

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application of:

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Serial No.: 15/611,508

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LIQUID FERTILIZER COMPOSITIONS
COMPRISING NICKEL, COBALT, AND
MOLYBDENUM, AND METHODS OF
FORMING AND USING THE SAME

Docket No.: 49274-US

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Examiner: SMITH, Jennifer A.

Commissioner for Patents
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AMENDMENT

In response to the Office Action dated November 12, 2019, amendment and reconsideration of the above-referenced application is requested.

Listing of Claims begin on page 2.

Remarks begin on page 5.

Listing of Claims:

1. (Currently Amended) A liquid fertilizer composition comprising a source of nickel, a source of cobalt, and monoethanolamine molybdate, ~~and a nonionic surfactant, and~~ said liquid fertilizer composition having a solution pH of about 6.0 to 7.5.
2. (Canceled)
3. (Original) The liquid fertilizer composition of claim 1, wherein said source of nickel is a chelated nickel compound.
4. (Original) The liquid fertilizer composition of claim 3, wherein said chelated nickel compound is an ethylenediaminetetraacetic acid nickel chelate compound.
5. (Original) The liquid fertilizer of claim 1, wherein said source of cobalt is a chelated cobalt compound.
6. (Original) The liquid fertilizer composition of claim 5, wherein said chelated cobalt compound is an ethylenediaminetetraacetic acid cobalt chelate compound.
7. (Original) The liquid fertilizer composition of claim 1, further comprising an organic acid.
8. (Original) The liquid fertilizer composition of claim 7, said fertilizer comprising from about 1% to about 10% by weight of said organic acid.
9. (Original) The liquid fertilizer composition of claim 8, wherein said organic acid is citric acid.

10. (Original) The liquid fertilizer composition of claim 1, said fertilizer comprising a nickel content of about 0.2% to about 2.0% by weight.

11. (Original) The liquid fertilizer composition of claim 1, said fertilizer comprising a cobalt content of about 0.1% to about 1.0 % by weight.

12. (Original) The liquid fertilizer composition of claim 1, said fertilizer comprising a molybdenum content of about 1% to about 20% by weight.

13. (Original) The liquid fertilizer composition of claim 1, further comprising seaweed.

14. (Original) The liquid fertilizer composition of claim 13, said fertilizer comprising from about 10% to about 55 % by weight of said seaweed.

15. (Original) The liquid fertilizer composition of claim 1, further comprising an amino acid.

16. (Original) The liquid fertilizer composition of claim 15, wherein said amino acid is tryptophan.

17. (Original) The liquid fertilizer composition of claim 1, wherein said fertilizer has an electrical conductivity between about 10 and about 100 mS·cm⁻¹ at 10 % in water solution.

18-29. (Canceled)

30. (New) The liquid fertilizer composition of claim 1, said monoethanolamine molybdate being formed by adding monoethanolamine to molybdic acid in heated water.

31. (New) The liquid fertilizer composition of claim 1, further comprising a nonionic surfactant.

32. (New) A liquid fertilizer composition comprising:
a source of nickel;
a source of cobalt;
monoethanolamine molybdate;
an organic acid; and
from about 5% to about 55% by weight seaweed, based on the total weight of the liquid fertilizer composition taken as 100% by weight,
said liquid fertilizer composition having a solution pH of about 6.0 to 7.5.

33. (New) The liquid fertilizer composition of claim 32, said monoethanolamine molybdate being formed by adding monoethanolamine to molybdic acid in heated water.

34. (New) The liquid fertilizer composition of claim 32, said seaweed being present at levels of from about 20% to about 45% by weight, based on the total weight of the liquid fertilizer composition taken as 100% by weight.

Remarks:

Claims 1, 3-17, and 30-34 are pending and remain under consideration. Claim 1 has been amended to remove the previously added “nonionic surfactant” limitation. Claims 2 and 18-29 have been canceled. Claims 30-34 are newly added.

In an Office Action dated November 12, 2019, it is noted with appreciation that the finality of the Office Action dated July 12, 2019 has been withdrawn. The Patent Office went on to reject claims 1, 3-12, and 17 under 35 U.S.C. § 103 as being unpatentable over BRPI0804771-5 to Produquimica (“PDQ”) in view of US 5,997,600 to Dean (“Dean”) and further in view of US 2005/0247091 to Gednalski et al. (“Gednalski”). Dean has been alleged by the Patent Office to supply the claimed monoethanolamine molybdate and Gednalski has been alleged to supply the claimed nonionic surfactant. Claim 1 has been amended to delete the ionic surfactant limitation, which is now part of new claim 31, so the Gednalski reference will not be addressed in arguing for the patentability of claim 1.

Applicant respectfully traverses the rejection as predicated in PDQ and Dean and submits that Dean does not supply the missing limitation of monoethanolamine molybdate. In fact, there is no teaching or suggestion in Dean of monoethanolamine molybdate. Example 2 of Dean is cited for the alleged teaching of monoethanolamine molybdate, but Example 2 does not teach monoethanolamine molybdate. Dean first combines 32 grams of citric acid and 114 grams of water, then adds 14 grams of molybdic oxide to the citric acid & water solution, while stirring. (Col. 4, line 67 to Col. 5, line 2) The molybdenum is chelated by citric acid during this step. “Later,” Dean adds 32 grams of 2-hydroxyethylamine (aka, monoethanolamine) and 4 grams of dimethylaminopropylamine to buffer the solution and raise its pH to 7.8. (Col. 5, lines 6-8)

Example 2 would not form the claimed monoethanolamine molybdate for two reasons: (1) molybdenum is not available when the 2-hydroxyethylamine is added because it has already been chelated by an excess of citric acid; and (2) even if molybdenum were available (without conceding such), monoethanolamine molybdate would not form simply because 2-hydroxyethylamine and molybdic oxide were present in the same solution. As noted in the application as filed, the Applicant disclosed that monoethanolamine molybdate is formed by adding molybdic acid to heated water and subsequently and slowly adding the monoethanolamine to the heated molybdic acid solution. See, for example, page 7, lines 6-9 as well as Example 1. Once the monoethanolamine molybdate was formed, the other ingredients (acid, cobalt and nickel sources, etc.) could be added. No such heating is described by Dean.

The fact that Dean does not form monoethanolamine molybdate is further supported by an examination of other teachings of Dean. Here are some examples:

- In column 2, lines 11-14, Dean describes complexing metal cations with an organic acid and providing enough difunctional amine to maintain a pH above 7.5.
- In column 2, lines 18-21, Dean states:

a basic pH, and better environmental safety. The difunctional amine, not only neutralizes the excess acid in solution, but also participates in the formation of the chelated complex via hydrogen bonding to create a more stable complex.

This is consistent with the above discussion of Example 2 of Dean. Excess acid is used during chelation formation, which means the particular metal (e.g., molybdenum) is not available to complex with the difunctional amine when it is added, and thus monoethanolamine molybdate cannot be formed (which is even more true in light of the lack of heating by Dean). Additionally, Dean explains that the diamine “participates in the formation of the chelated complex via hydrogen bonding.” One of ordinary skill in the art would understand that forming hydrogen bonds is not the same thing as the difunctional amine chelating with the particular metal atom. Chelating requires the formation of coordinate bonds. Additionally, while Dean used some “loose language” in a few locations of his disclosure (e.g., “The preferred chelating agents are citric acid and a difunctional amine” in the Abstract), this does not create the presence of something that was never explicitly mentioned or inherently created, nor does it negate the overall teachings of the reference to one of ordinary skill in the art. There is no teaching or suggestion of the claimed monoethanolamine molybdate.

- In Column 2, lines 62-67, Dean states:

cations. The preparation involves complexing metal cations in an acidic solution of water and an organic acid, preferably citric acid. The preferred metal source for the ions is the metal oxides. The solution of complexed metal ions is stabilized and buffered by addition of a sufficient quantity of an organic amine to maintain the pH above about 7.5, more

This wording again shows that the organic acid in Dean complexes with the metal ions, while the amine “stabilizes” and buffers the solution. This is in line with the previously discussed statements made by Dean that the amine creates stability by hydrogen bonding with the chelated complex, with the latter being the metal chelated by the organic acid.

- Another example of the foregoing can be found at Column 4, lines 6-16, where Dean teaches his formation method, and again he describes complexing the metal with an acid and then buffering the acidic solution with sufficient organic amine to raise the pH to 7.5 or higher.
- And probably the most explicit evidence that Example 2 doesn’t teach monoethanolamine molybdate can be found in the last paragraph of column 6 (part of Example 12) where Dean states:

chelated then insoluble salts will form. Tests were performed by blending various liquid fertilizers with chelated additive solutions made using the above methods of the present invention. The chelates in the following table were complexed with citric acid and buffered with 2-hydroxyethylamine. The results of those compatibility tests are set forth in Table I.

One of the chelated additive solutions from Table I contains molybdenum. Based on the above paragraph, that would mean that the Table I solution is the solution from Example 2, cited by the Patent Office. Dean states above that “the chelates in the following table were complexed with citric acid and buffered with 2-hydroxyethylamine.” (Emphasis added) Again, this is in line with the overall reading of Dean by one of ordinary skill in the art that the claimed monoethanolamine molybdate is not formed either intentionally or accidentally, as discussed above.

In light of the foregoing, it is respectfully submitted that because one of the claim limitations is entirely missing from the prior art, a *prima facie* case of obviousness has not been made, and this rejection should be withdrawn.

Finally, new claims 30-34 have been added. Claim 30 is dependent on claim 1 and adds a limitation reciting how the monoethanolamine molybdate of claim 1 is formed. Claim 31 depends from claim 1 and recites a nonionic surfactant, as discussed previously. Claim 32 is a new independent claim similar to claim 1 except also reciting the presence of organic acid and from about 5% to about 55% by weight seaweed, while claims 33-34 depend from claim 32. These new claims are patentable for the same reasons as discussed above with respect to claim 1 (i.e., the recitation of monoethanolamine molybdate, which is not taught by the prior art). Claims 32-34 are further patentable due to the recitation of seaweed, which combined with nickel, cobalt, and molybdenum increase biological fixation of nitrogen and provide a stimulating effect on seed germination and regulation of plant growth, as shown in Example II-IV.

In view of the foregoing, a Notice of Allowance appears to be in order, and such is respectfully requested. If any additional issues remain, the Examiner is urged to contact the undersigned. Any fee which is due in connection with this response should be applied against Deposit Account No. 19-0522.

Respectfully submitted,

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