CLAIMS

1. A method for decomposing struvite, comprising the steps of:

- dissolving (S10) a feed material (13) comprising struvite in a mineral acid (15), thereby forming a solution having an acid pH;

- removing magnesium (S30) from said solution;

said step of removing magnesium (S30) comprises the part steps of:

- increasing (S32) a pH of said solution to a pH in the range of 4.5 to 6;

- precipitating (S34) magnesium compounds that do not comprise ammonium; and

- separating (S36) said precipitated magnesium compounds from said solution;

whereby said solution after said step of removing magnesium (S30) comprises an ammonium salt of said mineral acid.

2. The method according to claim 1, **characterized in that** the feed material further comprises calcium compounds, whereby said dissolving (S10) of said feed material further comprises dissolving said calcium compounds into said solution; and

by the further step of:

- removing calcium (S20) from said acid solution before said step of removing magnesium (S30);

said step of removing calcium (S20) comprises the part steps of:

- precipitating (S22) calcium compounds from said solution; and

- filtering (S24) said precipitated calcium compounds from said solution.

3. The method according to claim 2, **characterized by** the further step of:

- feeding back (S29) a part of said solution after said step of removing calcium (S20) to be added in a subsequent said step of dissolving (S10) a feed material.

4. The method according to claim 3, **characterized in that** an amount of bleed back in said step of feeding back (S29) is controlled to give a final phosphate ion concentration after said step of removing calcium (S20) exceeds 1 molar.

5. The method according to any of the claims 1 to 4, **characterized in that** said steps of dissolving (S10) a feed material (13) and precipitating (S34) magnesium compounds that do not comprise ammonium occurs at least partly concurrently, whereby struvite in said feed material is recrystallized into newberyite.

6. The method according to any of the claims 1 to 5, **characterized in that**

said step of increasing (S32) a pH comprises addition (S31) of ammonia to said solution; and

said step of precipitating (S34) magnesium compounds comprises heating (S33) said solution to a temperature above 50°C, preferably above 65°C, and most preferably above 80°C.

7. The method according to claim 6, **characterized in that** said precipitated magnesium compounds comprise newberyite.

8. The method according to claim 7, **characterized by** the further step of washing said precipitated newberyite with acidic wash water of pH<5.

9. The method according to any of the claims 6 to 8, **characterized in that** said step of removing magnesium (S30) comprises the further steps of:

- adding (S41) more ammonia to said solution after said step of separating (S36) said precipitated magnesium compounds, thereby causing precipitation of struvite; and

- removing (S42) said precipitated struvite from said solution.

10. The method according to any of the claim 1 to 5, **characterized in that** said steps of increasing (S32) a pH and precipitating (S34) magnesium compounds are performed at least partly as a single process, said single process being adding (S32A) a base to said solution after said step of filtering.

11. The method according to claim 10, **characterized in that** said base is struvite, and said precipitated magnesium compounds comprise newberyite.

12. The method according to claim 11, **characterized by** the further step of washing said precipitated newberyite with acidic wash water of pH<5.

13. The method according to claim 11 or 12, **characterized in that** said step of removing magnesium (S30) comprises the further steps of:

- adding (S38) a further base to said solution after said step of separating (S36) said precipitated magnesium compounds, thereby causing precipitation of at least a part of remaining magnesium and phosphorus as struvite; and

- removing (S39) said precipitated struvite from said solution.

14. The method according to claim 13, **characterized by** the further step of:

- recirculating (S40) at least a part of said removed precipitated struvite to be used in a subsequent said step of adding (S32A) a base.

15. The method according to any of the claim 1 to 14, **characterized in that** said struvite is at least one of ammonium struvite and potassium struvite.

16. A method for recovering at least nitrogen from waste material, comprising the steps of:

- precipitating (S1) struvite from an initial liquid of waste material, by adding (S4) magnesium compounds that do not comprise ammonium to said initial liquid of waste material and adjusting (S5) a pH of said initial liquid of waste material to an alkaline pH;

- separating (S2) said precipitated struvite, from said initial liquid of waste material;

- decomposing (S3) said separated struvite by a method according to any of the claims 1 to 15.

17. The method according to claim 16, **characterized in that** at least a part of said precipitated magnesium compounds that do not comprise ammonium in said step of decomposing (S3) said separated struvite is used as at least a part of said added magnesium compounds that do not comprise ammonium in a subsequent said step of precipitating (S1) struvite from an initial liquid of waste material (13).

18. An arrangement for decomposing struvite, comprising:

- a dissolver (10) arranged for dissolving a feed material (13) comprising struvite and calcium compounds in a mineral acid (15), thereby forming a solution having an acid pH (17);

said dissolver having an input (11) for said feed material (13), an input (14) for said mineral acid (15) and an output (18) for said solution having an acid pH (17); and

- a magnesium-remover section (30) arranged for removing magnesium (S30) from said solution, thereby giving a solution (39) comprising an ammonium salt of said mineral acid;

said magnesium-remover section (30) having an input (34) connected to said output (18) for said solution having an acid pH (17) of said dissolver (10), an output (32) for precipitated magnesium compounds, and an output (38) for said solution (39) comprising an ammonium salt of said mineral acid;

said magnesium-remover section (30) being arranged for increasing a pH of said solution from said dissolver (10) to a pH in the range of 4.5 to 6, for precipitating magnesium compounds that do not comprise ammonium and for separating said precipitated magnesium compounds from said solution;

wherein the feed material further comprises calcium compounds, whereby said dissolver (10) further dissolves said calcium compounds into said solution, and in that said dissolver (10) further comprises a calcium-remover section (20) arranged for removing calcium from said acid solution;

said calcium-remover section (20) comprising means for causing precipitation of calcium compounds (22) from said solution, and a filter (24) for filtering said precipitated calcium compounds from said solution, and by

- a feed-back connection (60) between an output for said solution after filtering of said calcium-remover section (20) and an input to said dissolver (10) for adding a part of said solution after filtering to be added for a subsequent dissolving of said feed material.

19. An arrangement for recovering at least nitrogen from waste material, comprising:

- a struvite precipitator (2);

said struvite precipitator (2) having an input (3) for an initial liquid of waste material (135), and an input (5) for magnesium compounds (136) that do not comprise ammonium;

said struvite precipitator (2) being arranged for mixing said initial liquid of waste material (135) and said magnesium compounds (136), and for adjusting a pH of said initial liquid of waste material to an alkaline pH, whereby struvite (100) precipitates;

said struvite precipitator (2) comprising a separator (7), arranged for separating said precipitated struvite from said initial liquid of waste material (135), and an output (6) for said precipitated struvite (100); and

- an arrangement (1) for decomposing struvite (100) according to claim 18;

wherein said feed input (11) of said dissolving reactor (10) is connected to said output (6) for said precipitated struvite (100) of said struvite precipitator (2).

20. The arrangement according to claim 19, **characterized in that** said output for precipitated magnesium compounds of said magnesium-remover section (30) is connected to said input (5) for magnesium compounds (136) that do not comprise ammonium of said struvite precipitator (2), for using at least a part of said precipitated magnesium compounds that do not comprise ammonium produced in said arrangement (1) for decomposing struvite (100) in a subsequent precipitation of struvite.