Kalstein®

Freeze Dryer

Model YR05186

Instruction Manual

Thank you very much for purchasing our Freeze Dryer Model YR05186

Please read the “Operating Instructions” and “Warranty” before operating this unit to assure proper operation. After reading these documents, be sure to store them securely together with the “Warranty” at a hand place for future reference.

 Warning: Before operating the unit, be sure to read carefully and fully understand important warnings in the operating instructions.

(Please read carefully the specifications before operating the instrument)

Ⅰ Summary

The vacuum freeze–drying technology, which is also called sublimation drying, is a technical method that freezes the samples in advance, and then sublimates its moisture in the vacuum state. Goods are easier for long–term preservation after

freeze–drying processing. They can be restored to the original state and maintain their chemical and biological characteristics after being watered. So, the freeze– drying technology is widely used in medicine, food, chemistry industry and biological products etc.

Ⅱ Characteristics and technical parameters

1. Main characteristics

(1) SECOP compressor, the refrigeration process is rapid, and the condenser temperature is low.

(2) LCD screen control system, simple operation and good function.

(3) The control system automatically stores data, and data can be viewed in form of curves. Whole freeze–drying process is clear.

(4) The drying chamber uses the transparent organic glass drum. So, you can clearly view sample state and observe the whole freeze–drying process.

(5) The vacuum pump is connected with host by international standard KF quick joint.

(6) Performance of machine is stable, easy to operate and low noise.

2. Technical parameter

(1) cold trap coil temperature: −55℃ (no−load)

(2) Limit vacuum: less than 10Pa(empty)

Ⅲ Conditions in use

1. Ambient temperature in normal working condition: 10℃−30℃. Relative humidity: ≤70%.

Power supply: 220V±10%, 50Hz

The working environment should be no conductive dust, explosive and corrosive gases and strong electromagnetic interference.

2.Transport and storage conditions environment temperature: −40℃□ 50℃. Relative humidity: ≤93%.

The storage conditions should be well−ventilated, no corrosive gases.

3.The safety classification: I Grade B Type.

Ⅳ Installation and preparations for freeze−drying

1.Structure of freeze dryer and name of partition

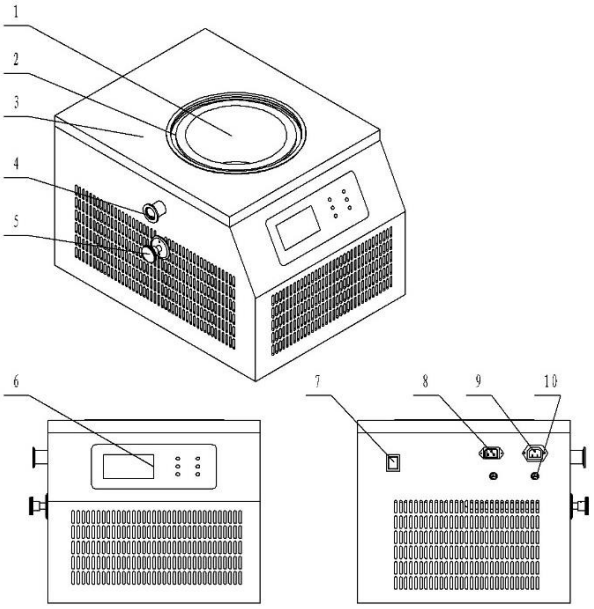

Figure 1–1 Structure of host

1□ condenser 2□ sealed ring 3□ workbench

4□ vacuum port 5□ drain valve (air inlet valve)

6□ control panel 7□ switch 8□ general power

9□ vacuum pump power 10□ fuse

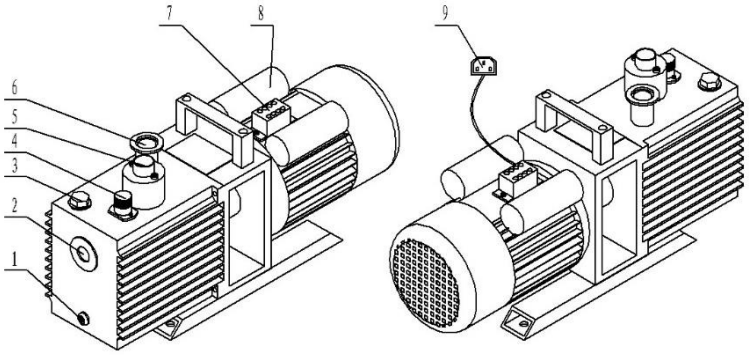

Figure 1–2 structure of vacuum pump

1□ oil drain 2□ oil level glass 3□ oil filler hole

4□ gas ballast valve 5□ exhaust port 6□ air inlet

7□ connecting terminal 8□ capacitor 9□ vacuum pump power cord

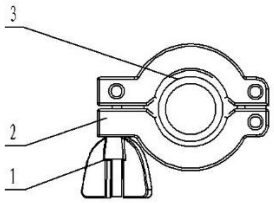

Figure 1–3 structure of clamp

1□ screw nut 2□ support 3□ gasket ring

2.Installation of freeze dryer

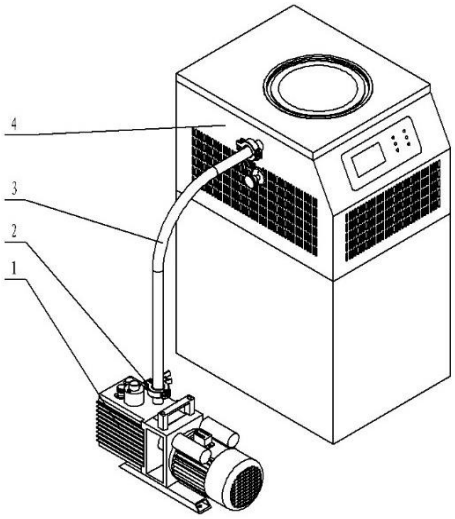

Figure 1–4 connection of the device

1□vacuum pump 2□clamp 3□tube that connects host with vacuum pump 4□

Installation steps:

1) Check accessories complete and undamaged after unpacking box.

2) Add vacuum pump oil to middle of level glass please use

our designated vacuum pump oil GS–1 **vacuum pump oil**

parameter:

coefficient of viscosity: 100 ; specific gravity: 1; flash point: 120 (℃)

40℃ kinematic viscosities: 100 (cSt) ; pour point: 60 (℃)

3) Connect the air inlet on pump and tube by clamp; the other end of tube connected with vacuum port on host.

4) Connect the "vacuum pump power cord" with "vacuum pump power" interface

on host.

5) One end of the power line is inserted into "general power" interface on host; the other end is connected to power supply 220V,50Hz (the power should be connected with ground lead)

6) Turn on switch and test the index of freeze dryer (vacuum degree<10Pa, Minimum condenser temperature<–50℃). Then the device is put into use.

3. Test of freeze dryer

● Test of condenser temperature

1) Cover the pre–freeze lid

2) Turn on switch, to enter control system. Touch the screen, to go to main interface. Press "compressor" to turn on compressor to test refrigeration.

3) Condenser temperature drops to −50℃ within 30 minutes, test is ok.

● Test of vacuum degree

1) Press "vacuometer" to turn on vacuum gauge, standard atmosphere is displayed.

2) Put on sealed ring

3) tighten the air inlet valve

4) place organic glass drum, drum bottom full contact with sealed ring.

5)Turn on vacuum pump by touching "vacuum pump". vacuum degree rapidly declines.

6) Vacuum degree goes down below 10 Pa within 10 minutes, test is ok.

7) After finishing tests, open air inlet valve on host to inflate host and restore normal pressure.

Then the machine is ready for running.

Notices:

1. There are no obstructions behind and at sides of host within 30cm.

2.Make sure that the vacuum pump oil has been filled before starting up.

V Operation of pre–freezing and drying process

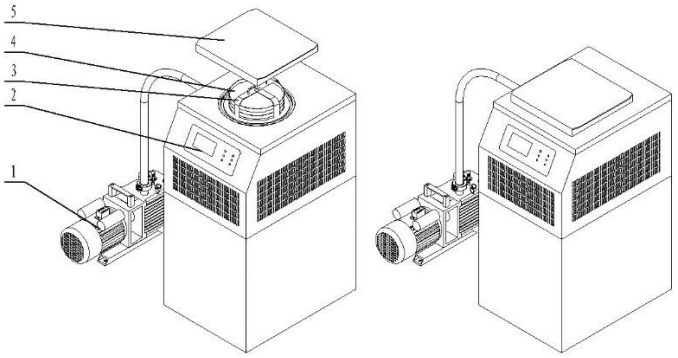

Figure 1-5 pre-freezing process

1□ vacuum pump 2□ control panel 3□ pre-freeze shelf

4□ material tray 5□ pre-freeze lid

The general pre-freezing process with steps:

(If you have low-temperature refrigerator, this process may be canceled.)

1.Turn on machine and start compressor. When condenser temperature drops below -40℃, you begin to freeze material.

2.Put material into tray (liquid directly into tray, solid material and vials evenly put on tray).

3.Put material tray into pre-freeze shelf and put the temperature sensor into material with full touch, to reduce error of sample temperature and actual temperature.

4.Put pre-freeze shelf into condenser.

5.Cover the pre-freeze lid.

6.When temperature of all parts of material drops below eutectic point, this condition will be still keeping about one hour. Then pre-freezing process is over and ready to make drying process.

4□ Drying process

4.1 Ordinary configuration drying process

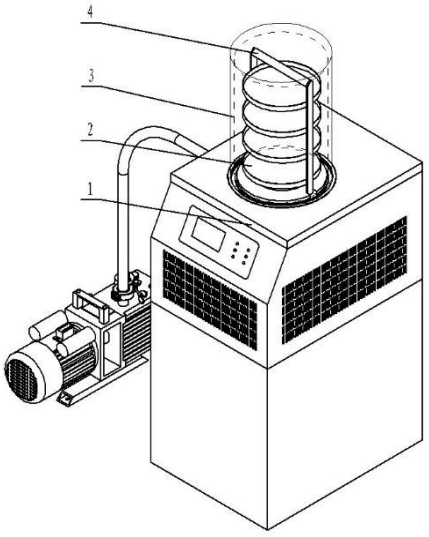

Figure 1–6 ordinary configuration drying process

1□ main engine 2□ material tray 3□ organic glass barrel

4□ drying shelf

1□ Take out the material from cold trap and put them on drying shelf.

2□ Put the drying shelf on cold trap.

3□ Check sealed ring and cover the organic glass barrel.

4□ Tight the drain valve in clockwise.

5□ Open vacuum pump and vacuum gauge. The vacuum degree is decline. It's normal that the vacuum degree is less than 20Pa.

6□ Open drain(inlet) valve and then close vacuum pump. Remove organic glass cover and collect material.

7□ Close drain(inlet) valve. Open drain (outlet) valve and clean this freeze dryer.

8□ When the vacuum pump doesn't work, please cover the exhaust hole. Notice: a□ the refrigerator mustn't turn off in drying process.

b□ drying time and freezing time is different because of differences in

material properties.

4.2 multi-manifold configuration drying process

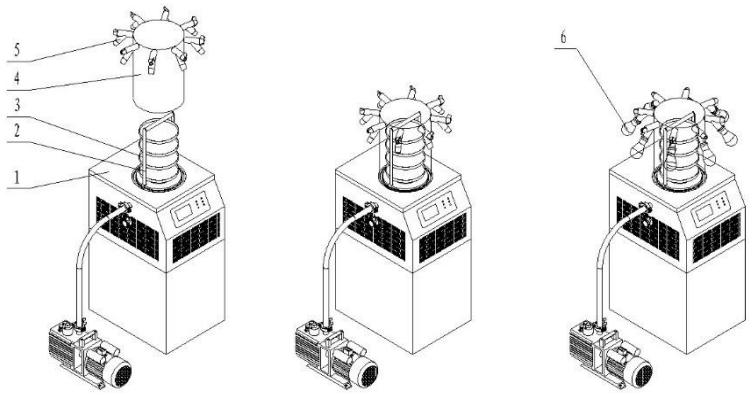

Figure 1–7 Multi–manifold drying process

1□ main engine 2□ drying shelf 3□ material tray

4□ multi–manifold organic glass barrel 5□ bottle

1□ Take out the material from cold trap and put them on drying shelf.

2□ Put the drying shelf on cold trap.

3□ Check sealed ring and cover the organic glass barrel.

4□ Tight the drain valve in clockwise.

5□ Open vacuum pump and vacuum gauge. The vacuum degree is decline. It's normal that the vacuum degree is less than 20Pa.

6□ Hang the flask one by one and open the manifold valve, When the material in the flask is dry, close the manifold valve and remove the flask.

7□ After drying, first open the "drain (inlet) valve" and then close the vacuum pump. Remove the organic glass cover and collect the dry matter.

8□ Close drain(inlet) valve. Open drain (outlet) valve and clean this freeze dryer.

9□ When the vacuum pump doesn't work, please cover the exhaust hole.

Notice: a□ the refrigerator mustn't turn off in drying process.

b□ drying time and freezing time is different because of differences in material properties.

4.3 Top–press configuration drying process

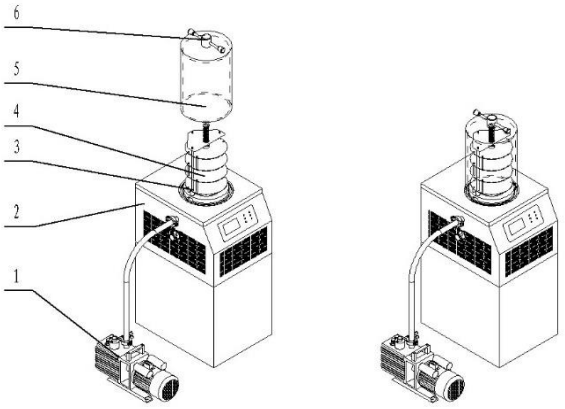

Figure 1–8 top–press configuration drying process

1□ vacuum pump 2□ main engine 3□ top press drying shelf

4□ material tray 5□ organic glass barrel 6□ handle

1□ Take out the material from cold trap and put them on drying shelf.

2□ Put the drying shelf on cold trap.

3□ Check sealed ring and cover the organic glass barrel.

4□ Tight the drain valve in clockwise.

5□ Open vacuum pump and vacuum gauge. The vacuum degree is decline. It's normal that the vacuum degree is less than 20Pa.

6□ After the drying, first open the drain (inlet) valve and then close the vacuum pump (turn the lid handle clockwise if you need to press the cylinder, then press the cork and let off the air). Remove the organic glass cover and collect the dry matter.

7□ Close drain(inlet) valve. Open drain (outlet) valve and clean this freeze dryer.

8□ When the vacuum pump doesn't work, please cover the exhaust hole. Notice: a□ the refrigerator mustn't turn off in drying process.

b□ drying time and freezing time is different because of differences in material properties.

4.4 Top–press multi–manifold configuration drying process

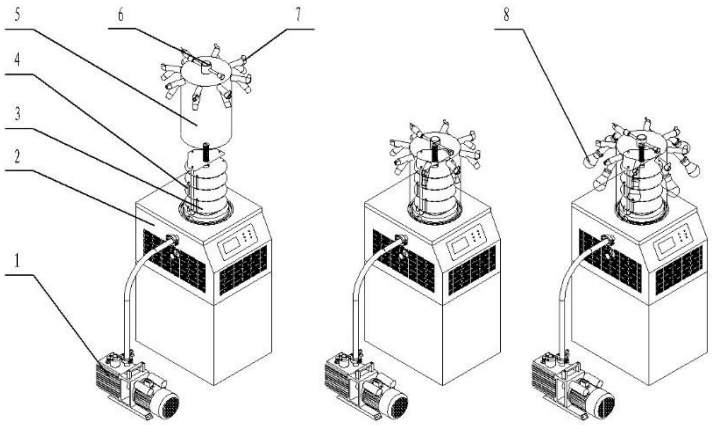

Figure 1–9 Top–press multi–manifold configuration drying process

1□ vacuum pump 2□ main engine 3□ top press drying shelf

4□ material tray

5□ top–press multi–manifold organic glass barrel

6□ handle 7□ multi–manifold interface 8□ bottle

1□ Take out the material from cold trap and put them on drying shelf.

2□ Put the drying shelf on cold trap.

3□ Check sealed ring and cover the organic glass barrel.

4□ Tight the drain valve in clockwise.

5□ Open vacuum pump and vacuum gauge. The vacuum degree is decline. It's normal that the vacuum degree is less than 20Pa.

6□ Hang the flask one by one and open the manifold valve, When the material in the flask is dry, close the manifold valve and remove the flask.

7□ After the drying, first open the drain (inlet) valve and then close the vacuum pump (turn the lid handle clockwise if you need to press the cylinder, then press the cork and let off the air). Remove the organic glass cover and collect the dry matter.

8□ Close power and close drain(inlet) valve. Open drain (outlet) valve and clean this freeze dryer.

9□ When the vacuum pump doesn't work, please cover the exhaust hole.

Notice: a□ the refrigerator mustn't turn off in drying process.

b□ drying time and freezing time is different because of differences in material properties.

Note: If material is loaded in vials, turn top press handle clockwise, to seal vial at vacuum state. Then open-air inlet valve to inflate host.

4.5 T–type configuration drying process

1. Install the T–shaped device above the cold trap.

2. The interfaces of the T–type device are connected to ensure sealing.

3. open the vacuum pump (before the "refrigerator" has been opened), when the vacuum value drops to 10–30Pa, you can connect the materials that need to be dried one by one.

4. Remove the dry material.

5. After the drying is finished, first open the water discharge (intake) valve and then

close the vacuum pump.

6. Turn off the power, turn off the water release (intake) valve, and defrost the equipment. After the defrosting is finished, open the draining (deflation) valve to drain the device and wipe the equipment clean.

7. When the vacuum pump is not working, please cover the vent hole to prevent dust from entering.

Ⅵ Turn off machine operation

1. Turn off power switch.

2. Unplug the power cord.

3. Clean condenser, drying shelf and acrylic drum and other parts.

4. When the vacuum pump does not work, please cover exhaust port to prevent dust entering.

Ⅶ Control system operation

The control system uses LCD touch screen display, easy to operate and the running status is clear. The system displays sample temperature curve, condenser temperature curve and vacuum degree curve. System adopts a variety of stable measures so that control system runs stable and reliable.

The control system contains following display screens:

1. Turn on switch, system goes into initial interface. Touch the screen center, it enters main interface.

Figure 1: initial interface

2□ On main interface, touch "compressor", compressor starts to work. Touch "vacuum pump", pump starts to work. Touch "vacuometer", vacuum degree displays. Touch "Real–time curve" for curves check. "History record" for earlier data check.

Figure 2: main interface

3□ Touch "real –time curve", to enter real–time curve interface. On right side, there are "sample", "condenser "and "vacuum "buttons to control relative curves. Please check interfaces as follows:

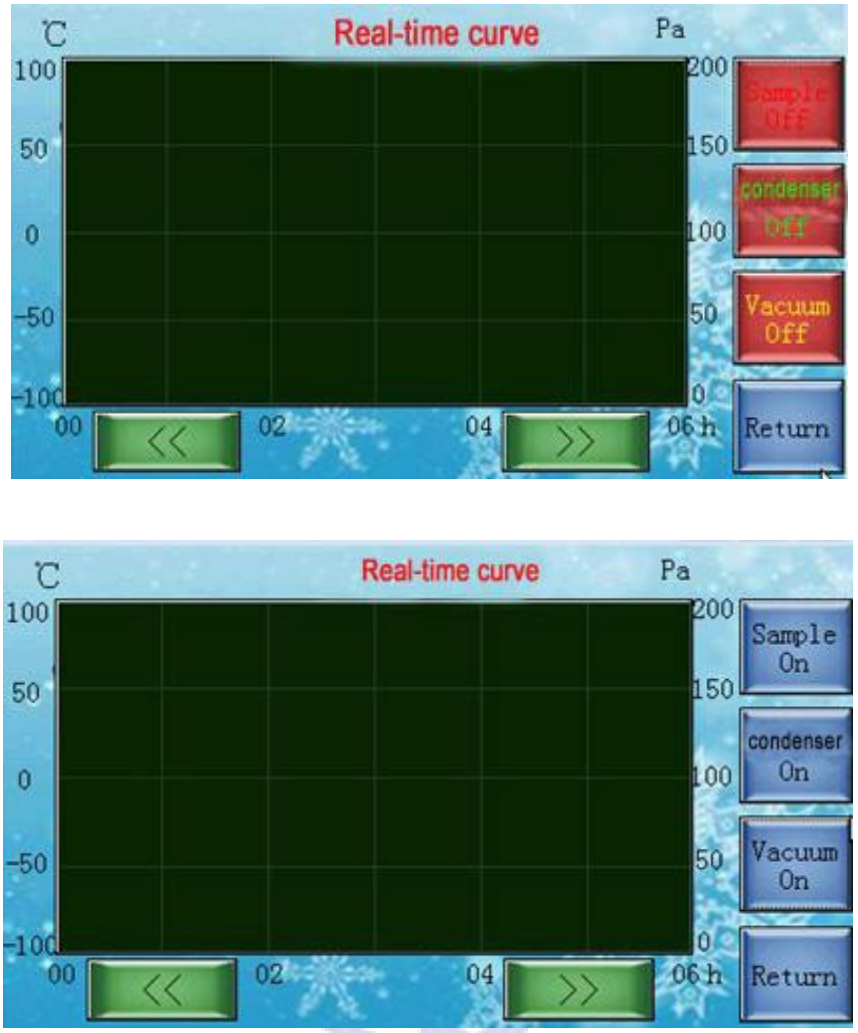

Figure 3: "real–time curve "interface

4. Click "history record "on main interface, it goes into "history select" interface. User can choose specific file, to check this curve, delete it □

Figure 4: "history select" interface

5.Click "confirm" on "history select" interface, user can see "history curve" interface.

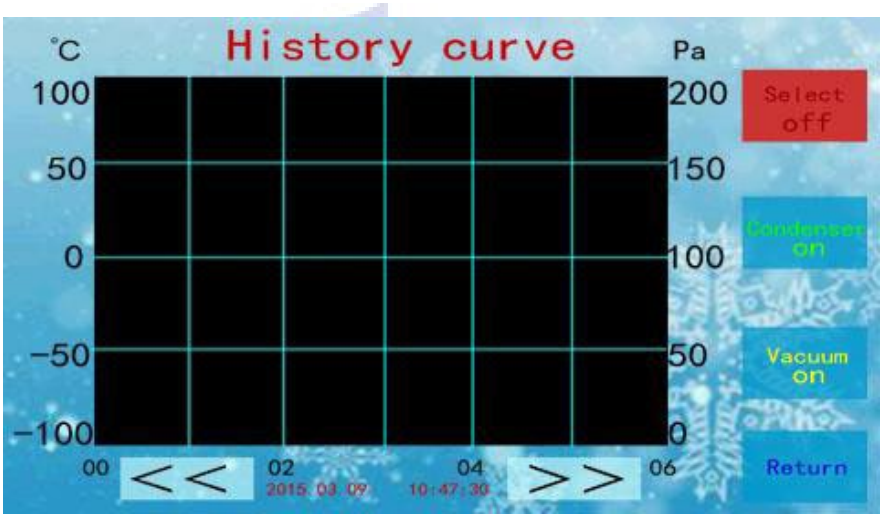

Figure 5: "history curve" interface

6. Click "Delete "button on "history select" interface. Selected file can be removed.

Figure 6: "Delete" interface

Ⅷ Notices

1.The vacuum pump should be put on ground so that it maintains a certain height difference with host (at least 50cm), to prevent oil return if power is suddenly off. If power off, you should open air inlet valve to inflate the host, take out the samples as soon as possible and properly store samples.

2.Working environment temperature should be less than or equal 32℃.
Humidity should be ≤80%.

3.When turn off the machine, user should inflate host first, later turn off vacuum pump to prevent oil return and sample pollution.

4.The acrylic drum is connected with host by "O" sealed ring.
Sealed ring should be kept clean, without organic solvent cleaning; acrylic drum's touch end with sealed ring should be protected from strike and damage.

5.Grounding power socket must be used.

6.The vacuum pump oil should be replaced regularly after working 200 hours

continuously.

7.Please don't frequently turn on and turn off power supply and compressor. If compressor stops working because of wrong operation, user needs to restart the compressor after waiting for at least 3 minutes.

Ⅸ Common breakdown and elimination

1.The vacuum degree cannot achieve below 15Pa.

(1) Check the connection between vacuum pump and host, to make sure clamp is tight

(2) Check whether the bottom of acrylic drum is clean, whether there is damage on the touch surface

(3) Check whether the "O" sealed ring is clean, whether its placement is correct.

(4) Check whether the vacuum pump works normally and whether the pump oil is clean.

(5) Check whether the air inlet valve is screwed tightly

2.High condenser temperature

Ambient temperature is too high, leading to bad heat dissipation. Please place the machine in proper environment with well-ventilated condition.