


Preparation of research data for the standardization of herbal medicines in chemistry – physics

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- **Importance of quality control in chemistry-physics.**

- **Requirements for the standardization of herbal medicines.**




Importance of quality control in chemistry-physics.




The standard used to judge the quality of herbal medicines

Thai Herbal Pharmacopoeia

Reference pharmacopoeia

A guide for quality control

Thai Herbal Pharmacopoeia, THP

:70 Monographs




Requirements for the standardization of herbal medicines.




Need to know the details:

- Local name, English name, Scientific name, Synonyms
- General characteristics of herbs
- Distribution
- Part used
- Constituent




Test

- Identification
- Foreign matter : NMT…
- Ethanol-soluble extractive : NLT…
- Water-soluble extractive : NLT…
- Total ash : NMT…
- Acid-insoluble ash : NMT…
- Loss on drying : NMT, Temp.
- Water: NMT…, Azeotropic Distillation Method
- Volatile oil : NLT…




Identification

- Chemical test
- Thin layer Chromatography

Chemical test

Color test

Specificity ✗ false positive reaction

Color → Time

Precipitate → Color → Time

Don’t use many chemical reagents, hazard

Reagent : manufacturer, batch




Thin layer Chromatography
(Appendix 3.1)

Stationary phase
TLC plate (HPTLC plate) : type of absorbent, plate, thickness, size, manufacturer, batch, pretreatment

Mobile phase : 2 systems, How to saturate
Don’t use many chemical reagents, hazard, controlled reagent

Standard : Reference standard and COA ➡ BDN
Extract for use: method, Ident., reason ➡ BDN
(repeat n≥10)
Marker: Similar R_f value




Thin layer Chromatography
(Appendix 3.1)

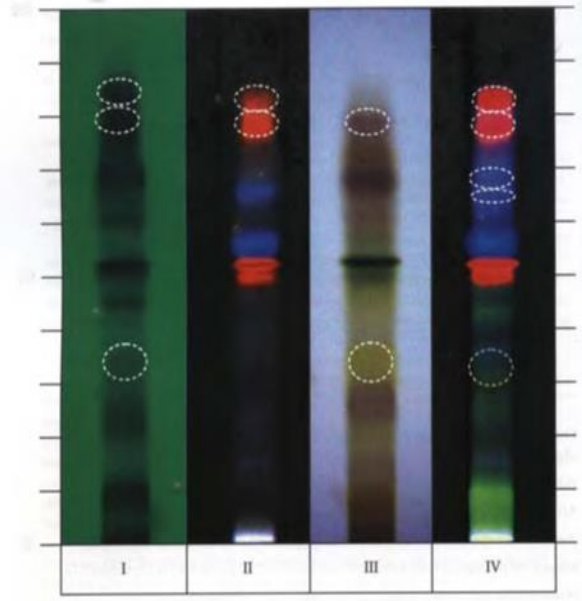
Solution preparation : How to prepare

Apply : Volume of apply,
Band (10-20 mm for TLC, 5-10 mm for HPTLC), every samples and NLT 3 plates

Distance : 15 cm or ? cm

Detection : Under 254 nm, 366 nm, spraying reagent, heat or not, temperature and time

Identification :TLC fingerprint



Photograph : Raw data
(Tiff or Bipmap)
resolution ≥600 dpi

Table of hR_f value

Table 1 hR_f Values of Components in the Extract of the Leaves of *Clinacanthus nutans* (Burm. f.) Lindau

Band	hR_f Value	Detection			
		UV 254	UV 366	*Phosphomolybdic Acid TS*	*NP/PEG TS* and UV 366
1	5-11	quenching	–	yellowish brown	yellow
2	14-17	–	pale blue	–	pale blue
3	20-24	weak quenching	–	–	–
4	24-30	–	–	pale greyish purple	yellowish green
5	30-37	weak quenching	–	yellowish brown	bluish green
6	40-44	–	–	–	yellowish green
7	44-47	weak quenching	–	pale yellowish brown	–
8	47-51	weak quenching	red	green	red
9	51-53	quenching	red	dark green	red
10	53-57	–	bright blue	pale green	bright blue
11	58-61	weak quenching	–	pale greyish purple	–
12	62-66	–	blue	–	pale blue
13	66-70	quenching	–	dark purple	pale blue
14	70-73	–	–	brown	–
15	75-80	quenching	red	purple	pinkish red
16	80-86	quenching	red	–	pinkish red

Loss on drying Not more than 12.0 per cent w/w after drying at 105° to constant weight (Appendix 4.15).

Foreign matter Not more than 2.0 per cent w/w (Appendix 7.2).

Acid-insoluble ash Not more than 1.0 per cent w/w (Appendix 7.6).

Total ash Not more than 18.0 per cent w/w (Appendix 7.7).

Ethanol (50 per cent)-soluble extractive Not less than 23.0 per cent w/w (Appendix 7.12).

Water-soluble extractive Not less than 28.0 per cent w/w (Appendix 7.12).




Foreign matter
(Appendix 7.2)

Part used: Known

Foreign organs: other parts

Foreign elements : other herbs, insect, soil

Use : 500 g for roots, bark, stem
250 g for leaves, flowers, seeds, fruits
50 g for sliced herb

Ash
(Appendix 7.6)

Total ash	Temperature : NMT 450 ◦C
Acid insoluble ash	Temperature : about 500 ◦C

Use : powder 2-3 g, accurately weight, readability 0.0001g

Ignite to constant weight : two consecutive weighings of the ash do not differ by more than 0.5 mg/g (second weighing after ignite for 15 min)




Extractives

(Appendix 7.12, 7.12H)

Water-soluble extractive : glucose, mucilage, pectin

Ethanol-soluble extractive : ketone, alcohol, calcium oxalate

Chloroform-soluble extractive : terpenes, sesquiterpenes

Hexane-soluble extractive : antraquinones, resin, glycosides




Extractives
(Appendix 7.12, 7.12H)

Use : powder 2-5 g, accurately weight, readability 0.0001g

Dry to constant weight : two consecutive weighings of the extract do not differ by more than 2.5 mg/g (second weighing after dry for 1 hour)

Temperature : 105 ◦C




Loss on drying
(Appendix 4.15)

Temperature : 100-105 ◦C

Time :……or until constant weight

Use : powder 2-5 g, accurately weight, readability 0.0001g

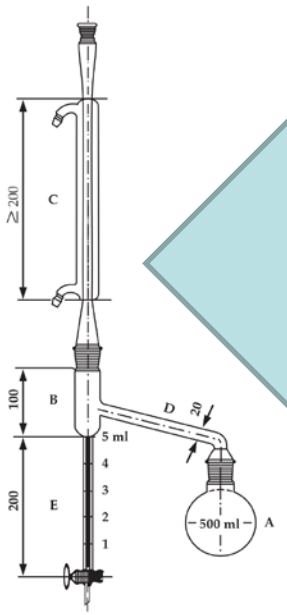
Dry to constant weight : two consecutive weighings of the extract do not differ by more than 2.5 mg/g (second weighing after dry for 1 hour)

Water content
(Appendix 4.12)

Azeotropic Distillation Method

Azeotropic Distillation Method

Apparatus The apparatus (see figure) consists of a glass flask (A) connected by a tube (D) to a cylindrical tube (B) fitted with a graduated receiving tube (E) and a reflux condenser (C). The receiving tube (E) is graduated in 0.1-ml subdivisions so that the error of reading is not greater than 0.05 ml. The source of heat is preferably an electric heater with rheostat control or an oil-bath. The upper portion of the flask and the connection tube may be insulated with asbestos.



Apparatus for Determination of Water by the Azeotropic Distillation Method
Dimensions in mm

- **Weight**
- **Volume of water (2-3ml)**
- **Gentle heat 15 min**
- **Toluene begins to boil,**
- **Rate of Distillation (2drops/sec)**
- **water has distilled over (4drops/sec)**
- **Calibrated glassware**

Volatile oil content
(Appendix 7.3H)

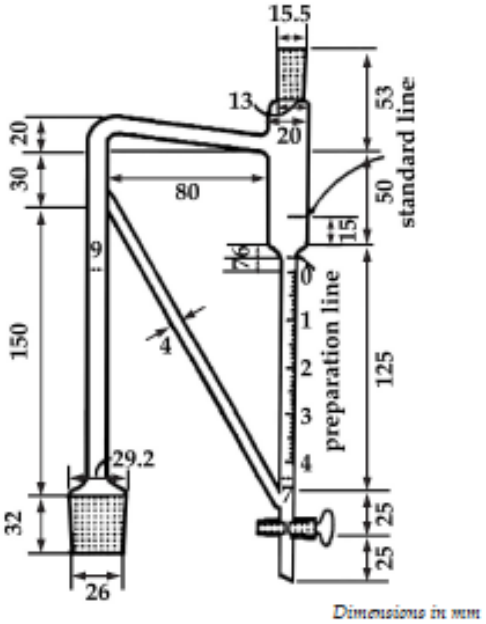


Fig. 1

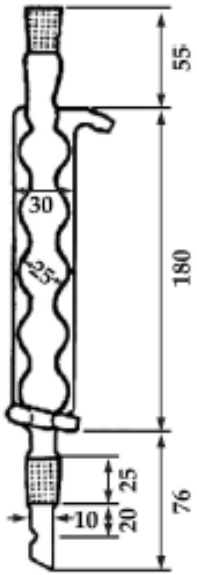


Fig. 2

- Weight
- Size
- Volume of distillation liquid, xylene
- Temp.(130-150 C)
- Rate of Distillation
- Time (5hr)
- Calibrated glassware




Quatitative Determination

Size of powder drug: Sieve No.

Calibrated instrument

Method: method validation (ICH guideline or guideline as announced by the Minister)

Calculation : as is and on dried basis/on anhydrous basis




Quatitative Determination

Standard : Reference standard and COA → BDN

Extract for use: method, Ident., reason, purity → BDN

(repeat n≥10)




Conclusion

Raw data : weight, repeat, picture, temperature, time
Assay : method validation
Standard : Standard and COA, manufacture, batch/lot
Extract for use(method, identification, reason)
*** repeat NLT 10
Reagent : Don’t use many chemical reagents, hazard, controlled reagents

Bureau of Drug and Narcotic

Thank you for your attention.