

What is claimed is:

1. A crystalline compound, 2-methyl-2-(3-methyl-4-(4-(methylamino)-5-(trifluoromethyl)pyrimidin-2-ylamino)-1H-pyrazol-1-yl)propanenitrile, selected from:

a Form B polymorph that exhibits an X-ray powder diffraction pattern having characteristic peaks expressed in degrees 2-theta at approximately 7.0, 7.3, 16.1, 16.3, 24.1, 25.1, and 26.6;

a Form C polymorph that exhibits an X-ray powder diffraction pattern having characteristic peaks expressed in degrees 2-theta at approximately 6.4, 15.1, 21.2, 25.7, and 27.8; and

a Form D polymorph that exhibits an X-ray powder diffraction pattern having characteristic peaks expressed in degrees 2-theta at approximately 9.2, 14.0, 14.8, 19.7, and 20.0.

2. The crystalline compound of claim 1, selected from:

a Form C polymorph that exhibits an X-ray powder diffraction pattern having characteristic peaks expressed in degrees 2-theta at approximately 6.4, 8.1, 8.6, 8.8, 9.9, 10.2, 12.9, 13.8, 15.1, 15.4, 16.5, 19.8, 21.2, 22.1, 23.7, 25.7, and 27.8; and

a Form D polymorph that exhibits an X-ray powder diffraction pattern having characteristic peaks expressed in degrees 2-theta at approximately 8.0, 8.7, 9.2, 9.8, 10.4, 12.9, 13.4, 14.0, 14.8, 16.4, 18.5, 19.7, 20.0, 20.8, 23.1, 23.3, 23.9, 25.5, and 25.7.

3. The crystalline compound of claim 1, wherein the compound is in substantially pure form.

4. The crystalline compound of claim 1, wherein the X-ray powder diffraction pattern is made using CuK α 1 radiation.

5. The crystalline compound of any one of claims 1, 3 and 4, wherein the compound is the Form B polymorph having an X-ray powder diffraction pattern substantially free of peaks at approximately 12.9 and 14.8 ± 0.05 degrees 2-theta.

6. The crystalline compound of any one of claims 1 and 3-5, wherein the Form B polymorph is a cyclohexanol solvate.

7. The Form B polymorph of any one of claims 1 and 3-6- wherein a differential scanning calorimetry DSC shows two melting endotherms at about 87.9 and 103.2 °C onset.

8. The crystalline compound of any one of claims 1-4, wherein the compound is the Form C polymorph having an X-ray powder diffraction pattern substantially free of peaks at 13.6

and 14.8 ± 0.05 degrees 2-theta.

9. The crystalline compound of any one of claims 1-4 and 8, wherein the compound is the Form C polymorph further comprising peaks at 16.5 and 22.1 ± 0.05 degrees 2-theta.

10. The crystalline compound of any one of claims 1-4, 8 and 9, wherein the Form C polymorph is an anhydrate.

11. The Form C polymorph of claim 1 characterized by the X-ray powder diffraction pattern shown in Figure 10.

12. The Form C polymorph of any one of claims 1-4 and 8-11 wherein a differential scanning calorimetry DSC shows a melting endotherm at about 127.8 °C onset.

13. The crystalline compound of and one of claims 1-4, wherein the compound is the Form D polymorph having an X-ray powder diffraction pattern substantially free of peaks at 13.6 ± 0.05 degrees 2-theta.

14. The crystalline compound of any one of claims 1-4 and 13, wherein the Form D polymorph is an anhydrate.

15. The Form D polymorph of claim 1 characterized by the X-ray powder diffraction pattern shown in Figure 12.

16. The Form D polymorph of any one of claims 1-4 and 13-15 wherein a differential scanning calorimetry DSC shows a melting endotherm at about 129.1 °C onset.

17. The crystalline compound of any one of the preceding claims, exhibiting a mass increase of less than about 1% when subjected to an increase in relative humidity from about 0% to about 95% relative humidity for about 180 minutes.

18. The crystalline compound of any one of the preceding claims, which is stable upon exposure to about 40 °C and about 75% relative humidity for at least 6 months.

19. A crystalline compound, 2-methyl-2-(3-methyl-4-(4-(methylamino)-5-(trifluoromethyl)pyrimidin-2-ylamino)-1H-pyrazol-1-yl)propanenitrile exhibiting an X-ray powder diffraction pattern having characteristic peaks expressed in ± 0.3 degrees 2-theta at approximately 6.4, 15.1, 21.2, 25.7, and 27.8.

20. A process for preparing a crystalline polymorph comprising heating at 50°C or above 2-methyl-2-(3-methyl-4-(4-(methylamino)-5-(trifluoromethyl)pyrimidin-2-ylamino)-1H-pyrazol-1-yl)propanenitrile in methyl *tert*-butyl ether, cyclopentyl methyl ether, ethyl acetate, isopropyl acetate, or combinations thereof and a non-polar solvent such as heptane, and then

cooling the mixture whereby a Form C crystalline polymorph that exhibits an X-ray powder diffraction pattern having characteristic peaks expressed in degrees 2-theta at approximately 6.4, 15.1, 21.2, 25.7, and 27.8 degrees 2-theta is formed.

21. A process for preparing a crystalline polymorph comprising heating at 50°C or above, an anhydrous solution of 2-methyl-2-(3-methyl-4-(4-(methylamino)-5-(trifluoromethyl)pyrimidin-2-ylamino)-1H-pyrazol-1-yl)propanenitrile in methyl *tert*-butyl ether, cyclopentyl methyl ether, ethyl acetate, isopropyl acetate, or combinations thereof, and a non-polar solvent such as heptane, and then cooling the mixture whereby a Form D crystalline polymorph that exhibits an X-ray powder diffraction pattern having characteristic peaks expressed in degrees 2-theta at approximately 9.2, 14.0, 14.8, 19.7, and 20.0 degrees 2-theta is formed.

22. The process of claim 20 or 21 wherein the mixture is seeded.

23. A pharmaceutical composition comprising a therapeutically effective amount of the crystalline compound of any one of claims 1-19, further comprising a pharmaceutically acceptable carrier, glidant, diluent, or excipient.

24. The pharmaceutical composition of claim 23, in the form of a tablet.

25. The pharmaceutical composition of claim 23 or 24, wherein the crystalline polymorph is milled.

26. A pharmaceutical composition comprising a therapeutically effective amount of a crystalline polymorph of 2-methyl-2-(3-methyl-4-(4-(methylamino)-5-(trifluoromethyl)pyrimidin-2-ylamino)-1H-pyrazol-1-yl)propanenitrile, and a pharmaceutically acceptable carrier, glidant, diluent, or excipient, wherein the crystalline polymorph is a Form C polymorph that exhibits an X-ray powder diffraction pattern having characteristic peaks expressed in degrees 2-theta at approximately 6.4, 15.1, 21.2, 25.7, and 27.8.

27. The pharmaceutical composition of claim 26, wherein the Form C polymorph exhibits an X-ray powder diffraction pattern having characteristic peaks expressed in degrees 2-theta at approximately 6.4, 8.1, 8.6, 8.8, 9.9, 10.2, 12.9, 13.8, 15.1, 15.4, 16.5, 19.8, 21.2, 22.1, 23.7, 25.7, and 27.8.

28. A pharmaceutical composition comprising a therapeutically effective amount of a crystalline polymorph of 2-methyl-2-(3-methyl-4-(4-(methylamino)-5-(trifluoromethyl)pyrimidin-2-ylamino)-1H-pyrazol-1-yl)propanenitrile, and a pharmaceutically

acceptable carrier, glidant, diluent, or excipient, wherein the crystalline polymorph is a Form D polymorph that exhibits an X-ray powder diffraction pattern having characteristic peaks expressed in degrees 2-theta at approximately 9.2, 14.0, 14.8, 19.7, and 20.0.

29. The pharmaceutical composition of claim 28, wherein the Form D polymorph
5 exhibits an X-ray powder diffraction pattern having characteristic peaks expressed in degrees 2-theta at approximately 8.0, 8.7, 9.2, 9.8, 10.4, 12.9, 13.4, 14.0, 14.8, 16.4, 18.5, 19.7, 20.0, 20.8, 23.1, 23.3, 23.9, 25.5, and 25.7.