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(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DJ, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, JO, JP, KE, KG, KH, KN, KP, KR, KW, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

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Declarations under Rule 4.17:

- as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))
- as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii))
- of inventorship (Rule 4.17(iv))

Published:

- with international search report (Art. 21(3))
- before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments (Rule 48.2(h))
- in black and white; the international application as filed contained color or greyscale and is available for download from PATENTSCOPE

(88) Date of publication of the international search report:

16 April 2020 (16.04.2020)

(54) Title: APALUTAMIDE POLYMORPHS

(57) Abstract: The present invention discloses novel crystalline polymorphic forms of Apalutamide, methods of preparation, pharmaceutical compositions and methods of therapeutic treatment involving polymorphic forms thereof.



# INTERNATIONAL SEARCH REPORT

|   |
|---|
| International application No<br>PCT/IN2019/050647 |
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|---|--|-----------------------|--|--|
| <b>A. CLASSIFICATION OF SUBJECT MATTER</b><br>INV. C07D401/04 A61K31/4439 A61P35/00<br>ADD.   |  |                       |  |  |
| According to International Patent Classification (IPC) or to both national classification and IPC   |  |                       |  |  |
| <b>B. FIELDS SEARCHED</b>   |  |                       |  |  |
| Minimum documentation searched (classification system followed by classification symbols)<br>C07D   |  |                       |  |  |
| Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched   |  |                       |  |  |
| Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)<br>EPO-Internal, CHEM ABS Data, WPI Data   |  |                       |  |  |
| <b>C. DOCUMENTS CONSIDERED TO BE RELEVANT</b>   |  |                       |  |  |
| Category*   | Citation of document, with indication, where appropriate, of the relevant passages   | Relevant to claim No. |  |  |
| X   | WO 2018/112001 A1 (WATSON LAB INC [US])<br>21 June 2018 (2018-06-21)<br>cited in the application<br>claims<br>-----  | 1                     |  |  |
| X   | WO 2013/184681 A1 (ARAGON PHARMACEUTICALS<br>INC [US]; SLOAN KETTERING INST CANCER<br>[US]) 12 December 2013 (2013-12-12)<br>cited in the application<br>claims<br>-----   | 1                     |  |  |
| X   | WO 2016/124149 A1 (CRYSTAL PHARMATECH CO<br>LTD [CN]) 11 August 2016 (2016-08-11)<br>cited in the application<br>claims<br>-----   | 1                     |  |  |
| -----<br>-/--   |  |                       |  |  |
| <input checked="" type="checkbox"/> Further documents are listed in the continuation of Box C. <span style="margin-left: 100px;"><input checked="" type="checkbox"/> See patent family annex.</span>  |  |                       |  |  |
| * Special categories of cited documents :<br><table style="width: 100%; border: none;"> <tr> <td style="width: 50%; border: none; vertical-align: top;">                     "A" document defining the general state of the art which is not considered to be of particular relevance<br/>                     "E" earlier application or patent but published on or after the international filing date<br/>                     "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)<br/>                     "O" document referring to an oral disclosure, use, exhibition or other means<br/>                     "P" document published prior to the international filing date but later than the priority date claimed                 </td> <td style="width: 50%; border: none; vertical-align: top;">                     "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention<br/>                     "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone<br/>                     "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art<br/>                     "&amp;" document member of the same patent family                 </td> </tr> </table> |  |                       | "A" document defining the general state of the art which is not considered to be of particular relevance<br>"E" earlier application or patent but published on or after the international filing date<br>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)<br>"O" document referring to an oral disclosure, use, exhibition or other means<br>"P" document published prior to the international filing date but later than the priority date claimed | "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention<br>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone<br>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art<br>"&" document member of the same patent family |
| "A" document defining the general state of the art which is not considered to be of particular relevance<br>"E" earlier application or patent but published on or after the international filing date<br>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)<br>"O" document referring to an oral disclosure, use, exhibition or other means<br>"P" document published prior to the international filing date but later than the priority date claimed  | "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention<br>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone<br>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art<br>"&" document member of the same patent family |                       |  |  |
| Date of the actual completion of the international search   | Date of mailing of the international search report   |                       |  |  |
| 7 January 2020  | 17/03/2020   |                       |  |  |
| Name and mailing address of the ISA/<br>European Patent Office, P.B. 5818 Patentlaan 2<br>NL - 2280 HV Rijswijk<br>Tel. (+31-70) 340-2040,<br>Fax: (+31-70) 340-3016  | Authorized officer<br><br>Beysse-Kahana, Ellen   |                       |  |  |

# INTERNATIONAL SEARCH REPORT

International application No.  
PCT/IN2019/050647

## Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1.  Claims Nos.:  
because they relate to subject matter not required to be searched by this Authority, namely:
  
2.  Claims Nos.:  
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
  
3.  Claims Nos.:  
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

## Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1.  As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2.  As all searchable claims could be searched without effort justifying an additional fees, this Authority did not invite payment of additional fees.
3.  As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
4.  No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

1(partially)

### Remark on Protest

- The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- No protest accompanied the payment of additional search fees.

## INTERNATIONAL SEARCH REPORT

International application No  
PCT/IN2019/050647

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

| Category* | Citation of document, with indication, where appropriate, of the relevant passages  | Relevant to claim No. |
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# INTERNATIONAL SEARCH REPORT

Information on patent family members

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| International application No<br>PCT/IN2019/050647 |
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# INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No  
PCT/IN2019/050647

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| -----                                  |                  |                         |                  |

**FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210**

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claim: 1(partially)

Crystalline Form-C2 of Apalutamide

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2. claims: 2-20(completely); 1(partially)

Crystalline Form-C3 of Apalutamide and process for its preparation

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3. claim: 1(partially)

Crystalline Form-C4 of Apalutamide

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4. claim: 1(partially)

Crystalline Form-C5 of Apalutamide

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5. claim: 1(partially)

Crystalline Form-C6 of Apalutamide

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6. claim: 1(partially)

Crystalline Form-C7 of Apalutamide

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7. claim: 1(partially)

Crystalline Form-C8 of Apalutamide

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8. claim: 1(partially)

Crystalline Form-C9 of Apalutamide

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9. claim: 1(partially)

Crystalline Form-C10 of Apalutamide

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