Automated Kjeldahl Distillation Unit

DW-ATN-300

User Guide

DRAWELL

Artist of Science

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Contents

Dear user,

Thank you for choosing our company's product. In order to obtain satisfactory using experience, please read the product manual carefully before starting the apparatus. If you have any question, please contact us in time, we will serve you wholeheartedly!
This user guide(trial version) is edited by our company's technicians with great efforts, but limited by their capabilities, there must be something not expressed or omitted, if you find problems, or you have new ideas, please feel free to let us know, we would be sincerely thankful to you.

Safety Instructions

Danger!!! Property damage or personal injuries may be caused, please use the machine as required!


专用电源


可靠接地


易燃易爆


禁止改造

special power supply reliable grounding flammable& explosive no renovation

a. Please use required power supply and voltage for this product--AC220V/50HZ.
b. The device must be grounded safely and kept away from electromagnetic interference(neutral wire or third wire mustn’t be grounded.)
c. Please use independent power socket for this product, and confirm the plug and power socket are well grounded.
d. It is not allowed to unplug the power plug while the apparatus is in operation.
e. Don’t repair without permission, entrusted repair must be instructed by a professional.
f. There mustn’t be dust or inflammable, explosive gas in the working environment.
g. The device should work under conditions of 10 -45℃, relative humidity ≤ 80%.
h. The device must be installed in a place without direct sunlight.
i. Reagents and other solutions are corrosive, please wear protective outfit and pay attention to safety while operating.

Packing List

Please check accompanied accessories

Articles in the host machine box

Host machine ··· 1
User Guide··· 1
Warranty Card ··· 1
Qualification Certificate ··· 1
Distilled water inlet tube (6mm*1.5m) ··· 1
Alkali liquid inlet tube (6mm*1.5m) ··· 1
Boric acid solution inlet tube (6mm*1.5m) ··· 1
Waste distilled water tube (6mm*1.5m) ··· 1
Condensed water inlet and outlet tubes (8mm*1.5m) ··· 1 for each
Digestive tube (40*300mm) ··· 1
Gloves ··· 1 pair
Power cable (1.8m) ··· 1

I. Summary

Kjeldahl method is a classic method for nitrogen determination. Currently, it's widely applied to determine the nitrogen content of soil, food, agricultural products, feed and other materials. During determination, there are three processes to finish, digestion, distillation, and titration, of which distillation is very important.

ATN-300 automated Kjeldahl distillation unit is developed in accordance with the Kjeldahl method, featured by user-friendly operation and easy learning for its Chinese menu and man-machine interface.

With manual distillation and automatic distillation two parts, ATN-300 is available for manual and automatic water filling, alkali filling, acid filling, and distillation, which brings much convenience to laboratory personnel.

The automatic part of ATN-300 can save 20 groups of combination of water filling, alkali filling, acid filling, and distillation time settings.

ATN-300 applies imported self-sucking pump for liquid feeding rather than the inflatable method applied by many domestic manufacturers, which allows liquid feeding barrel to be placed under the control console and to select liquid feeding barrel of large capacity.

ATN-300 has been furnished with several protective measures:absence protection for distillation tube (no heating or distillation without distillation tube); steam generator over-pressure alarm (shut down and alarm in case of abnormal pressure); water shortage protection for steam generator;electric leakage protection.

II. Working Principle

When the sample is fully digested and cooled down to room temperature, distillation can be performed, its principle is as follows:

$$(NH_4)_2SO_4+2NaOH=Na_2SO_4+2H_2O+2NH_3\uparrow$$

separate out ammonia with alkali solution under the help of high temperature steam, collect it in a conical flask containing boric acid absorption liquid (with mixed indicator), finally, titrate with H_2SO_4 or HCL.

III. Technical Parameters

3.0. Measuring range: 0.1-250mg N
3.1. Distillation speed: ≈15——20ml/min; ≤8-5min/sample
3.2. Recovery ratio: 99.9±0.5%
3.3. Distillation time: range from 0 to 999s
3.4. Cooling water consumption: 1.2L—2.4L/min
3.5. Amount of water filling, alkali filling, acid filling: 0—99ml
3.6. Sample weight: solid<6g, liquid<30ml
3.7. Operation mode: dual modes, manual distillation/automatic distillation
3.8. Automatic distillation: 20 distillation programs

3.9. Alarm and shutdown temperature: ≈120℃
3.10. Power voltage: AC110-250V/50/60HZ
3.11. Max. power consumption: 1600w
3.12. Max. current: 10A
3.13. Dimensions: 330mm*380mm*780mm

IV. Apparatus Structure

The system is mainly composed of microcomputer controller, steam generator, distillation system, and liquid filling system.

Front-side Structural Figure of the Apparatus (see Figure 4-1)

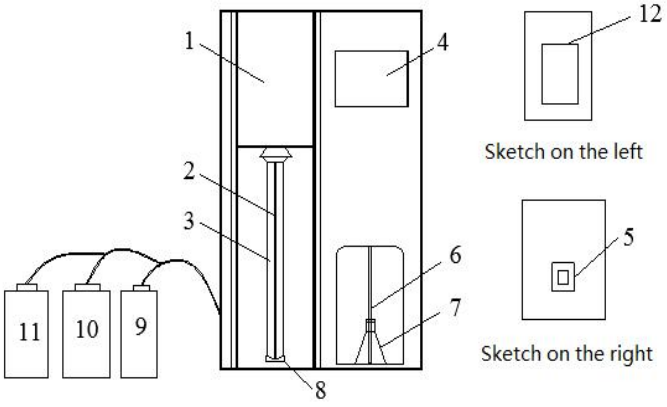

Figure 4-1

1-Front cover

1- Steam tube
2- Digestive tube
3- Liquid crystal display
4- Power switch
5- Distillate outlet hose
6- Conical flask
7- Tray for digestive tube
8- Acid liquid barrel
9- Alkali liquid barrel
10- Distilled water barrel
11- Observation window

Back-side Structural Figure of the Apparatus (see Figure 4-2)

1- Distilled water inlet
2- Alkali liquid inlet
3- Boric acid solution inlet
4- Condensated water inlet
5- Condensated water outlet
6- Waste liquid outlet
7 Power socket

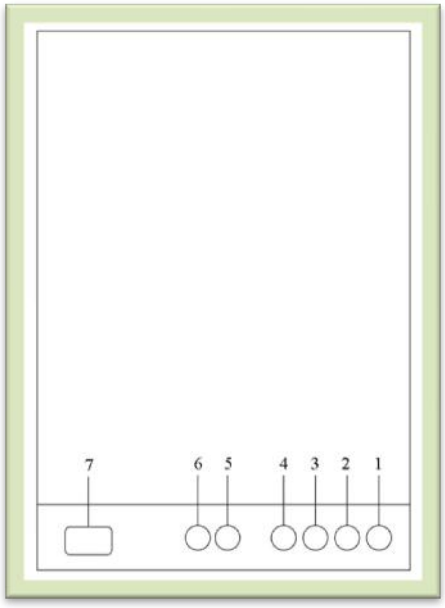

Figure 4-2

V. Installation Method

5.1 Pre-installation Check

After opening the apparatus container, please check all accessories according to "Packing List"; if there is any damage, please contact with our company timely (keep the damaged parts).

5.2 Installation Conditions

(1) The apparatus should be installed in a environment with room temperature 10-45°C and relative humidity ≤80%; sharp temperature changes should be avoided.

(2) Power voltage for the apparatus should be AC220V/50HZ, and there should be reliable ground wire and independent ≥10A power socket.

(3) The apparatus should not be installed in a place with direct sunlight, dust, or over humidity.

(4) The apparatus shall be installed close to water source and drain tank.

(5) Supplied water shall meet with pressure and temperature requirements(cooling water pressure: 0.15Mpa, cooling water temperature: lower than 18°C).

(6) The drain tank shall be 10cm lower than the apparatus's drainage outlet to ensure smooth drainage.

(7) This product is precise instrument, violent concussion, transverse or upside-down placement should be avoided.

5.3 Installation Steps (refer to Figure 4-1 and Figure 4-2)

(1). Place the apparatus on a stable experiment table.

(2). Connect one end of the "condensated water inlet tube" with "condensated water inlet" of the host machine and another with the tap water valve.

(3). Connect one end of the "condensated water outlet tube" with "condensated water outlet" of the host machine and another with the water tank.

(4). Connect one end of the "waste liquid tube" with "waste liquid outlet" and another with the waste liquid barrel or the water tank.

(Note:Unnecessary to frequently drain or change the distilled water inside the steam generator, unless there are impurities or the apparatus hasn't been used for a long time.)

(5). Connect one end of the "distilled water tube" with "distilled water inlet" of the host machine and another with the "distilled water barrel".

(6). Connect one end of the "alkali liquor tube" with "alkali liquor inlet" of the host machine and another with the "alkali liquor barrel".

(7). Connect one end of the "boric acid tube" with "boric acid inlet" of the host machine and another with the "boric acid barrel".

VI. Operation Steps

- Pour prepared reagents into a container in accordance with"VII" in page 11.

6.1. Plug power plug into socket.

Starting the apparatus, the LCD will show as Figure 6.1.

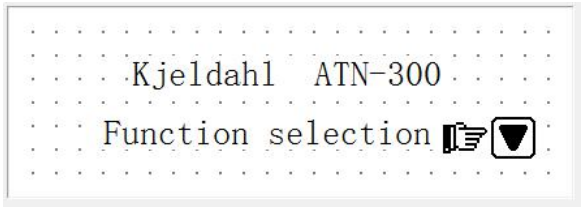

Figure 6.1

6.2. Press "▼" key to enter "Function :Selection" page: See Figure 6-2.

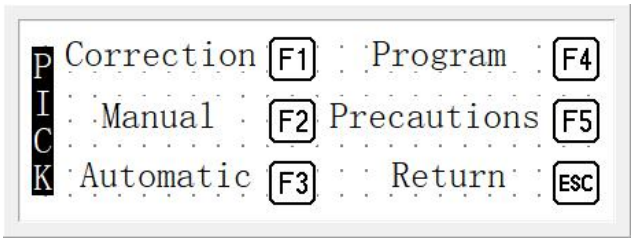

Figure 6.2

F1:Correction-Flow correction F2:Manual-Manual distillation

F3:Automatic-Automatic distillation F4:Program-Program setting

6.3. Flow Calibration

Prior to flow calibration, connect with the container; after that, press “F6”, “F7”,“F8” keys several times to fill tubes with liquid.

In the “function selection” page, press “F1” key to enter “flow calibration” page: See Figure 6-3.

Figure 6.3

Flow---Flow Calibration

F6:Alkali---Alkali Flow Calibration

Value ---Calibration Value

F7:Acid---Acid Flow Calibration

F8:Water---Water Flow Calibration

A. Alkali Flow Calibration: fix the digestive tube well, (see Figure 6-4), then press “F6” key to select “Alkali Flow Calibration”. After operating, pour alkali liquor into the graduated cylinder, record its volume.

B. Water Flow Calibration: fix the digestive tube well, (see Figure 6-4), then press “F8” key to select “Water Flow Calibration”. After operating, pour distilled water into the graduated cylinder, record its volume.

C. Boric Acid Flow Calibration: Place “distillate outlet tube” into the graduated cylinder; press “F7” key to select “Acid Flow Calibration”. After operating, record the boric acid solution volume left in the graduated cylinder.

D. Press “SET” after above steps completed.

E. Input recorded volumes (mL) as corresponding “calibration value”. （Inputted Calibration Value is twice the measured solution’ average volume, for example, if the measured average volumes of distilled water is 20ml, input 40ml as Calibration Value.）

F. Press “ENT” key to save after inputting, till then, calibration is finished.

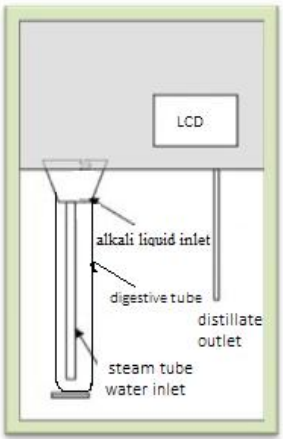

Figure 6.4 flow calibration sketch map

(Note: Factory calibration of the product is performed with distilled water; but at different temperatures, liquids of different concentrations and specific gravity will also flow different volume within a certain time, so user should recalibrate according to the liquid they actually use.)

6.4. Program Settings

"Program" here refers to different "combinations" of "Water Filling, Alkali Filling, Acid Filling, and Distillation Time", the machine can save 20 kinds of "combinations".

Press "F4" in the "Function Selection" page to enter"Program Settings" page: See Figure 6-5.

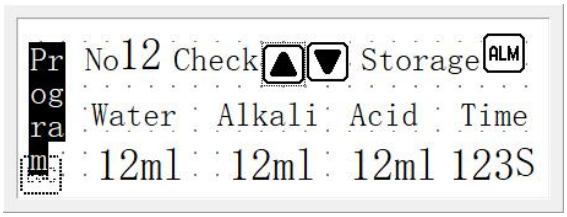

Figure 6-5 Program Settings

Water 12 ml: Water filling amount 12 ml Alkali 12ml:Alkali filling amount 12 ml

Acid 12ml: Acid filling amount 12 ml Time 123S: Distillation time 123 S

A. Press "SET" key to set up program parameters.

B. After each setting, press "ENT" to confirm, following the next sequence:

C.SET ⟶ ▲, ▼Select Program X ⟶ ENT ⟶ Water filling volume ml ⟶ ENT ⟶ Alkali filling volume ml ⟶ ENT ⟶ Acid filling volume ml ⟶ ENT ⟶ Distillation time S ⟶ ENT ⟶ ALM.

(Keep in mind!!! After pressing "ENT" to confirm each program setting, **"ALM"** must be pressed for saving; or the setting is of no validity.)

6.5. Manual Distillation

Press "F2" in the "Function Selection" page to enter "Manual Distillation" page: See Figure 6-6.

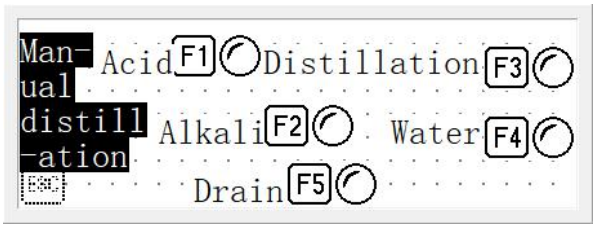

Figure 6-6

F1:Acid---acid filling F2:Alkali---alkali filling F3:Distillation---distillation

F4:Water---water filling F5:Drain---drain water

- Manual distillation: "on" and "off" of the alkali filling, acid filling, water filling, and distillation process are all controlled manually.

A.Press "F1" to select "acid filling"; when the boric acid solution inside conical flask reaches the required amount, press "F1" again to stop.

B. Press "F2" to select "alkali filling"; when the solution inside digestive tube reaches the required amount, press "F2" again to stop.

C. Press "F3" to perform "distillation"; when obtained liquid reaches the requirement, press "F3" again to stop.

D. Press "F4" to select "water filling"; when the solution inside digestive tube reaches the requirement, press "F4" again to stop.

E. Pressing "F5" means to drain out water inside steam generator. No need to frequently

discharge or change the distilled water inside steam generator, but when there are impurities or the apparatus has not been used for a long time.

6.6. Automatic Distillation

"Automatic Distillation" means to operate one of the previously saved 20 programs automatically.

Press "F3" in the "function selection" page to enter "automatic distillation" page: See Figure 6-7

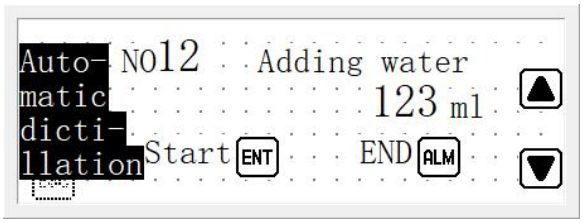

Figure 6-7

A. Press "▲" and "▼" to select one of the previously saved "20" programs. (It will operate the one you choose, if not choose, the one worked last time will work again.)

B. Put sample into digestive tube. If not, the program will not be executed, to avoid reagent or steam from overflowing.

C. Press "ENT" to operate the automatic distillation program, following the sequence of "water filling——alkali filling——acid filling——distillation (countdown)——end".

D. After the set distillation time (it takes around 400S to distill 100mL) is over, there will be two "ticking" sound as alarm, meaning the program ends, pressing "ESC" can get back to the "automatic distillation" interface.

E. During distillation, pressing"ALM" will exit midway, pressing "ESC" will go back to the "Automatic Distillation" interface.

Note:Users at different places may use cooling water of different temperatures and flow, time cost for distilling same volume(100ml for instance) are also various, so user should make trials to make clear time cost for his/her distillation.

F. Precautions and reagent preparation（see Figure 6-8）

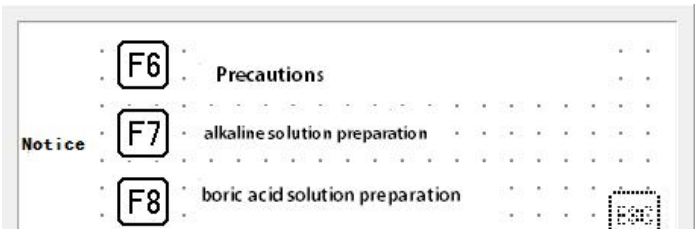

Figure 6-8

VII. Reagent Preparation

- alkaline solution:take a glass container, weigh 350g NaOH, add it into the container, then same with 650ml distilled water, stir the water to dissolve NaOH thoroughly, then the solution is of 35% alkaline.

- boric acid solution:（a）first weigh 0.5g methyl red, then 1g bromocresol green, dissolve them with 300ml 95% alcohol for later use.
  （b）weigh 20g boric acid, dissolve it with 980ml distilled water, then add 10ml already prepared methyl red-bromocresol green indicator.
  （c）Mix the two solutions.

VIII. Precautions

8.1 After starting the apparatus preheating is needed; please directly enter manual mode to select distillation, discharge steam through steam tube for about 1min.
8.2 Performing water, alkali and acid calibration is a must before using the apparatus.
8.3 The digestive tube should be well positioned to jack the rubber plug.
8.4 As the digestive tube is very hot after distillation, gloves should be worn to avoid scalding when taking the tube down.
8.5 Condensated water must flow smoothly during distillation.
8.6 The filled alkali must ensure the alkalinity of digestive solution greater than or equaling to 11.
8.7 If the apparatus will not be used for a long time in winter, water inside the steam generator must be drained out to avoid cracking.