcinogenic substances.

(l) **Safety Precautions in handling potent/toxic CMM** – Adopting and observing the following safety requirements:

- Perform all manipulations inside fume hood to avoid inhalation of fine powder of potent/toxic CMM.
- Wear goggles, disposable gloves and protective clothing while handling potent/toxic CMM.
- Avoid eye and skin contact with potent/toxic CMM.
- In case of accident and feeling unwell, seek medical advice immediately (show container or label).
- Label potent/toxic CMM properly.
- Keep proper records of potent/toxic CMM delivered, stored, and used.
- Keep potent/toxic CMM tightly sealed with suitable material.
- Store potent/toxic CMM in suitable and locked receptacle.
- Dispose potent/toxic CMM in accordance to the Waste Disposal (Chemical Waste) (General) Regulation 1992.
- Wash hands and arms after handling potent/toxic CMM.

(m) **Sieve** – The Chinese national standard R40/3 series regarding sieve size is adopted and the numbers are indicated in Table 1 below.

Table 1 Sieve sizes of the Chinese national standard R40/3 series

Sieve No.	Average internal diameter of aperture (µm)	Aperture No.
1	2000 ± 70	10
2	850 ± 29	24
3	355 ± 13	50
4	250 ± 9.9	65
5	180 ± 7.6	80
6	150 ± 6.6	100
7	125 ± 5.8	120
8	90 ± 4.6	150
9	75 ± 4.1	200

Powder of CMM is graded according to the sieve through which the material passes and is indicated as follows –

- Very coarse powder : all particles pass through a No.1 sieve, and not more than 20% pass through a No.3 sieve.
- Coarse powder : all particles pass through a No.2 sieve, and not more than 40% pass through a No.4 sieve.
- Medium powder : all particles pass through a No.4 sieve, and not more than 60% pass through a No.5 sieve.
- Fine powder : all particles pass through a No.5 sieve, and not less than 95% pass through a No.6 sieve.
- Very fine powder : all particles pass through a No.6 sieve, and not less than 95% pass through a No.7 sieve.
- Ultra fine powder : all particles pass through a No.8 sieve, and not less than 95% pass through a No.9 sieve.

(n) **Temperatures** – All temperatures are expressed in degree Celsius (°C). Unless otherwise specified, particular conditions are indicated as follows –

- “Room temperature” refers to a temperature of 15-30°C.
- “Hot water” refers to water temperature of 70-80°C.
- “Warm water” refers to water temperature of 40-50°C.
- “Cold water” refers to water temperature of 2-10°C.
- “Ice bath” refers to water temperature below 4°C.
- “Water bath” refers to water temperature of 98-100°C.

(o) **Testing procedures** – Unless otherwise specified, analytical procedures are carried out at a controlled temperature between 15 and 25°C.

(p) **Water** – Water used in all tests is distilled or de-ionized.

(q) **Weights and measures** – The metric system of weights and measures is employed. The unit of measurement conforms to SI units (Table 2). In abbreviated unit of measure, a solidus (/) is used as a symbol for “per”.

Table 2 The SI units adopted in the HKCMM Standards

Quantity	Unit	
	Name	Symbol
Length	centimeter	cm
	millimeter	mm
	micrometer	µm
Mass	kilogram	kg
	gram	g
	milligram	mg
	microgram	µg
Volume	litre	L
	millilitre	mL
	microlitre	µL
Time	hour	h
	minute	min
	millisecond	ms
Wavelength	nanometer	nm
Power	watt	W

Abbreviations and Symbols

The abbreviations and symbols adopted in the HKCMM Standards are listed as follows –

λ_{em}	Wavelength of emission
λ_{ext}	Wavelength of excitation
amu	Atomic mass unit
CMM	Chinese materia medica
CRS	Chemical reference substance
DAD	Diode array detector
ELSD	Evaporative light scattering detector
FID	Flame ionization detector

<i>g</i>	Gravity
GC	Gas chromatography
GC-MS	Gas chromatography-mass spectrometry
HLB	Hydrophilic-Lipophilic Balance
HPLC	High-performance liquid chromatography
HPTLC	High-performance thin-layer chromatography
ICP-MS	Inductively coupled plasma-mass spectrometry
ISO	International Organization for Standardization
LC	Liquid chromatography
LC-MS/MS	Liquid chromatography with tandem mass spectrometry
<i>m/z</i>	Mass-to-charge ratio
M	Molarity
M_w	Molecular weight
<i>n</i>	Number of theoretical plates
No.	Number
ODS	Octadecylsilane
OS	Octasilane
PTFE	Polytetrafluoroethylene
<i>R</i>	Resolution factor
RC	Regenerated cellulose

R_f	Retention factor
RRT	Relative retention time
RSD	Relative standard deviation
r^2	Square of correlation coefficient
SI units	International system of units
SPE	Solid phase extraction
Std-AS	Standard solution for assay
Std-FP	Standard solution for fingerprinting
Std-Int	Standard intermediate solution
Std-Stock	Standard stock solution
T	Tailing factor
TLC	Thin-layer chromatography
TS	Test solution
UHPLC	Ultra-high performance liquid chromatography
UV	Ultraviolet