

# Instruction of Simplified Powder Microscopic Identification

## ■ ■ ■ Principle of microscopic identification ■ of Chinese medicines

Living organisms are composed of various cell types. Cells can be different in shape and structure, and the ergastic substances, such as crystal, starch granule, within cells of different living organisms can also be different. By using a microscope to observe the tissue structure, cell shape and types of ergastic substance of Chinese materia medica, their species can be distinguished.

Microscopic identification of Chinese medicines can be further subdivided into three types:

### ① Identification of powder slide

Sample is pulverised to prepare a slide for observing the appearance of cells or ergastic substances.

### ② Identification of session slide

Transverse sectioning is generally employed. Sample is cut into thin sections for observing the arrangement or distribution of tissues and ergastic substances.

### ③ Identification of surface slide

Epidermis of sample is torn out for observing features such as epidermal cell, stoma, hair, etc.



## ■ ■ ■ Procedures for conventional powder ■ ■ ■ microscopic identification

**Pulverise the sample and sieve it through a number 4 (65 apertures) or number 5 (80 apertures) sieve of the Chinese national standard R40/3 series. Put a small amount of the sieved powder onto a microscope slide and add a suitable test solution on it. Stir the mixture gently until homogenised, then cover it with a cover slip and observe under a microscope.**

**Three commonly used test solutions are listed below:**

### ① Chloral hydrate test solution

A commonly used chemical clearing agent that can quickly penetrate cells, causing dried and shrunken cells gradually to expand. It can dissolve most of the ergastic substances, such as starch granule, aleurone grain, and protein, making the cells clear and transparent for easy observation.

### ② Dilute glycerol test solution

A commonly used physical clearing agent that can penetrate cells to create a favourable condition for light transmission.

### ③ Glycerol-acetic acid test solution

Used for starch granule observation, as it prevents the expansion and distortion of starch granule after water absorption.

**Apart from using white light, features can also be observed using polarized light. Birefringent substances, such as crystal of calcium oxalate and fibre, have certain level of brightness when using polarized light to observe.**





## Simplified Powder Microscopic Identification

The procedures of pulverisation and sieving of the sample are omitted. Sample is directly scraped with a razor blade on its cross section to obtain the powder for examination. Dilute glycerol test solution or water is used to prepare the slide, and some easily recognised microscopic features are employed for identification.

**Instruments and tools required:**

### ① Light microscope

Recommend to use an upright microscope (light source is located below the sample), either the conventional or portable type. The maximum magnification power shall be above 200 times.



Conventional  
upright microscope

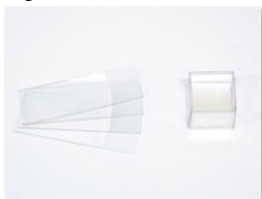


Portable microscope



## Instruction of Simplified Powder Microscopic Identification

### ② Microscope slide and cover slip\*



### ③ Single edge razor blade\*



### ④ Spatula



### ⑤ Dropper bottle



### ⑥ Test solution

Recommend to use dilute glycerol test solution that is prepared by mixing glycerol and water thoroughly in 1:2 ratio; or to simply use water but the evaporation rate will be faster.

Note :

\* Be cautious when using and wrap properly before disposal.



### Operation procedures:

- ① To obtain more comprehensive features, sampling shall be performed from the cross section of sample, avoiding sampling only from the outer or inner surface. Foreign matter may adhere to the surface of sample, so the sample shall be broken to expose a new fracture for sampling, ensuring the accuracy of the experiment; if the sample is difficult to break, cut surface can be used for sampling, but the outer layer should first be scraped with a razor blade.

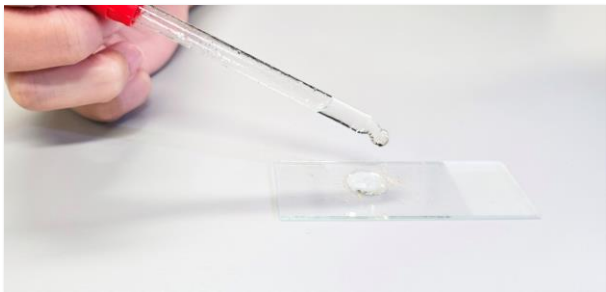


## Instruction of Simplified Powder Microscopic Identification

- ② Put the sample over a microscope slide. Scrape the fracture or processed cut surface with a razor blade, causing the powder to fall on the microscope slide.

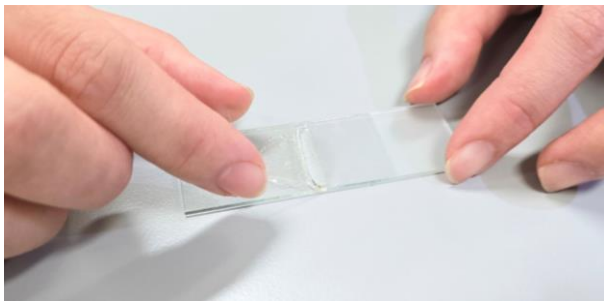


- ③ Use a spatula to remove any coarse powder, and then add suitable amount of test solution and stir gently.



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- ④ Take a cover slip and put it on one side of the test solution. Slowly cover it onto the test solution. Excess test solution shall be wiped with tissue paper when necessary.



- ⑤ Put the slide under a microscope to observe.



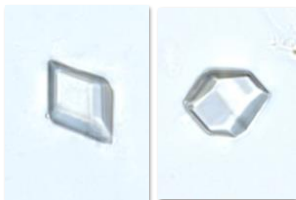


## Commonly observable features of powder microscopic identification

### ① Crystal of calcium oxalate

Widely presents in plants and insoluble in water. Can further be subdivided into different types of crystal according to the shape.

#### Prism of calcium oxalate



20  $\mu$ m

Rhombic, polygonal  
(Cortex Ailanthi)

#### Cluster of calcium oxalate



20  $\mu$ m

Crystal cluster-like  
(Cortex Acanthopanax)

#### Crystal sand of calcium oxalate



20  $\mu$ m

Small, slightly appears arrowhead-shaped  
(Cortex Lycii)

#### Columnar crystal of calcium oxalate



20  $\mu$ m

Columnar  
(Phyllanthi Emblicae Cortex)

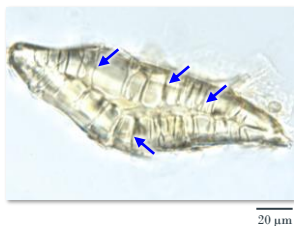


## ② Stone cell

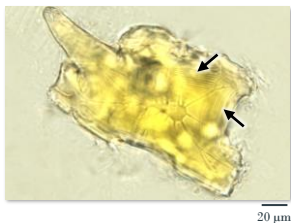
Varies in shape and size. With thickened cell wall that some have pits, pit canals or striations on it; some of which has prism of calcium oxalate within.



Sub-square, distinct pit (→)  
(Cortex Albiziae)



Sub-triangular, distinct pit canal (→)  
(Phyllanthi Emblicae Cortex)



Irregular, distinct striations (→)  
(Cortex Phellodendri)

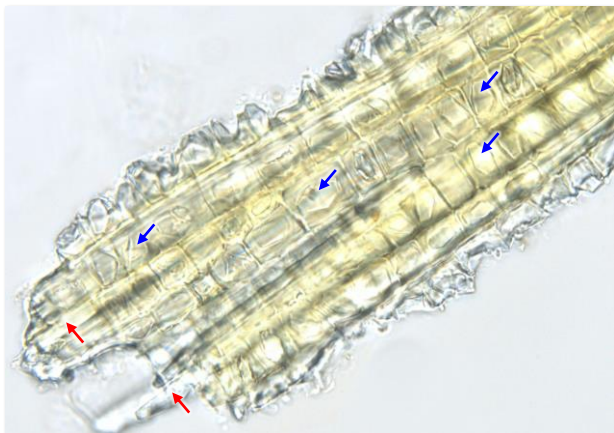


Cell contains a prism of calcium oxalate (→) (Cortex Ailanthi)



### ③ Crystal fibre

Formed by fibre bundles and their surrounding crystal cells which contain prism of calcium oxalate.



Fibre bundle (→) and prism of calcium oxalate (→)  
(Cortex Albiziae)

Government Chinese Medicines Testing Institute

Department of Health

Enquiry hotline: 2509 5809

Website: [www.cmro.gov.hk](http://www.cmro.gov.hk)

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