This opinion contains indications relating to the following items:

- Box No. I Basis of the opinion
- Box No. II Priority
- Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- Box No. IV Lack of unity of invention
- Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step and industrial applicability; citations and explanations supporting such statement
- Box No. VI Certain documents cited
- Box No. VII Certain defects in the international application
- Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will usually be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA220.
Box No. 1  Basis of the opinion

1. With regard to the language, this opinion has been established on the basis of:

☐ the international application in the language in which it was filed.

☐ a translation of the international application into , which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b)).

2. ☐ This opinion has been established taking into account the rectification of an obvious mistake authorized by or notified to this Authority under Rule 91 (Rule 43bis.1(a))

3. ☐ With regard to any nucleotide and/or amino acid sequence disclosed in the international application, this opinion has been established on the basis of a sequence listing:

   a. ☐ forming part of the international application as filed:

      ☐ in the form of an Annex C:ST.25 text file.

      ☐ on paper or in the form of an image file.

   b. ☐ furnished together with the international application under PCT Rule 13ter.1(a) for the purposes of international search only in the form of an Annex C:ST.25 text file.

   c. ☐ furnished subsequent to the international filing date for the purposes of international search only:

      ☐ in the form of an Annex C:ST.25 text file (Rule 13ter.1(a)).

      ☐ on paper or in the form of an image file (Rule 13ter.1(b) and Administrative Instructions, Section 713).

4. ☐ In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that forming part of the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

5. Additional comments:
Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability

The questions whether the claimed invention appears to be novel, to involve an inventive step (to be non obvious), or to be industrially applicable have not been examined in respect of

☐ the entire international application
☒ claims Nos. 12-23

because:

☐ the said international application, or the said claims Nos. relate to the following subject matter which does not require an international search (specify):

☐ the description, claims or drawings (indicate particular elements below) or said claims Nos. are so unclear that no meaningful opinion could be formed (specify):

☐ the claims, or said claims Nos. are so inadequately supported by the description that no meaningful opinion could be formed (specify):

☒ no international search report has been established for the whole application or for said claims Nos. 12-23

☐ a meaningful opinion could not be formed without the sequence listing; the applicant did not, within the prescribed time limit:

☐ furnish a sequence listing in the form of an Annex C/ST.25 text file, and such listing was not available to the International Searching Authority in the form and manner acceptable to it; or the sequence listing furnished did not comply with the standard provided for in Annex C of the Administrative Instructions.

☐ furnish a sequence listing on paper or in the form of an image file complying with the standard provided for in Annex C of the Administrative Instructions, and such listing was not available to the International Searching Authority in the form and manner acceptable to it; or the sequence listing furnished did not comply with the standard provided for in Annex C of the Administrative Instructions.

☐ pay the required late furnishing fee for the furnishing of a sequence listing in response to an invitation under Rule 13/ter.1(a) or (b).

☐ See Supplemental Box for further details
Box No. IV  Lack of unity of invention

1. ☑ In response to the invitation (Form PCT/ISA/206) to pay additional fees, the applicant has, within the applicable time limit:
   - ☐ paid additional fees
   - ☐ paid additional fees under protest and, where applicable, the protest fee
   - ☐ paid additional fees under protest but the applicable protest fee was not paid
   ☑ not paid additional fees

2. ☐ This Authority found that the requirement of unity of invention is not complied with and chose not to invite the applicant to pay additional fees.

3. This Authority considers that the requirement of unity of invention in accordance with Rule 13.1, 13.2 and 13.3 is
   - ☐ complied with
   ☑ not complied with for the following reasons:
     see separate sheet

4. Consequently, this report has been established in respect of the following parts of the international application:
   - ☐ all parts.
   ☑ the parts relating to claims Nos. 1-11

Box No. V  Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

   - Novelty (N)
     - Yes: Claims 2-11
     - No: Claims 1

   - Inventive step (IS)
     - Yes: Claims 1-11
     - No: Claims

   - Industrial applicability (IA)
     - Yes: Claims 1-11
     - No: Claims

2. Citations and explanations
   see separate sheet
Box No. VII  Certain defects in the international application

The following defects in the form or contents of the international application have been noted:

see separate sheet

Box No. VIII  Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

see separate sheet
Re Item IV

Lack of Unity of the invention

1. The search authority considers that there are 3 inventions covered by the claims, indicated as follows:

I: Claims 1 - 11

A phosphorous pentoxide producing method comprising:
forming pre-feed agglomerates containing phosphate ore particles, carbonaceous material particles, and silica particles;
heating the pre-feed agglomerates in a reducing or inert atmosphere to an induration temperature from above 900 °C to less than 1180 °C and maintaining the induration temperature for 15 minutes or more;
forming feed agglomerates, the feed agglomerates exhibiting a calcium-to-silica mole ratio less than 1 and a silica-to-(calcium + magnesium) mole ratio greater than 2;
forming a reducing kiln bed using the feed agglomerates; and
generating kiln off-gas and collecting phosphorous pentoxide from the kiln off gas.

II: Claims 12 - 19

A phosphorous pentoxide producing method comprising:
forming green agglomerates containing phosphate ore particles, carbonaceous material particles, silica particles, and a polymer;
drying the green agglomerates at a drying temperature from 40 °C to 300 °C, the dried agglomerates exhibiting a compression strength above 25 lb;
heating the dried agglomerates in a reducing or inert atmosphere to an induration temperature from above 900 °C to less than 1180 °C and maintaining the induration temperature for 15 minutes or more;
forming feed agglomerates, the feed agglomerates exhibiting a calcium-to-silica mole ratio less than 1 and a silica-to-(calcium + magnesium) mole ratio greater than 2;
forming a reducing kiln bed using the feed agglomerates; and
generating kiln off-gas and collecting phosphorous pentoxide from the kiln off gas.
III: Claims 20 - 23

A phosphorous pentoxide producing method comprising:

extruding a material to form green agglomerates containing phosphate ore particles, carbonaceous material particles, silica particles, and 2 to 5 wt% (dry basis) clay particles;

drying the extruded, green agglomerates at a drying temperature from 40 °C to 150 °C, the dried agglomerates exhibiting a compression strength above 50 lb;

heating the dried agglomerates in a reducing or inert atmosphere to an induration temperature from above 900 °C to less than 1180 °C and maintaining the induration temperature for 15 minutes or more;

forming feed agglomerates, the feed agglomerates exhibiting a calcium-to-silica mole ratio less than 1 and a silica-to-(calcium + magnesium) mole ratio greater than 2;

forming a reducing kiln bed using the feed agglomerates; and

generating kiln off-gas and collecting phosphorous pentoxide from the kiln off gas.

The inventions I - III are not linked as to form a single general inventive concept as required by Rule 13(1) PCT, as is evidenced a priori by the disclosed subject-matter of claims 1, 12 and 20, respectively.

A general inventive concept between inventions I - III could be considered to be the "phosphorous pentoxide producing method comprising:

forming agglomerates containing phosphate ore particles, carbonaceous material particles, and silica particles;

heating the agglomerates in a reducing or inert atmosphere to an induration temperature from above 900 °C to less than 1180 °C and maintaining the induration temperature for 15 minutes or more;

forming feed agglomerates, the feed agglomerates exhibiting a calcium-to-silica mole ratio less than 1 and a silica-to-(calcium + magnesium) mole ratio greater than 2;

forming a reducing kiln bed using the feed agglomerates; and

generating kiln off-gas and collecting phosphorous pentoxide from the kiln off gas".
However, this concept is known (cf. US 2013/136682, WO 2005/118468; citations in the Search Report, also cf. reasoning under 1st invention, 2.1).

Therefore it is noted that the subject-matter disclosed in claims 1 - 11 (I), 12 - 19 (II) and 20 - 23 (III) does not disclose any technical features that can be considered as a single general inventive concept within the meaning of Rule 13(1) PCT.

In conclusion, the groups of claims are not linked by common or corresponding special technical features and define 3 different inventions not linked by a single general inventive concept.

Thus, the application does not meet the requirements of unity of invention as defined in Rules 13.1 and 13.2 PCT.

Re Item V

Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1st invention only

1 Reference is made to the following documents:

2 Independent claim 1

2.1 Novelty (Article 33(2) PCT)

Document D1 is regarded as being the closest prior art to the subject-matter of present independent claim 1 and discloses a phosphorous pentoxide producing method (claim 1) comprising:

- forming pre-feed agglomerates containing phosphate ore particles, carbonaceous material particles, and silica particles (for exact amounts, cf. par. 133);
- heating the pre-feed agglomerates in a reducing or inert atmosphere to an induration temperature from above 900 °C to less than 1180 °C and maintaining the induration temperature for 15 minutes or more (claim 1, 1180 °C; par. 133, ball heated with a ramp of 20 °C/min, thus in the claimed range);
- forming feed agglomerates and increasing a compression strength of the feed agglomerates to above 25 lb, using the heating, the feed agglomerates exhibiting a calcium-to-silica mole ratio less than 1 and a silica-to-(calcium + magnesium) mole ratio greater than 2 (claim 2);
- forming a reducing kiln bed using the feed agglomerates (claim 1); and
- generating kiln off-gas and collecting phosphorous pentoxide from the kiln off gas (claim 1; also cf. claims 11 and 17, par. 27, 28, 51, 52, 70 - 77).

Therefore all features of present independent claim 1 are disclosed in document D1. Thus, claim 1 of the present application is not new in the sense of Article 33(2) PCT.

NB: Since all process and material parameters are identical, the compression strength has to be seen as being an inherent feature of the agglomerates (same material = same properties).

2.2 The reasoning under 2.1 also applies in view of document D2 (e.g. claim 1, example 1, p. 26, l. 20 - 37).

3 Dependent claims 2 - 11

Some of the dependent claims 2 - 11 do not appear to contain any additional features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT with respect to inventive step.
4 Further prior art, the corresponding passages in the respective documents D3 and D4 each disclose methods for preparing phosphorus pentoxide, comprises forming reducing kiln bed using feed agglomerates having phosphate ore particles, carbonaceous material particles, and silica particles, maintaining specific bed temperatures and generating kiln off gas. Thus, these methods are very similar to the ones discussed under 2.1.

However, none of these documents recapitulates magnesium as being part of the process.

Re Item VII

Certain defects in the international application

1 The citation of the name of an author/inventor (e.g. the Megy patent”) used throughout the description does not represent a clear and unambiguous reference to a document.

2 The priority claim disclosed in par. 1 of the description does not form part of the latter under the provisions of the PCT (Article 5 PCT, Rule 4.10 PCT)

3 The reference to documents by the serial application number, e.g. as in par. 1 does not represent a clear reference to a published document (Article 5 PCT, PCT Guidelines 4.27).

4 The expression "incorporated by reference" used throughout the description is not recognised as part of the description under the provisions of the PCT (Article 5 PCT, PCT Guidelines 4.26)

5 The units such as "lbr", "mesh", etc., do not meet the requirements of Rule 10.1. PCT.

6 The section "features and benefits", pa. 112 - par. 162 appears to represent an old claim set.

Thus, the subject - matter for which protection is sought is not clear. In addition, the application is not concise.

7 The passage of the description in par. 163 referring to the wording "appropriately interpreted" are vague and unclear (PCT Guidelines 5.30).
This applies to the content of the entire paragraph.

Re Item VIII

Certain observations on the international application

1 Clarity (Article 6 PCT)

The application does not meet the requirements of Article 6 PCT, because present claims 1, 2 and 8 - 11 are not clear.

1.1 Claim 1 reads: “forming feed agglomerates and increasing a compression strength of the feed agglomerates to above 25 lb, using the heating, the feed agglomerates exhibiting a calcium-to-silica mole ratio less than 1 and a silica-to-(calcium + magnesium) mole ratio greater than 2; forming a reducing kiln bed using the feed agglomerates”.

Having both, a calcium-to-silica mole ratio less than 1 and a (calcium + magnesium)-to-silica mole ratio less than 0.5 (aka a silica-to-(calcium + magnesium) mole ratio greater than 2) does not seem to be plausible. The phrasing appears to be erroneous.

It appears that there is no remedy to correct this deficiency.

Furthermore, the claim does not meet the requirements of Article 6 PCT in that the matter for which protection is sought is not defined. The claim attempts to define the subject-matter in terms of the result to be achieved (PCT Guidelines 5.35).

1.2 The same applies to claim 8 (“preparing the phosphate ore particles, carbonaceous material particles, clay particles, and silica particles such that 80% or more exhibit a size less than 200 mesh”), claim 9 (“making the scrubber off-gas reducing”) and 11 (“decreasing a concentration of the contaminants in the feed agglomerates using the heating when compared to the pre-feed agglomerates”).

1.3 The units in claims 1, 2 and 8 are not according to SI standard.

1.4 Claim 10 reads: “adding over bed air through a plurality of ports along the bed length, the over bed air entering kiln freeboard through a plurality of standpipes extending from respective ports to a height above the bed.”

The phrase appears to be incomplete and is thus not clear.