



(51) International Patent Classification:
A61K 31/00 (2006.01)

(21) International Application Number:
PCT/IB2015/059657

(22) International Filing Date:
16 December 2015 (16.12.2015)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
6355/CHE/2014 17 December 2014 (17.12.2014) IN

(71) Applicant: **DR. REDDY'S LABORATORIES LIMITED** [IN/IN]; 8-2-337, Road No 3, Banjara Hills, Telangana, Hyderabad 500034 (IN).

(72) Inventors: **SALADI, Venkata Narasayya**; H.No. 48-579/5/1, Ganesh Nagar, Chintal, Hyderabad 500055 (IN).
PEDDY, Vishweshwar; Plot No. 341, Vasavi Colony, Green Hills Road No.1, Saroornagar Post, Hyderabad (IN).

(81) Designated States (*unless otherwise indicated, for every kind of national protection available*): AE, AG, AL, AM,

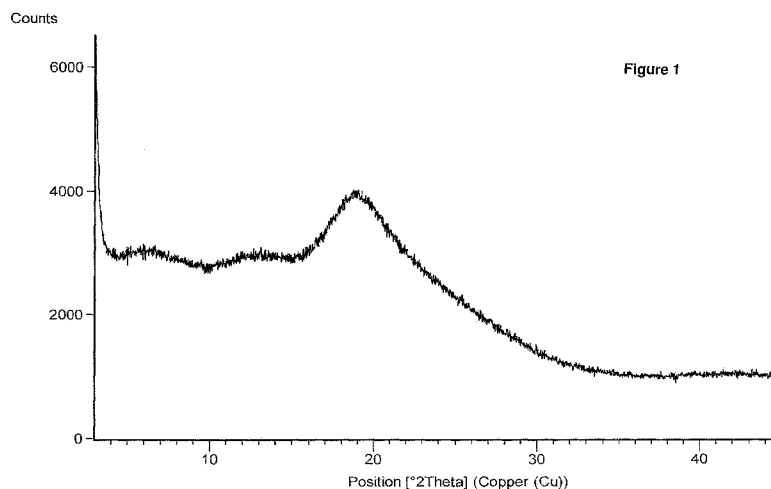
AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, JP, KE, KG, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, 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.

(84) Designated States (*unless otherwise indicated, for every kind of regional protection available*): ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, ST, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

Published:

— *without international search report and to be republished upon receipt of that report (Rule 48.2(g))*

(54) Title: PURE AMORPHOUS AND AMORPHOUS SOLID DISPERSION OF CERITINIB

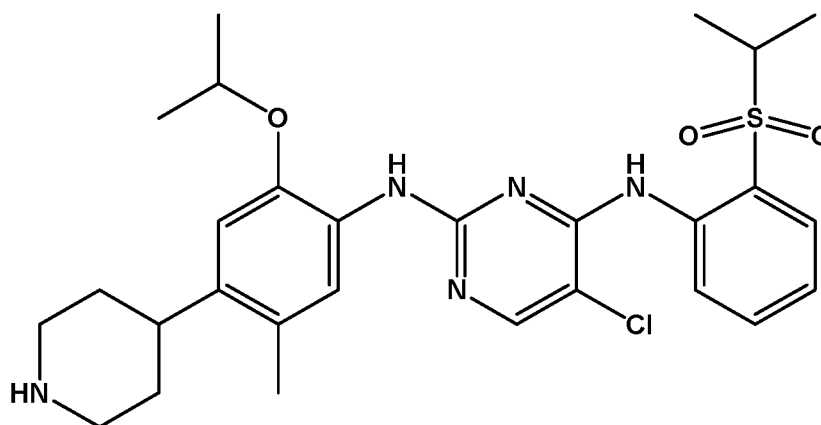


(57) Abstract: The present application relates to pure amorphous form of ceritinib and process for preparation thereof. Another aspect of the present application relates to amorphous solid dispersion of ceritinib and process for preparation thereof.

PURE AMORPHOUS AND AMORPHOUS SOLID DISPERSION OF CERITINIB**INTRODUCTION**

One aspect of the present application relates to pure amorphous form of ceritinib and process for preparation thereof. Another aspect of the present application relates to amorphous solid dispersion of ceritinib and process for preparation thereof.

Ceritinib is a kinase inhibitor indicated for the treatment of patients with anaplastic lymphoma kinase (ALK)-positive metastatic non-small cell lung cancer (NSCLC) who have progressed on or are intolerant to crizotinib. Ceritinib is chemically known as 5-chloro-N4-[2-[(1-methylethyl)sulfonyl]phenyl]-N2-[5-methyl-2-(1-methylethoxy)-4-(4-piperidiny)phenyl]-2,4-pyrimidinediamine and has following structural formula:



US patent application, US2013274279A1 (hereinafter referred as US'279) discloses crystalline form A and crystalline form B of ceritinib.

In general, polymorphism refers to the ability of a substance to exist as two or more crystalline phases that have different spatial arrangements and/or conformations of molecules in their crystal lattices. Thus, "polymorphs" refer to different crystalline forms of the same pure substance in which the molecules have different spatial arrangements of the molecules, atoms, and/or ions forming the crystal. Different polymorphs may have different physical properties such as melting points, solubilities, X-ray diffraction patterns, etc. The variation in solid forms may

appreciably influence the pharmaceutical properties, such as bioavailability, handling properties, dissolution rate, and stability, and in turn such properties can significantly influence the processing, shelf life, and commercial acceptance of a polymorphic form. For these reasons, regulatory authorities require drug manufacturing companies to put efforts into identifying all polymorphic forms, *e.g.*, crystalline, amorphous, solvates, stable dispersions with a pharmaceutically acceptable carriers, *etc.*, of new drug substances.

The existence and possible numbers of polymorphic forms for a given compound cannot be predicted, and there are no “standard” procedures that can be used to prepare polymorphic forms of a substance. This is well-known in the art, as reported, for example, by A. Goho, “Tricky Business,” *Science News*, Vol. 166(8), August 2004.

It has been disclosed earlier that the amorphous forms in a number of drugs exhibit different dissolution characteristics and in some cases different bioavailability patterns compared to crystalline forms [Konne T., *Chem pharm Bull.*, 38, 2003(1990)]. Typically, the more crystalline the pharmaceutical agent, the lower is its bioavailability or vice versa, reducing the degree of crystallinity has a positive effect on bioavailability. Amorphous material generally offers interesting properties such as higher dissolution rate and solubility than crystalline forms, typically resulting in improved bioavailability. An amorphous form of cefuroxime axetil is a good example for exhibiting higher bioavailability than the crystalline form.

Hence, there remains a need for alternate solid forms of ceritinib and processes for preparing them.

SUMMARY

One aspect of the present application relates to pure amorphous form of ceritinib.

Another aspect of the present application relates to pure amorphous form of ceritinib which may be characterized by a PXRD pattern substantially as illustrated in Figure 1 or Figure 2.

Yet another aspect of the present application relates to process for preparing pure amorphous form of ceritinib comprising:

- a) dissolving ceritinib in a suitable solvent or mixture thereof;
 - b) optionally filtering the un-dissolved particles;
 - c) removing the solvent from the filtrate of step b) by any suitable technique;
- and
- d) optionally, drying the product at suitable temperature.

Still another aspect of the present application relates to amorphous solid dispersion of ceritinib with one or more pharmaceutically acceptable carrier.

Another aspect of the present application relates to amorphous solid dispersion of ceritinib with one or more pharmaceutically acceptable carrier that can be characterized by a PXRD pattern substantially as illustrated in the pattern of Figure 3 or Figure 4 or Figure 5 or Figure 6.

Yet another aspect of the present application relates to amorphous solid dispersion of ceritinib with one or more pharmaceutically acceptable carrier or mixture thereof comprising:

- a) dissolving ceritinib and a pharmaceutically acceptable carrier in suitable solvent or mixtures thereof;
- b) optionally filtering the un-dissolved particles;
- c) isolating amorphous solid dispersion of ceritinib with a pharmaceutically acceptable carrier;
- d) optionally drying the amorphous solid dispersion of ceritinib.

BRIEF DESCRIPTION OF THE DRAWING

Figure 1 is an illustration of a PXRD pattern of pure amorphous form of ceritinib obtained by the example 1a.

Figure 2 is an illustration of a PXRD pattern of pure amorphous form of ceritinib obtained by the example 1d.

Figure 3 is an illustration of a PXRD pattern of amorphous solid dispersion of ceritinib with copovidone obtained by the example 2a.

Figure 4 is an illustration of a PXRD pattern of amorphous solid dispersion of ceritinib with PVP K-30 obtained by the example 2b.

Figure 5 is an illustration of a PXRD pattern of amorphous solid dispersion of ceritinib with PVP K-30 and syloid obtained by the example 2b1.

Figure 6 is an illustration of a PXRD pattern of amorphous solid dispersion of ceritinib with HPC obtained by example 2c.

DETAILED DESCRIPTION

One aspect of the present application relates to pure amorphous form of ceritinib.

Another aspect of the present application relates to pure amorphous form of ceritinib which may be characterized by a PXRD pattern substantially as illustrated in Figure 1 or Figure 2.

Yet another aspect of the present application relates to process for preparing pure amorphous form of ceritinib comprising:

- (a) dissolving ceritinib in a suitable solvent or mixture thereof;
 - (b) optionally filtering the un-dissolved particles;
 - (c) removing the solvent from the filtrate of step b) by any suitable technique;
- and
- (d) optionally, drying the product at suitable temperature.

Any crystalline form of ceritinib or mixture thereof may be used as starting material for preparing pure amorphous form of ceritinib.

Suitable solvents for dissolving ceritinib include, but are not limited to dimethylformamide; dimethylacetamide; dimethyl sulphoxide; ketones such as acetone, ethyl methyl ketone, 2-butanone, methyl isobutyl ketone; ethers such as tetrahydrofuran, dioxane; esters such as ethyl acetate, isopropyl acetate; aromatic hydrocarbons such as toluene, xylene; halogenated hydrocarbons such as dichloromethane; alcohols such as methanol, ethanol, propanol, isopropanol; water; mixtures thereof. Specifically, the solvent is selected from a group of ketones such as acetone, ethyl methyl ketone, 2-butanone; alcohols such as methanol, ethanol,

propanol, isopropanol; halogenated hydrocarbons such as dichloromethane; and mixtures thereof. More specifically, the solvent is selected from a group of acetone; methyl ethyl ketone; methanol; ethanol; isopropanol; tert-butanol; dichloromethane and mixture thereof. Most specifically, the solvent is selected from a group of acetone; methanol; dichloromethane and mixture thereof.

The step a) may be performed at a temperature of about 10°C to about the boiling point of the solvent. Specifically, ceritinib may be dissolved in a suitable solvent at a temperature of about 15°C to about 60°C.

Suitable techniques that may be used for the removal of solvent include but are not limited to rotational distillation using a device such as Buchi Rotavapor, spray drying, agitated thin film drying ("ATFD"), freeze drying (lyophilization) and the like, optionally under reduced pressure. One aspect of the present application relates to a solution comprising ceritinib is subjected to spray-drying or freeze-drying technique, to provide pure amorphous form of ceritinib. Alternatively, an anti-solvent may be added to the solution of ceritinib of step (a) to precipitate amorphous form of ceritinib and the precipitated solid may be isolated by any methods known in the art, such as filtration.

The resulting solid may be collected by using techniques such as by scraping, or by shaking the container, or other techniques specific to the equipment used. The isolated solid may be optionally further dried to afford pure amorphous form of ceritinib.

Drying may be suitably carried out using any of an air tray dryer, vacuum tray dryer, fluidized bed dryer, spin flash dryer, flash dryer, and the like. The drying may be carried out at atmospheric pressure or above, or under reduced pressures, specifically at temperatures less than about 80 °C and more specifically less than about 60 °C. The drying may be carried out for any time period required for obtaining a desired product quality, such as from about 30 minutes to about 24 hours, or longer.

The dried product may optionally be subjected to a particle size reduction procedure to produce desired particle sizes and distributions. Milling or micronization may be performed before drying, or after the completion of drying of the product. Equipment that may be used for particle size reduction includes but not limited to ball mill, roller mill, hammer mill, and jet mill.

The amorphous form of ceritinib that is substantially free of any crystalline form is hereby referred to as 'pure amorphous' ceritinib. Pure amorphous form of ceritinib does not contain more than about 10 % of any crystalline form of ceritinib. Specifically, pure amorphous form of ceritinib does not contain more than about 5 % of any crystalline form of ceritinib. More specifically, pure amorphous form of ceritinib does not contain more than about 3 % of any crystalline form of ceritinib. Most specifically, pure amorphous form of ceritinib does not contain more than about 1 % of any crystalline form of ceritinib. Fig. 1 and Fig. 2 illustrate XRPD patterns of pure amorphous ceritinib obtained by a process of example 1a and example 1d, respectively.

It was found that the pure amorphous ceritinib is stable and has excellent physico-chemical properties. The pure amorphous form of ceritinib of the present application may be easily formulated into a pharmaceutical composition along with suitable pharmaceutically acceptable excipients.

Another aspect of the present application provides pharmaceutical formulations comprising pure amorphous form of ceritinib, together with one or more pharmaceutically acceptable excipients. Ceritinib together with one or more pharmaceutically acceptable excipients of the present application may be formulated as: solid oral dosage forms such as, but not limited to, powders, granules, pellets, tablets, and capsules; liquid oral dosage forms such as, but not limited to, syrups, suspensions, dispersions, and emulsions; and injectable preparations such as, but not limited to, solutions, dispersions, and freeze dried compositions. Formulations may be in the forms of immediate release, delayed release, or modified release. Further, immediate release compositions may be conventional, dispersible, chewable, mouth dissolving, or flash melt preparations; and modified release compositions that may comprise hydrophilic or hydrophobic, or combinations of hydrophilic and hydrophobic release rate controlling substances to form matrix or

reservoir or combination of matrix and reservoir systems. The compositions may be prepared using any one or more of techniques such as direct blending, dry granulation, wet granulation, extrusion and spheronization. Compositions may be presented as uncoated, film coated, sugar coated, powder coated, enteric coated, and modified release coated.

Another aspect of the present application relates to amorphous solid dispersion of ceritinib with one or more pharmaceutically acceptable carrier.

The amount of ceritinib in amorphous solid dispersion with one or more pharmaceutically acceptable carrier may be about 5% w/w to about 95% w/w, or about 10% w/w to about 90% w/w, or about 20% w/w to about 80% w/w, or about 30% w/w to about 70% w/w, or about 40% w/w to about 60% w/w, or about 50% w/w.

Another aspect of the present application relates to amorphous solid dispersion of ceritinib with one or more pharmaceutically acceptable carrier that can be characterized by a PXRD pattern substantially as illustrated in the pattern of Figure 3 or Figure 4 or Figure 5 or Figure 6.

Any crystalline form of ceritinib or mixture thereof may be used for the preparation of solid dispersion of ceritinib of the present application.

Yet another aspect of the present application relates to amorphous solid dispersion of ceritinib with one or more pharmaceutically acceptable carrier or mixture thereof comprising:

- (a) dissolving ceritinib and a pharmaceutically acceptable carrier in suitable solvent or mixtures thereof;
- (b) optionally filtering the un-dissolved particles;
- (c) isolating amorphous solid dispersion of ceritinib with a pharmaceutically acceptable carrier;
- (d) optionally drying the amorphous solid dispersion of ceritinib.

The suitable solvent for dissolving ceritinib in step a) include, but are not limited to ketones such as acetone, ethyl methyl ketone, 2-butanone, methyl isobutyl ketone; ethers such as tetrahydrofuran; esters such as ethyl acetate, isopropyl acetate; aromatic hydrocarbons like toluene, xylene; halogenated hydrocarbons such as dichloromethane, chloroform; alcohols such as methanol, ethanol, propanol, isopropanol; water; mixtures thereof. Specifically, the solvent for dissolving ceritinib in step a) include alcohols such as methanol, ethanol, propanol, isopropanol; halogenated hydrocarbons such as dichloromethane, chloroform; ketones such as acetone; ethers such as tetrahydrofuran; mixtures thereof. Specifically, the suitable solvent for dissolving ceritinib is an alcohol solvent such as methanol, ethanol, propanol, isopropanol and the like. More specifically, the alcohol solvent is methanol.

The mixture of step a) may be heated at a temperature of about 30 °C to about the boiling point of the solvent to provide a solution. Specifically, the solution comprising ceritinib and a pharmaceutically acceptable carrier in a suitable solvent may be prepared at a temperature of about 40 °C to about 70 °C.

The pharmaceutically acceptable carrier may be any suitable carrier reported in the literature. Specifically, the pharmaceutically acceptable carrier includes, but not restricted to methyl cellulose, ethyl cellulose, hydroxypropyl methylcellulose, hydroxypropyl methylcellulose acetate succinate, hydroxypropyl cellulose, polysaccharides, heteropolysaccharides (pectins), poloxamers, poloxamines, ethylene vinyl acetates, polyethylene glycols, dextrans, polyvinylalcohols, propylene glycols, polyvinylacetates, phosphatidylcholines (lecithins), miglyols, polylactic acid, polyhydroxybutyric acid, polyvinylpyrrolidones (PVP), copovidone, methacrylic acid, mixtures of two or more thereof, copolymers thereof and derivatives thereof. More specifically, the pharmaceutically acceptable carrier may be selected from a group of hydroxypropyl cellulose, copovidone, polyvinylpyrrolidones (PVP).

Optionally, silicon dioxide may be added to the amorphous solid dispersion of ceritinib, prepared by the process of this application, in order to increase the stability and reduce hygroscopicity of the amorphous solid dispersion.

Isolation of amorphous solid dispersion of ceritinib may involve one or more methods including removal of solvent by techniques known in the art e.g.

evaporation, distillation, filtration of precipitated solid and the like, cooling, concentrating the reaction mass, and the like. Stirring or other alternate methods such as shaking, agitation, and the like, may also be employed for the isolation. One of the embodiments relates to addition of an anti-solvent to the solution of step (a) to precipitate amorphous solid dispersion of ceritinib with one or more pharmaceutically acceptable carrier or mixture thereof. Distillation of the solvent may be conducted at atmospheric pressure or above, or under reduced pressures and at a temperatures less than about 120°C, less than about 100°C, less than about 90°C, or any other suitable temperatures. Any temperature and vacuum conditions can be used as long as there is no increase in the impurity levels of the product due to decomposition.

Suitable techniques which can be used for the distillation include, but not limited to, distillation using a rotary evaporator device such as a Buchi Rotavapor, spray drying, agitated thin film drying ("ATFD"), and the like. Specifically, techniques providing a rapid solvent removal may be utilized to provide the desired amorphous solid dispersion of ceritinib with one or more pharmaceutically acceptable carrier. More specifically, distillation using a rota-vapor device such as a Buchi Rotavapor or a spray drying technique may be used for the isolation of amorphous solid dispersion of ceritinib with one or more pharmaceutically acceptable carrier.

The solid may be collected using techniques such as by scraping, or by shaking the container, or other techniques specific to the equipment used. The isolated solid may be optionally further dried to afford amorphous solid dispersion of ceritinib.

Drying may be suitably carried out using any of an air tray dryer, vacuum tray dryer, fluidized bed dryer, spin flash dryer, flash dryer and the like. The drying may be carried out at atmospheric pressure or above, or under reduced pressures, at temperatures less than about 120°C, less than about 100°C, less than about 80°C, or any other suitable temperatures. The drying may be carried out for any time period required for obtaining a desired product quality, such as from about 30 minutes to about 24 hours, or longer.

The obtained amorphous solid dispersion of ceritinib may optionally be subjected to a particle size reduction procedure to produce desired particle sizes and distributions. Milling or micronization may be performed before drying, or after the completion of drying of the amorphous solid dispersions. Equipment that may be used for particle size reduction include, but not limited to, ball, roller, and hammer mills, jet mills and the like.

It was found that the amorphous solid dispersion of ceritinib is stable and has excellent physico-chemical properties. The amorphous solid dispersion of the present application may be easily formulated into a pharmaceutical composition comprising ceritinib along with one or more pharmaceutically acceptable excipients.

Another aspect of the present application provides pharmaceutical formulations comprising amorphous solid dispersion of ceritinib with one or more pharmaceutically acceptable carrier, together with one or more pharmaceutically acceptable excipients. Ceritinib together with one or more pharmaceutically acceptable excipients of the present application may be formulated as: solid oral dosage forms such as, but not limited to, powders, granules, pellets, tablets, and capsules; liquid oral dosage forms such as, but not limited to, syrups, suspensions, dispersions, and emulsions; and injectable preparations such as, but not limited to, solutions, dispersions, and freeze dried compositions. Formulations may be in the forms of immediate release, delayed release, or modified release. Further, immediate release compositions may be conventional, dispersible, chewable, mouth dissolving, or flash melt preparations; and modified release compositions that may comprise hydrophilic or hydrophobic, or combinations of hydrophilic and hydrophobic release rate controlling substances to form matrix or reservoir or combination of matrix and reservoir systems. The compositions may be prepared using any one or more of techniques such as direct blending, dry granulation, wet granulation, extrusion and spheronization. Compositions may be presented as uncoated, film coated, sugar coated, powder coated, enteric coated, and modified release coated.

All PXRD data reported herein are obtained using a PANalytical X-ray Diffractometer, with copper K α radiation.

DEFINITIONS

The following definitions are used in connection with the present application unless the context indicates otherwise.

The terms "about," "general, 'generally," and the like are to be construed as modifying a term or value such that it is not an absolute. Such terms will be defined by the circumstances and the terms that they modify as those terms are understood by those of skill in the art. This includes, at very least, the degree of expected experimental error, technique error and instrument error for a given technique used to measure a value.

All percentages and ratios used herein are by weight of the total composition and all measurements made are at about 25°C and about atmospheric pressure, unless otherwise designated. All temperatures are in degrees Celsius unless specified otherwise. As used herein, the terms "comprising" and "comprises" mean the elements recited, or their equivalents in structure or function, plus any other element or elements which are not recited. The terms "having" and "including" are also to be construed as open ended. All ranges recited herein include the endpoints, including those that recite a range between two values. Whether so indicated or not, all values recited herein are approximate as defined by the circumstances, including the degree of expected experimental error, technique error, and instrument error for a given technique used to measure a value.

The term "optional" or "optionally" is taken to mean that the event or circumstance described in the specification may or may not occur, and that the description includes instances where the event occurs and instances where it does not.

The term "anti-solvent" may be taken to mean a solvent in which ceritinib has low solubility.

Certain specific aspects and embodiments of the present application will be explained in greater detail with reference to the following examples, which are

provided only for purposes of illustration and should not be construed as limiting the scope of the disclosure in any manner.

EXAMPLES

EXAMPLE 1: Preparation of pure amorphous form of ceritinib

EXAMPLE 1a:

A mixture of ceritinib (500 mg) and methanol (30 mL) was heated to 55-60°C to provide a clear solution. The solution was filtered and the solvent was evaporated in rotavapor at 60°C under a vacuum pressure of 25 torr. The solid was dried for 2 hours and 30 minutes to provide the title compound.

Yield: 300 mg

EXAMPLE 1b:

A solution of ceritinib (500 mg) and acetone (40 mL) was filtered and the solvent was evaporated in rotavapor at 55°C under a vacuum pressure of 25 torr. The solid was dried for about 2 hours to provide the desired compound.

Yield: 380 mg

EXAMPLE 1c:

A solution of ceritinib (500 mg) and dichloromethane (5 mL) was filtered and the solvent was evaporated in rotavapor at 30°C under a vacuum pressure of 10 torr. The solid was dried for about 1 hour and 30 minutes to provide the title compound.

Yield: 380 mg

EXAMPLE 1d:

A solution of ceritinib (3 g) and methanol (250 mL) was filtered to remove any particulate matter. The solution was then spray dried with the following parameters:

Feed pump: 20%

Aspirator: 70%

Inlet Temperature: 65°C

Outlet Temperature: 40°C

The obtained solid was dried at 55°C for about 2 hours.

Yield: 1.1 g

EXAMPLE 2: Preparation of amorphous solid dispersion of ceritinib**EXAMPLE 2a:**

A mixture of ceritinib (300 mg) and copovidone (Kollidon VA-64) (300 mg) was dissolved in methanol (30 mL). The solution was filtered and the solvent was evaporated in rotavapor at 60°C under a vacuum pressure of 4 torr. The obtained solid was dried for about 1 hour to provide the desired compound.

Yield: 500 mg

EXAMPLE 2a1:

Syloid (300 mg) was added to amorphous solid dispersion of ceritinib obtained through example 2a.

EXAMPLE 2b:

A solution of ceritinib (300 mg) and PVP K-30 (300 mg) was dissolved in methanol (30 mL). The solution was filtered and the solvent was evaporated in rotavapor at 60°C under a vacuum pressure of 4 torr. The obtained solid was dried for about 1 hour to provide the desired compound.

Yield: 490 mg

EXAMPLE 2b1:

Syloid (300 mg) was added to amorphous solid dispersion of ceritinib obtained through example 2b.

EXAMPLE 2c:

A solution of ceritinib (300 mg) and hydroxypropyl cellulose (300 mg) was dissolved in methanol (30 mL). The solution was filtered and the solvent was evaporated in rotavapor at 60°C under a vacuum pressure of 4 torr. The obtained solid was dried for about 1 hour and 30 minutes to provide the desired compound.

Yield: 300 mg

EXAMPLE 2c1:

Syloid (300 mg) was added to amorphous solid dispersion of ceritinib obtained through example 2c.

We Claim:

1. Pure amorphous form of ceritinib.
2. Pure amorphous form of ceritinib, characterized by a PXRD pattern substantially as illustrated in Figure 1 or Figure 2.
3. A process for preparation of pure amorphous form of ceritinib comprising:
 - (a) dissolving ceritinib in a suitable solvent or mixture thereof;
 - (b) optionally filtering the un-dissolved particles;
 - (c) removing the solvent from the filtrate of step b) by any suitable technique;and
 - (d) optionally, drying the product at suitable temperature.
4. The process of claim 3, wherein the suitable solvent of step (a) is an alcoholic solvent.
5. The process of claim 3, wherein the suitable solvent of step (a) is methanol.
6. Amorphous solid dispersion of ceritinib with one or more pharmaceutically acceptable carrier.
7. Amorphous solid dispersion of ceritinib with one or more pharmaceutically acceptable carrier selected from a group of hydroxypropyl cellulose, copovidone, polyvinylpyrrolidones (PVP).
8. The amorphous solid dispersion of ceritinib of claim 7, further comprises silicon dioxide.
9. Amorphous solid dispersion of ceritinib with one or more pharmaceutically acceptable carrier, characterized by a PXRD pattern substantially as illustrated in the pattern of Figure 3 or Figure 4 or Figure 5 or Figure 6.
10. A process for preparation of amorphous solid dispersion of ceritinib comprising:

- (a) dissolving ceritinib and a pharmaceutically acceptable carrier in suitable solvent or mixtures thereof;
- (b) optionally filtering the un-dissolved particles;
- (c) isolating amorphous solid dispersion of ceritinib with a pharmaceutically acceptable carrier;
- (d) optionally drying the amorphous solid dispersion of ceritinib.

11. The process of claim 10, wherein the suitable solvent of step (a) is selected from a group of acetone; methyl ethyl ketone; methanol; ethanol; isopropanol; tert-butanol; dichloromethane and mixtures thereof.

12. The process of claim 10, wherein the suitable solvent of step (a) is selected from a group of acetone; methanol; dichloromethane and mixtures thereof.

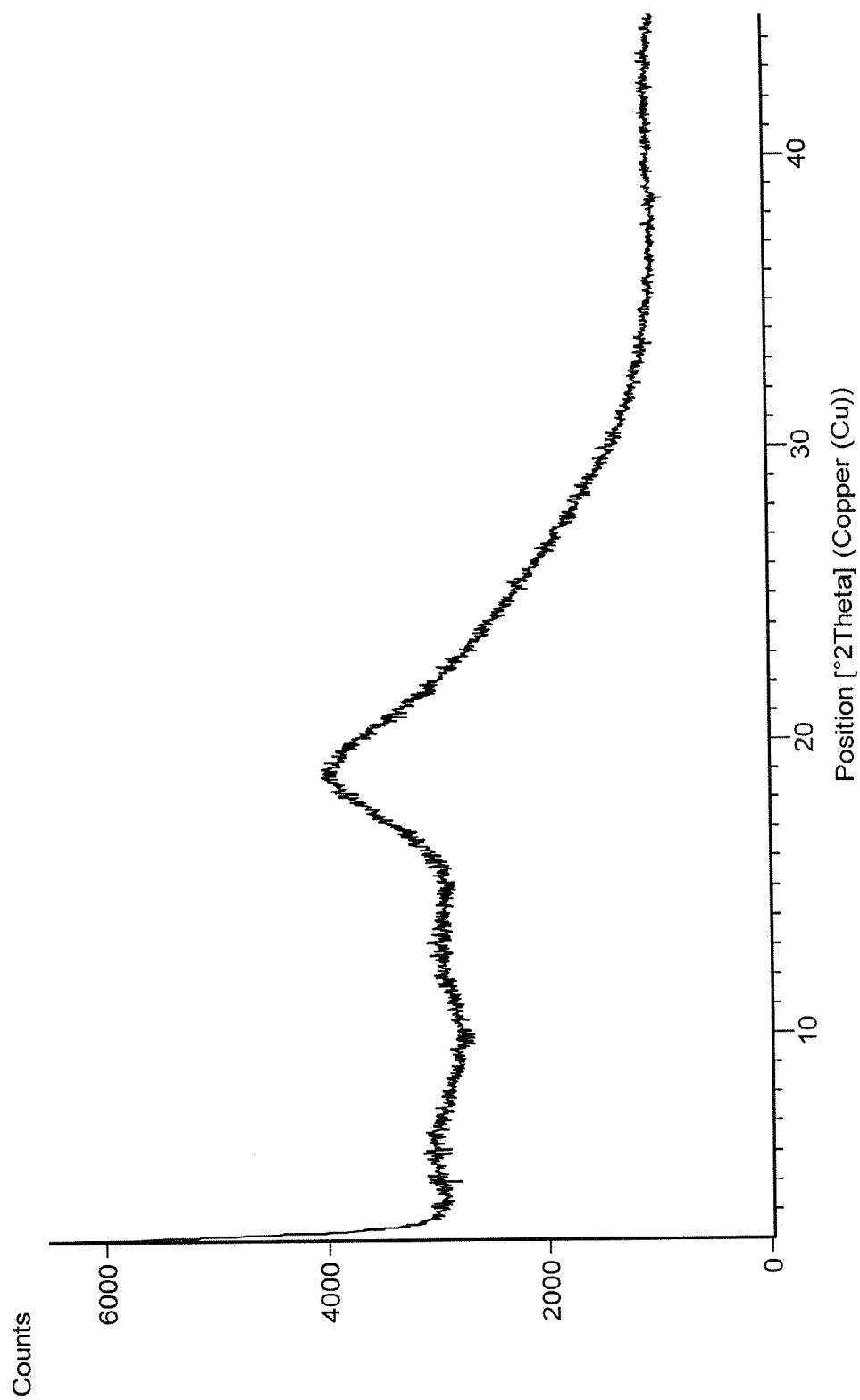


Figure 1

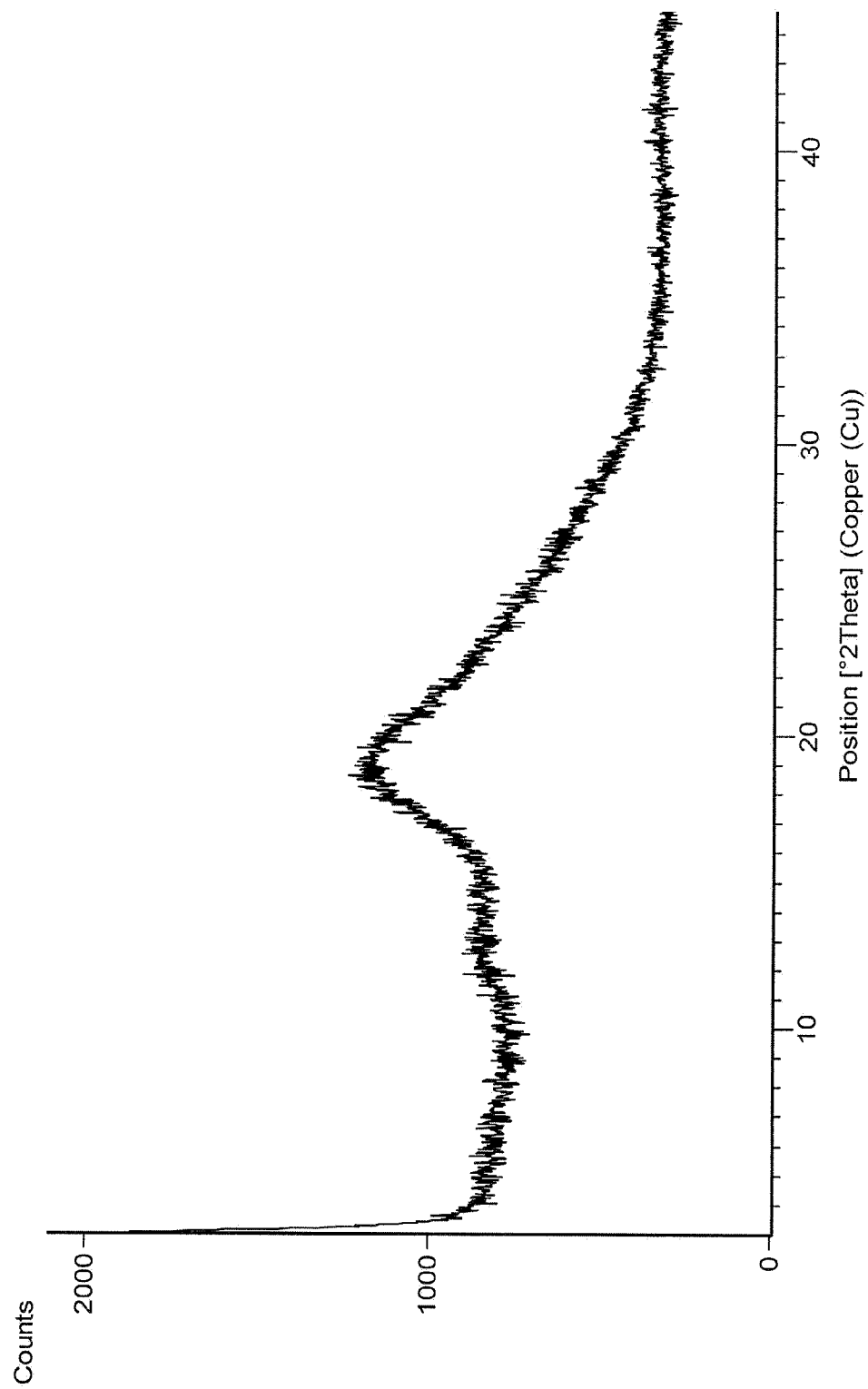


Figure 2

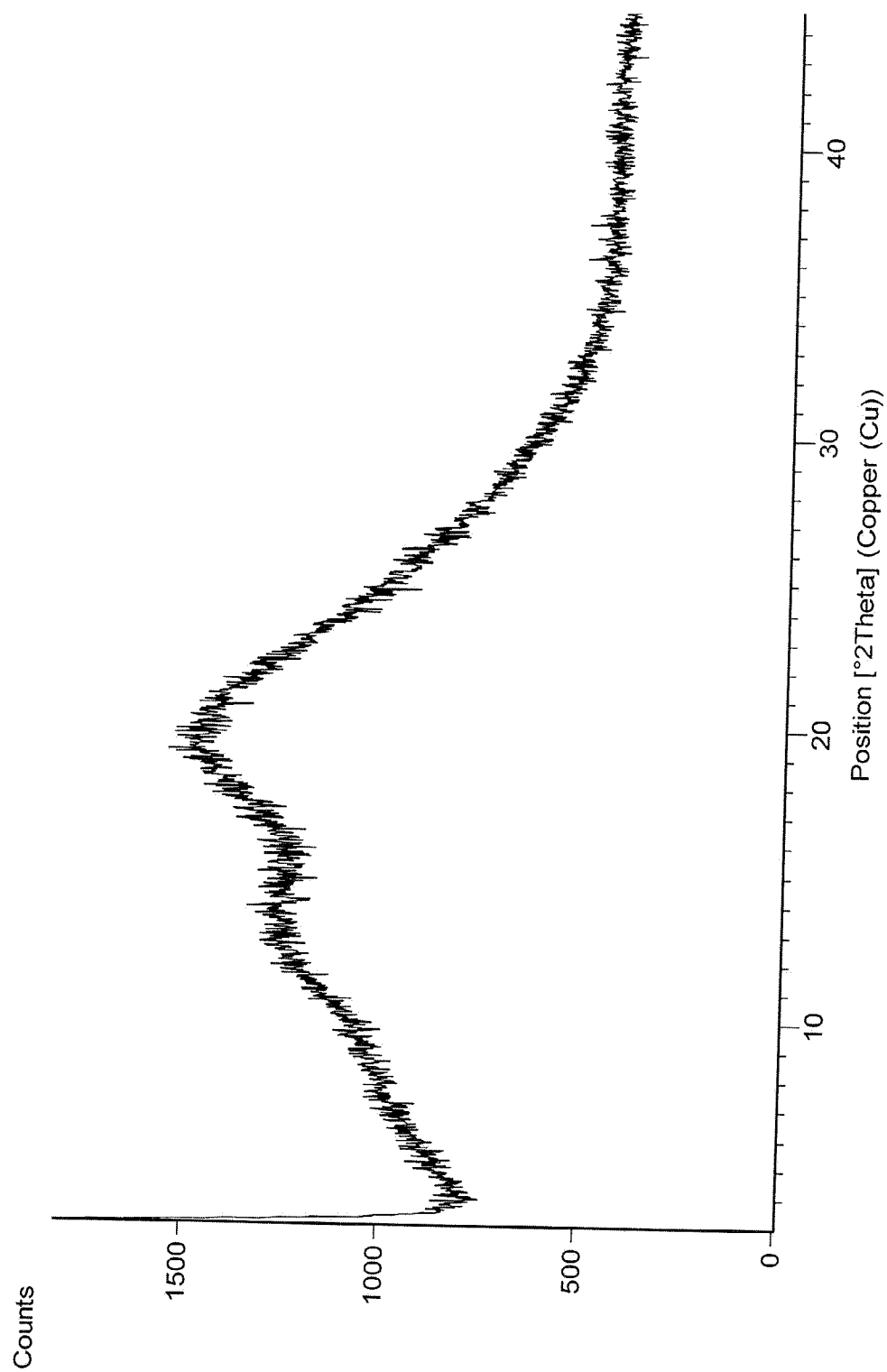


Figure 3

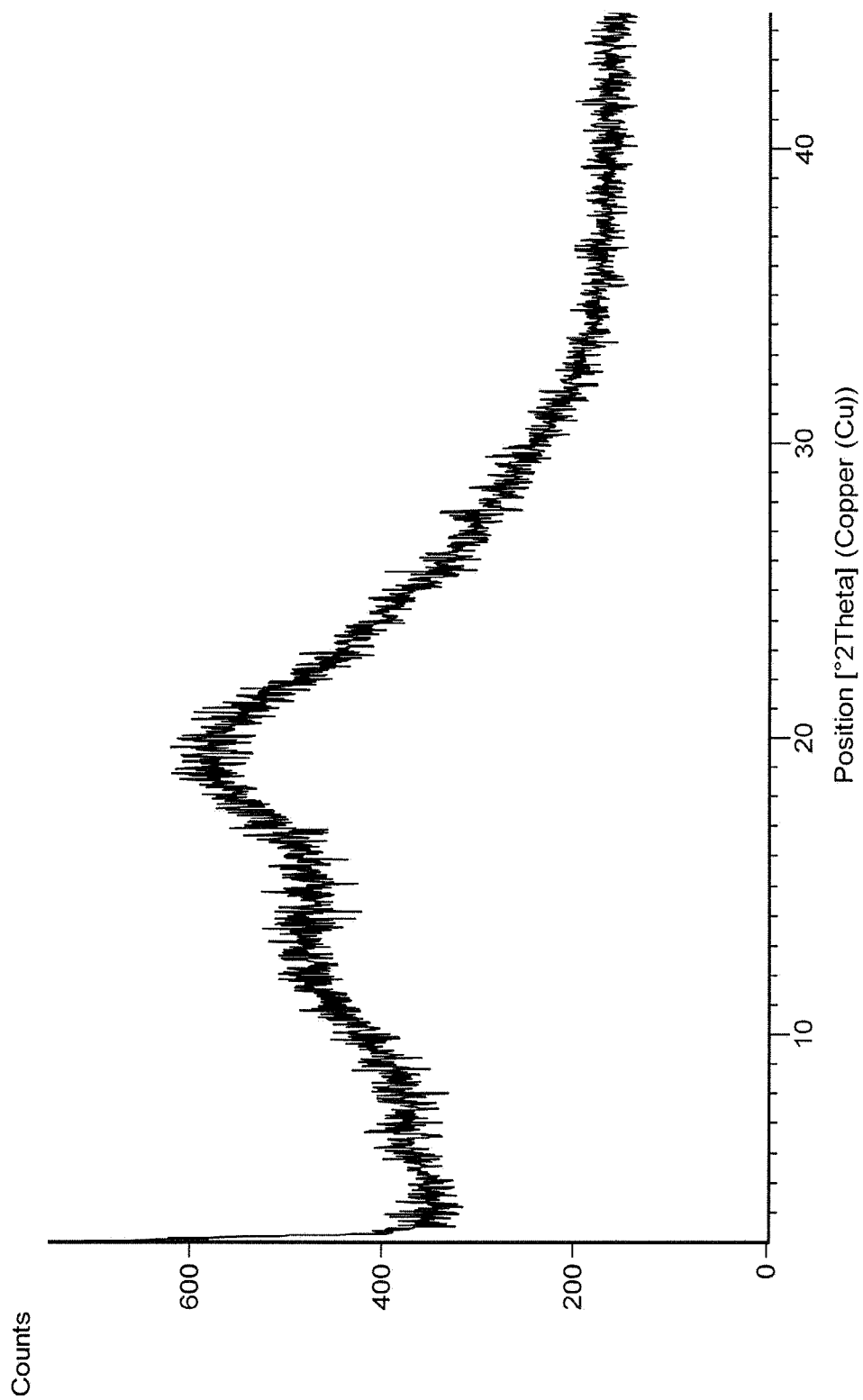


Figure 4

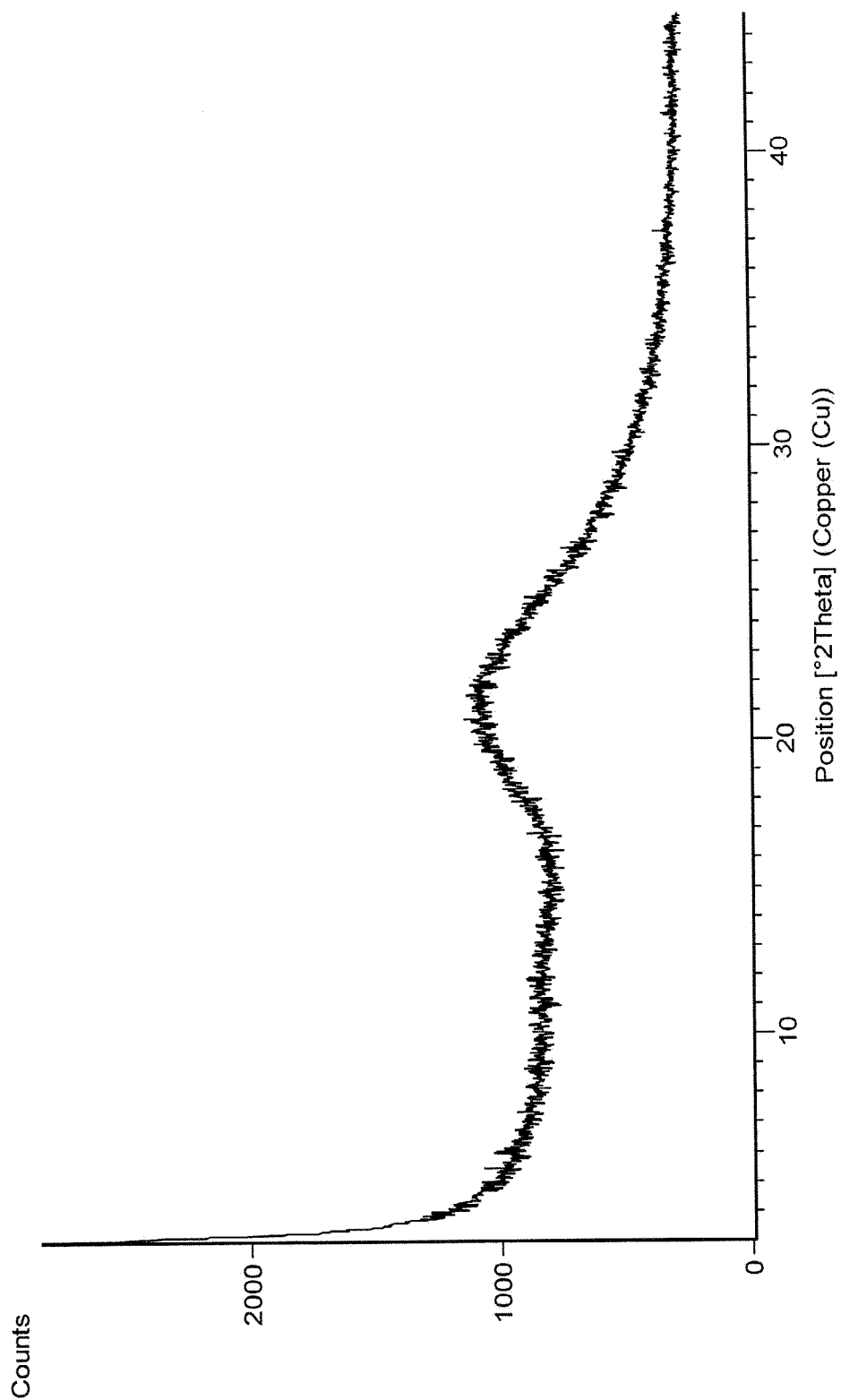


Figure 5

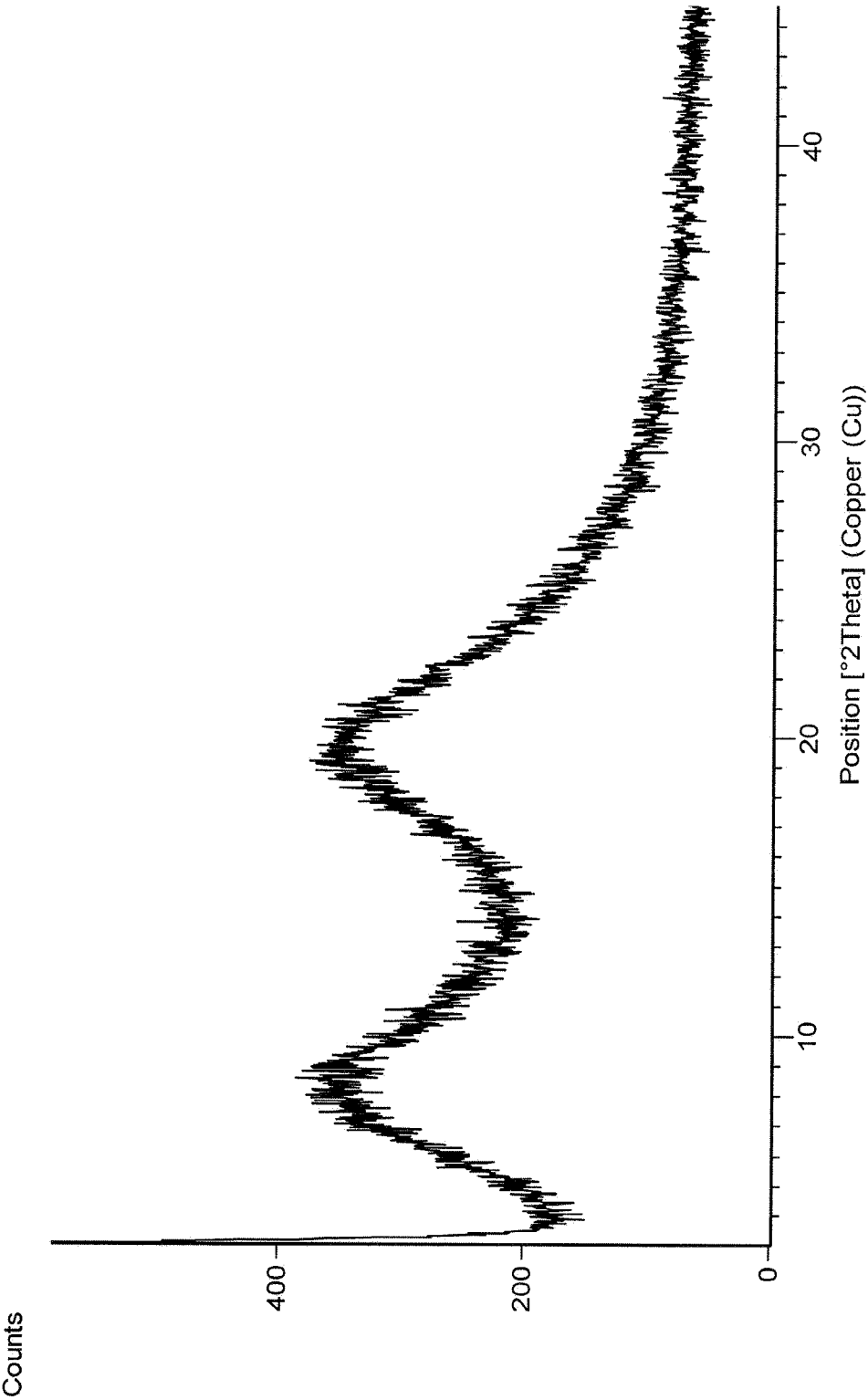


Figure 6