CLAIMS

1. An apparatus for removing nitrogen in sewage/wastewater, the apparatus comprising:

a pretreatment unit for removing solids or organic matters in influent sewage/wastewater;

a sludge treatment unit for receiving, thickening, and digesting the solids removed in the pretreatment unit to separate them into a dewatered cake and a supernatant liquid;

a sequencing batch biofilm reactor which receives sewage/wastewater that has passed through the pretreatment unit and adjusts the ratio of ammonia nitrogen and nitrite nitrogen in sewage/wastewater to a preset ratio;

an anammox reaction tank which receives sewage/wastewater that has passed through the sequencing batch biofilm reactor and removes ammonia nitrogen and nitrite nitrogen in sewage/wastewater with nitrogen gas; and

a control unit for controlling the sequencing batch biofilm reactor and performing controlling so that a supernatant liquid separated from the sludge treatment unit, not sewage/wastewater that has passed through the pretreatment unit, is flowed into the sequencing batch biofilm reactor,

when the concentration of nitrate nitrogen in the sequencing batch biofilm reactor is a preset concentration or more,

wherein the sequencing batch biofilm reactor discharges the entire amount of sewage/wastewater in the sequencing batch biofilm reactor to the anammox reaction tank when the concentrations of ammonia nitrogen and nitrite nitrogen in the flowed-in sewage/wastewater have a preset ratio, and

the sequencing batch biofilm reactor includes a media that allows ammonia-oxidizing bacteria to be selectively immobilized or attached to grow, and prevents the media from being discharged when the sewage/wastewater or supernatant liquid flowing into the inside of the sequencing batch biofilm reactor is discharged to the outside of the sequencing batch biofilm reactor.

2. The apparatus of claim 1, wherein the supernatant liquid has a free ammonia (FA) concentration within a preset range.

3. The apparatus of claim 1, wherein the sequencing batch biofilm reactor contains media for oxidizing nitrogen components by being moved, or fixed depending on the inflow of sewage/wastewater or a supernatant liquid into the sequencing batch biofilm reactor.

4. The apparatus of claim 3, wherein the media is a moving media that is up and down depending on the inflow of sewage/wastewater or a supernatant liquid, an packed-type media immersed in the lower

part of the sequencing batch biofilm reactor, or a fixed-type fibrous media having a space for air supply in the middle.

5. The apparatus of claim 4, wherein the media is implemented with polypropylene (PP), polyethylene (PE), polystyrene (PS), or hydrogel in the case of the moving media, ceramic or clay in the case of the packed-type media, and polypropylene (PP), polyethylene (PE), polystyrene (PS), polytetrafluoroethylene (PTFE), or polyvinylidene fluoride or polyvinylidene difluoride (PVDF) in the case of the fixed-type fibrous media.

6. The apparatus of any one of claims 1 to 5, wherein the sequencing batch biofilm reactor comprises:

an ammonia nitrogen sensor;

a nitrate nitrogen sensor;

a pH sensor;

a dissolved oxygen sensor;

an outlet formed in the lowest part of the sequencing batch biofilm reactor to discharge the entire amount of the sewage/wastewater flowed into the sequencing batch biofilm reactor to the outside; and

an inlet formed in one side of the sequencing batch biofilm reactor to supply oxygen into the sequencing batch biofilm reactor.