CLAIMS

1. A solid controlled release dosage form comprising:

a core comprising a first portion of an opioid analgesic dispersed in a first matrix material; and

a shell encasing the core and comprising a second portion of the opioid analgesic dispersed in a second matrix material;

wherein the amount of opioid analgesic released from the dosage form is proportional within 20% to elapsed time from 8 to 24 hours, as measured by an in-vitro dissolution in a USP Apparatus 1 (basket) at 100 rpm in 900 ml simulated gastric fluid without enzymes (SGF) at 37°C.

2. The solid controlled release dosage form of claim 1, wherein the core is a compressed tablet.

3. The solid controlled release dosage form of claim 1 or 2, wherein the shell is a compression coating.

4. The solid controlled release dosage form of any one of claims 1 to 3, wherein the first matrix material comprises polyethylene oxide.

5. The solid controlled release dosage form of any one of claims 1 to 4, wherein the second matrix material comprises polyethylene oxide.

6. The solid controlled release dosage form of any one of claims 1 to 3, wherein both the first matrix material and the second matrix material comprise polyethylene oxide.

7. The solid controlled release dosage form of claim 6, wherein the polyethylene oxide in the second matrix material has a higher viscosity than the polyethylene oxide in the first matrix material.

8. The solid controlled release dosage form of claim 4, wherein the first matrix material comprises polyethylene oxide having an average molecular weight from about 300,000 to about 10,000,000.

9. The solid controlled release dosage form of claim 8, wherein the first matrix material comprises polyethylene oxide having an average molecular weight from about 500,000 to about 1,000,000.

10. The solid controlled release dosage form of claim 5, wherein the second matrix material comprises polyethylene oxide having an average molecular weight from about 1,000,000 to about 10,000,000.

11. The solid controlled release dosage form of claim 10, wherein the second matrix material comprises polyethylene oxide having an average molecular weight from about 6,000,000 to about 8,000,000.

12. The solid controlled release dosage form of claim 6, wherein the polyethylene oxide in the second matrix material has an average molecular weight from about 4,000,000 to about 10,000,000 and the polyethylene oxide in the first matrix material has an average molecular weight from about 300,000 to about 3,000,000.

13. The solid controlled release dosage form of claim 6, wherein the polyethylene oxide in the second matrix material has an average molecular weight from about 6,000,000 to about 8,000,000 and the polyethylene oxide in the first matrix material has an average molecular weight from about 500,000 to about 1,000,000.

14. The solid controlled release dosage form of any one of claims 1 to 13, wherein the weight ratio of the core to the shell is from about 1:0.5 to about 1:5.

15. The solid controlled release dosage form of claim 14, wherein the weight ratio of the core to the shell is from about 1:0.6 to about 1:1.5.

16. The solid controlled release dosage form of claim 15, wherein the weight ratio of the core to the shell is from about 1:0.8 to about 1:1.2.

17. The solid controlled release dosage form of claim 4, wherein the weight ratio of the first portion of opioid analgesic to polyethylene oxide in the first matrix material is from about 1:0.5 to about 1:100.

18. The solid controlled release dosage form of claim 17, wherein the weight ratio of the first portion of opioid analgesic to polyethylene oxide in the first matrix material is from about 1:1 to about 1:10.

19. The solid controlled release dosage form of claim 18, wherein the weight ratio of the first portion of opioid analgesic to polyethylene oxide in the first matrix material is from about 1:1.5 to about 1:4.

20. The solid controlled release dosage form of claim 5, wherein the weight ratio of the second portion of opioid analgesic to polyethylene oxide in the second matrix material is from about 1:2 to about 1:200.

21. The solid controlled release dosage form of claim 20, wherein the weight ratio of the second portion of opioid analgesic to polyethylene oxide in the second matrix material is from about 1:5 to about 1:50.

22. The solid controlled release dosage form of claim 21, wherein the weight ratio of the second portion of opioid analgesic to polyethylene oxide in the second matrix material is from about 1:12 to about 1:25.

23. The solid controlled release dosage form of any one of claims 1 to 22, wherein the opioid analgesic in the first portion is the same as the opioid analgesic in the second portion.

24. The solid controlled release dosage form of any one of claims 1 to 22, wherein the opioid analgesic in the first portion is different than the opioid analgesic in the second portion.

25. The solid controlled release dosage form of any one of claims 1 to 24, wherein the ratio of opioid analgesic in the core to the ratio of opioid analgesic in the shell is from about 1:1 to about 10:1.

26. The solid controlled release dosage form of claim 25, wherein the ratio of opioid analgesic in the core to the ratio of opioid analgesic in the shell is from about 2:1 to about 8:1.

27. The solid controlled release dosage form of claim 25, wherein the ratio of opioid analgesic in the core to the ratio of opioid analgesic in the shell is from about 2:1 to about 5:1.

28. The solid controlled release dosage form of any one of claims 1 to 27, wherein the opioid analgesic is selected from the group consisting of alfentanil, allylprodine, alphaprodine, anileridine, benzylmorphine, bezitramide, buprenorphine, butorphanol, clonitazene, codeine, desomorphine, dextromoramide, dezocine, diampromide, diamorphone, dihydrocodeine, dihydromorphine, dimenoxadol, dimepheptanol, dimethylthiambutene, dioxaphetyl butyrate, dipipanone, eptazocine,

ethoheptazine, ethylmethylthiambutene, ethylmorphine, etonitazene, etorphine, dihydroetorphine, fentanyl and derivatives, hydrocodone, hydromorphone, hydroxypethidine, isomethadone, ketobemidone, levorphanol, levophenacylmorphan, lofentanil, meperidine, meptazinol, metazocine, methadone, metopon, morphine, myrophine, narceine, nicomorphine, norlevorphanol, normethadone, nalorphine, nalbuphene, normorphine, norpipanone, opium, oxycodone, oxymorphone, papaveretum, pentazocine, phenadoxone, phenomorphan, phenazocine, phenoperidine, piminodine, piritramide, propheptazine, promedol, properidine, propoxyphene, sufentanil, tilidine, tramadol, pharmaceutically acceptable salts thereof, hydrates thereof, solvates thereof, and mixtures thereof.

29. The solid controlled release dosage form of claim 28, wherein the opioid analgesic is selected from the group consisting of codeine, hydrocodone, hydromorphone, morphine, oxycodone, oxymorphone, tramadol, pharmaceutically acceptable salts thereof, hydrates thereof, solvates thereof, and mixtures thereof.

30. The solid controlled release dosage form of claim 29, wherein the opioid analgesic is selected from the group consisting of hydrocodone, pharmaceutically acceptable salts thereof, hydrates thereof, solvates thereof, and mixtures thereof

31. The solid controlled release dosage form of claim 30, wherein the opioid analgesic is hydrocodone bitartrate.

32. The solid controlled release dosage form of claim 31, wherein total amount of hydrocodone bitartrate in the dosage form is from about 0.5 mg to about 1250 mg.

33. The solid controlled release dosage form of claim 31, wherein total amount of hydrocodone bitartrate in the dosage form is from about 2 mg to about 200 mg.

34. The solid controlled release dosage form of claim 31, wherein total amount of hydrocodone bitartrate in the dosage form is from about 16 mg to about 120 mg.

35. The solid controlled release dosage form of any one of claims 1 to 34, wherein the amount of opioid analgesic released is proportional within 10% to elapsed time from 8 to 24 hours.

36. The solid controlled release dosage form of claim 35, wherein the amount of opioid analgesic released is proportional within 5% to elapsed time from 8 to 24 hours.

37. The solid controlled release dosage form of any one of claims 1 to 34, wherein the amount of opioid analgesic released is proportional within 20% to elapsed time from 8 to 18 hours.

38. The solid controlled release dosage form of any one of claims 1 to 34, wherein the amount of opioid analgesic released is proportional within 20% to elapsed time from 8 to 12 hours.

39. The solid controlled release dosage form of any one of claims 1 to 34, wherein the amount of opioid analgesic released is proportional within 20% to elapsed time from 12 to 24 hours.

40. The solid controlled release dosage form of any one of claims 1 to 34, wherein the amount of opioid analgesic released is proportional within 20% to elapsed time from 12 to 18 hours.

41. The solid controlled release dosage form of claim 37, wherein the amount of opioid analgesic released is proportional within 10% to elapsed time from 8 to 18 hours.

42. The solid controlled release dosage form of claim 38, wherein the amount of opioid analgesic released is proportional within 10% to elapsed time from 8 to 12 hours.

43. The solid controlled release dosage form of claim 39, wherein the amount of opioid analgesic released is proportional within 10% to elapsed time from 12 to 24 hours.

44. The solid controlled release dosage form of claim 40, wherein the amount of opioid analgesic released is proportional within 10% to elapsed time from 12 to 18 hours.

45. The solid controlled release dosage form of claim 37, wherein the amount of opioid analgesic released is proportional within 5% to elapsed time from 8 to 18 hours.

46. The solid controlled release dosage form of claim 38, wherein the amount of opioid analgesic released is proportional within 5% to elapsed time from 8 to 12 hours.

47. The solid controlled release dosage form of claim 39, wherein the amount of opioid analgesic released is proportional within 5% to elapsed time from 12 to 24 hours.

48. The solid controlled release dosage form of claim 40, wherein the amount of opioid analgesic released is proportional within 5% to elapsed time from 12 to 18 hours.

49. The solid controlled release dosage form of any one of claims 1 to 48, wherein the amount of opioid analgesic released at 2 hours is less than about 25%.

50. The solid controlled release dosage form of any one of claims 1 to 49, wherein the amount of opioid analgesic released at 4 hours is from about 10% to about 30%.

51. The solid controlled release dosage form of any one of claims 1 to 50, wherein the amount of opioid analgesic released at 8 hours is from about 20% to about 60%.

52. The solid controlled release dosage form of any one of claims 1 to 51, wherein the amount of opioid analgesic released at 12 hours is from about 40% to about 90%.

53. The solid controlled release dosage form of any one of claims 1 to 52, wherein the amount of opioid analgesic released at 18 hours is greater than about 70%.

54. The solid controlled release dosage form of any one of claims 1 to 53, wherein the amount of opioid analgesic released at 2 hours is less than about 20%.

55. The solid controlled release dosage form of any one of claims 1 to 54, wherein the amount of opioid analgesic released at 4 hours is from about 10% to about 20%.

56. The solid controlled release dosage form of any one of claims 1 to 55, wherein the amount of opioid analgesic released at 8 hours is from about 20% to about 40%.

57. The solid controlled release dosage form of any one of claims 1 to 56, wherein the amount of opioid analgesic released at 12 hours is from about 40% to about 65%.

58. The solid controlled release dosage form of any one of claims 1 to 57, wherein the amount of opioid analgesic released at 18 hours is greater than about 80%.

59. The solid controlled release dosage form of any one of claims 1 to 58, wherein the amount of opioid analgesic released at 2 hours is less than about 15%.

60. The solid controlled release dosage form of any one of claims 1 to 59, wherein the amount of opioid analgesic released at 4 hours is from about 20% to about 30%.

61. The solid controlled release dosage form of any one of claims 1 to 60, wherein the amount of opioid analgesic released at 8 hours is from about 45% to about 60%.

62. The solid controlled release dosage form of any one of claims 1 to 61, wherein the amount of opioid analgesic released at 12 hours is from about 70% to about 90%.

63. The solid controlled release dosage form of any one of claims 1 to 62, wherein the amount of opioid analgesic released at 18 hours is greater than about 90%.

64. The solid controlled release dosage form of claim 6, wherein the dosage form is cured at a temperature of at least the softening point of the polyethylene oxide for at least 1 minute.

65. The solid controlled release dosage form of claim 6, wherein the dosage form is cured at a temperature of at least the softening point of the polyethylene oxide for at least 5 minutes.

66. The solid controlled release dosage form of claim 6, wherein the dosage form is cured at a temperature of at least the softening point of the polyethylene oxide for at least 15 minutes.

67. The solid controlled release dosage form of claim 6, wherein the dosage form is cured at a temperature of at least the softening point of the polyethylene oxide from about 1 minute to about 48 hours.

68. The solid controlled release dosage form of claim 6, wherein the dosage form is cured at a temperature of at least the softening point of the polyethylene oxide from about 5 minutes to about 24 hours.

69. The solid controlled release dosage form of claim 6, wherein the dosage form is cured at a temperature of at least the softening point of the polyethylene oxide from about 15 minutes to about 1 hour.

70. The solid controlled release dosage form of any of claims 64-69, wherein the dosage form is cured at a temperature of at least about 60°C.

71. The solid controlled release dosage form of any of claims 64-69, wherein the dosage form is cured at a temperature of at least about 65°C.

72. The solid controlled release dosage form of any of claims 64-69, wherein the dosage form is cured at a temperature of at least about 70°C.

73. The solid controlled release dosage form of any of claims 64-69, wherein the dosage form is cured at a temperature of at least about 75°C.

74. The solid controlled release dosage form of any of claims 64-69, wherein the dosage form is cured at a temperature of about 72°C.

75. The solid controlled release dosage form of any of claims 64-69, wherein the dosage form is cured at a temperature from about 60°C to about 90°C.

76. The solid controlled release dosage form of any of claims 64-69, wherein the dosage form is cured at a temperature from about 65°C to about 85°C.

77. The solid controlled release dosage form of any of claims 64-69, wherein the dosage form is cured at a temperature from about 70°C to about 80°C.

78. The solid controlled release dosage form of any of claims 64-69, wherein the dosage form is cured at a temperature from about 75°C to about 80°C.

79. The solid controlled release dosage form of any of claims 64-69, wherein the dosage form is cured at a temperature from about 70°C to about 75°C.

80. The solid controlled release dosage form of any one of claims 1 to 79, wherein the core and the shell are visually indistintinguishable.

81. The solid controlled release dosage form of any one of claims 1 to 79, wherein the core and the shell have a CIE L*A*B* value within 10% of each other.

82. The solid controlled release dosage form of any one of claims 1 to 81, wherein the dosage form can be flattened without breaking, wherein the thickness of

the dosage form after flattening corresponds to no more than about 60% of the thickness of the dosage form before flattening.

83. The solid controlled release dosage form of claim 82, wherein the dosage form can be flattened without breaking, wherein the thickness of the dosage form after flattening corresponds to no more than about 50% of the thickness of the dosage form before flattening.

84. The solid controlled release dosage form of claim 82, wherein the dosage form can be flattened without breaking, wherein the thickness of the dosage form after flattening corresponds to no more than about 40% of the thickness of the dosage form before flattening.

85. The solid controlled release dosage form of claim 82, wherein the dosage form can be flattened without breaking, wherein the thickness of the dosage form after flattening corresponds to no more than about 30% of the thickness of the dosage form before flattening.

86. The solid controlled release dosage form of claim 82, wherein the dosage form can be flattened without breaking, wherein the thickness of the dosage form after flattening corresponds to no more than about 20% of the thickness of the dosage form before flattening.

87. The solid controlled release dosage form of any of claims 82-86, wherein the amount of opioid analgesic released at 0.5 hour from a flattened dosage form deviates no more than about 20% points from a non-flattened dosage form as measured by an in-vitro dissolution in a USP Apparatus 1 (basket) at 100 rpm in 900 ml simulated gastric fluid without enzymes (SGF) at 37°C.

88. The solid controlled release dosage form of any of claims 82-86, wherein the amount of opioid analgesic released at 0.5 hour from a flattened dosage form deviates no more than about 15% points from a non-flattened dosage form as measured by an in-vitro dissolution in a USP Apparatus 1 (basket) at 100 rpm in 900 ml simulated gastric fluid without enzymes (SGF) at 37°C.

89. The solid controlled release dosage form of any of claims 82-86, wherein the amount of opioid analgesic released at 0.5 hour from a flattened dosage form deviates no more than about 10% points from a non-flattened dosage form as measured by an in-vitro dissolution in a USP Apparatus 1 (basket) at 100 rpm in 900 ml simulated gastric fluid without enzymes (SGF) at 37°C.

90. The solid controlled release dosage form of claim 30, that provides a C_{24}/C_{max} ratio of hydrocodone of about 0.55 to about 1.0 after administration.

91. The solid controlled release dosage form of claim 90, wherein the C_{24}/C_{max} ratio is about 0.55 to about 0.85.

92. The solid controlled release dosage form of claim 90, wherein the C_{24}/C_{max} ratio is about 0.55 to about 0.75.

93. The solid controlled release dosage form of claim 90, wherein the C_{24}/C_{max} ratio is about 0.60 to about 0.70.

94. The solid controlled release dosage form of claim 30, that provides a T_{max} (h) of hydrocodone from about 4 to about 20 hours after administration.

95. The solid controlled release dosage form of claim 94, wherein the T_{max} (h) is about 6 to about 12 hours.

96. The solid controlled release dosage form of claim 94, wherein the T_{max} (h) is about 8 to about 10 hours.

97. The solid controlled release dosage form of claim 94, wherein the T_{max} (h) is about 4 to about 10 hours.

98. The solid controlled release dosage form of claim 94, wherein the T_{max} (h) is about 8 to about 14 hours.

99. The solid controlled release dosage form of claim 94, wherein the T_{max} (h) is about 14 to about 20 hours after administration of the dosage form.

100. The solid controlled release dosage form of any of claims 90-99, wherein the administration is a first administration to a healthy subject.

101. The solid controlled release dosage form of any of claims 90-99, wherein the administration is a first administration to a population of healthy subjects.

102. The solid controlled release dosage form of any of claims 90-99, wherein the administration is steady state administration to a healthy subject.

103. The solid controlled release dosage form of any of claims 90-99, wherein the administration is steady state administration to a population of healthy subjects.

104. The solid controlled release dosage form of claim 30, that contains about 20 mg hydrocodone or a pharmaceutically acceptable salt thereof.

105. The solid controlled release dosage form of claim 30, that contains about 120 mg hydrocodone or a pharmaceutically acceptable salt thereof.

106. The solid controlled release dosage form of claim 30, that provides a mean AUC (ng*h/mL) after administration of about 250 to 400 per each 20 mg hydrocodone included in the dosage form.

107. The solid controlled release dosage form of claim 104, that provides a mean AUC (ng*h/mL) after administration of about 250 to about 400, about 275 to about 350, about 300 to 330 or about 280 to about 320.

108. The solid controlled release dosage form of claim 105, that provides a mean AUC (ng*h/mL) after administration of about 1500 to about 2400, about 1700 to about 2200, about 1800 to about 2100 or about 1900 to about 2100.

109. The solid controlled release dosage form of claim 30, that provides a mean C_{max} (ng/mL) after administration of about 10 to about 30 per each 20 mg hydrocodone included in the dosage form.

110. The solid controlled release dosage form of claim 104, that provides a mean C_{max} (ng/mL) after administration of about 10 to about 30, about 12 to about 25, about 14 to about 18 or about 12 to about 17.

111. The solid controlled release dosage form of claim 105, that provides a mean C_{max} (ng/mL) after administration of about 60 to about 180, about 100 to about 160, about 110 to about 150 or about 100 to about 140.

112. The solid controlled release dosage form of claim 30, that provides a mean T_{max} (h) after administration of about 10 to about 20, about 12 to about 18, about 13 to about 17 or about 14 to about 16.

113. The solid controlled release dosage form of claim 30, that provides a mean $T_{1/2}$ (h) after administration of about 5 to about 10, about 6 to about 9, about 7 or about 8.

114. The solid controlled release dosage form of claim 30, that provides a mean T_{lag} (h) after administration of about 0.01 to about 0.2, about 0.1 to about 0.18, about 0.3 to about 0.17 or about 0.06 t about 0.15.

115. The solid controlled release dosage form of claim 30, wherein the mean C_{24}/C_{max} ratio is about 0.2 to about 0.8, about 0.3 to about 0.7 or about 0.4 to about 0.6.

116. The solid controlled release dosage form of any of claims 106-115, wherein the administration is in the fasted state.

117. The solid controlled release dosage form of claim 30, wherein the mean AUC (ng*h/mL) after administration in the fed state is less than 20% higher, less than 16% higher or less than 12% higher than the AUC (ng*h/mL) after administration in the fasted state.

118. The solid controlled release dosage form of claim 30, wherein the mean C_{max} (ng/mL) after administration in the fed state is less than 80% higher, less than 70% higher or less than 60% higher than the C_{max} after administration in the fasted state.

119. The solid controlled release dosage form of claim 30, wherein the mean T_{max} (h) after administration in the fed state is within 25%, within 20% or within 15% of the T_{max} (h) after administration in the fasted state.

120. The solid controlled release dosage form of claim 30, wherein the mean $T_{1/2}$ (h) after administration in the fed state is within 8%, within 5% or within 2% of the $T_{1/2}$ after administration in the fasted state.

121. The solid controlled release dosage form of claim 30, wherein the mean T_{lag} (h) after administration in the fed state is less than 150% higher, less than 125% higher or less than 100% higher than the $T_{1/2}$ after administration in the fasted state.

122. A solid controlled release dosage form comprising:

a core comprising a first portion of an opioid analgesic dispersed in a first matrix material comprising polyethylene oxide; and

a shell encasing the core and comprising a second portion of the opioid analgesic dispersed in a second matrix material comprising polyethylene oxide.

123. A solid controlled release dosage form comprising:

a compressed core comprising a first portion of an opioid analgesic dispersed in a first matrix material comprising polyethylene oxide; and

a compression coating encasing the core and comprising a second portion of the opioid analgesic dispersed in a second matrix material comprising polyethylene oxide.

124. A solid controlled release dosage form comprising:

a core comprising a first portion of an opioid analgesic dispersed in a first matrix material; and

a shell encasing the core and comprising a second portion of the opioid analgesic dispersed in a second matrix material;

wherein the amount of opioid analgesic released from the dosage form at 2 hours is less than about 25%;

the amount of opioid analgesic released from the dosage form at 4 hours is from about 10% to about 30%;

the amount of opioid analgesic released from the dosage form at 8 hours is from about 20% to about 60%;

the amount of opioid analgesic released from the dosage form at 12 hours is from about 40% to about 90%; and

the amount of opioid analgesic released from the dosage form at 18 hours is greater than about 70%;

as measured by an in-vitro dissolution in a USP Apparatus 1 (basket) at 100 rpm in 900 ml simulated gastric fluid without enzymes (SGF) at 37°C.

125. A solid controlled release dosage form comprising:

a therapeutically effective amount of hydrocodone or a pharmaceutically acceptable salt thereof, and a controlled release excipient;

wherein the amount of hydrocodone or salt thereof released from the dosage form is proportional within 20% to elapsed time from 8 to 24 hours, as measured by an in-vitro dissolution in a USP Apparatus 1 (basket) at 100 rpm in 900 ml simulated gastric fluid without enzymes (SGF) at 37°C; and

the dosage form can be flattened without breaking, wherein the thickness of the dosage form after flattening corresponds to no more than about 20% of the thickness of the dosage form before flattening; and

the amount of hydrocodone or salt thereof released at 0.5 hour from a flattened dosage form deviates no more than about 20% points from a non-flattened dosage form as measured by an in-vitro dissolution in a USP Apparatus 1 (basket) at 100 rpm in 900 ml simulated gastric fluid without enzymes (SGF) at 37°C.

126. A solid controlled release dosage form comprising:

a therapeutically effective amount of hydrocodone or a pharmaceutically acceptable salt thereof, and a controlled release excipient;

wherein the amount of hydrocodone or salt thereof released from the dosage form at 2 hours is less than about 25%;

the amount of hydrocodone or salt thereof released from the dosage form at 4 hours is from about 10% to about 30%;

the amount of hydrocodone or salt thereof released from the dosage form at 8 hours is from about 20% to about 60%;

the amount of hydrocodone or salt thereof released from the dosage form at 12 hours is from about 40% to about 90%; and

the amount of hydrocodone or salt thereof released from the dosage form at 18 hours is greater than about 70%;

as measured by an in-vitro dissolution in a USP Apparatus 1 (basket) at 100 rpm in 900 ml simulated gastric fluid without enzymes (SGF) at 37°C; and

the dosage form can be flattened without breaking, wherein the thickness of the dosage form after flattening corresponds to no more than about 20% of the thickness of the dosage form before flattening; and

the amount of hydrocodone or salt thereof released at 0.5 hour from a flattened dosage form deviates no more than about 20% points from a non-flattened dosage form as measured by an in-vitro dissolution in a USP Apparatus 1 (basket) at 100 rpm in 900 ml simulated gastric fluid without enzymes (SGF) at 37°C.

127. A solid controlled release dosage form comprising:

a therapeutically effective amount of hydrocodone or a pharmaceutically acceptable salt thereof dispersed in a controlled release excipient; wherein the inner 60% of the dosage form contains at least 80% of the hydrocodone or salt thereof;

wherein the amount of hydrocodone or salt thereof released from the dosage form is proportional within 20% to elapsed time from 8 to 24 hours, as measured by an in-vitro dissolution in a USP Apparatus 1 (basket) at 100 rpm in 900 ml simulated gastric fluid without enzymes (SGF) at 37°C.

128. The solid controlled release dosage form of claim 127, wherein the inner 50% of the dosage form contains at least 80% of the hydrocodone or salt thereof.

129. A solid controlled release dosage form according to any of claims 1-128 for use in the treatment of pain in a subject in need thereof.

130. Use of a solid controlled release dosage form according to any of claims 1-128 in the manufacture of a medicament for the treatment of pain in a subject in need thereof.

131. A method of preparing a solid controlled release dosage form comprising:

preparing a core comprising a first portion of an opioid analgesic dispersed in a first matrix material; and

encasing the core with a shell comprising a second portion of the opioid analgesic dispersed in a second matrix material;

wherein the amount of opioid analgesic released from the dosage form is proportional within 20% to elapsed time from 8 to 24 hours, as measured by an in-vitro dissolution in a USP Apparatus 1 (basket) at 100 rpm in 900 ml simulated gastric fluid without enzymes (SGF) at 37°C.

132. A method of preparing a solid controlled release dosage form comprising:

preparing a core comprising a first portion of an opioid analgesic dispersed in a first matrix material comprising polyethylene oxide; and

encasing the core in a shell comprising a second portion of the opioid analgesic dispersed in a second matrix material comprising polyethylene oxide.

133. A method of preparing a solid controlled release dosage form comprising:

preparing a compressed core comprising a first portion of an opioid analgesic dispersed in a first matrix material comprising polyethylene oxide; and

encasing the core by compression coating a second portion of the opioid analgesic dispersed in a second matrix material comprising polyethylene oxide over the core.

134. A method of preparing a solid controlled release dosage form comprising:

preparing a core comprising a first portion of an opioid analgesic dispersed in a first matrix material; and

encasing the core in a shell comprising a second portion of the opioid analgesic dispersed in a second matrix material over the core;

wherein the amount of opioid analgesic released from the dosage form at 2 hours is less than about 25%;

the amount of opioid analgesic released from the dosage form at 4 hours is from about 10% to about 30%;

the amount of opioid analgesic released from the dosage form at 8 hours is from about 20% to about 60%;

the amount of opioid analgesic released from the dosage form at 12 hours is from about 40% to about 90%; and

the amount of opioid analgesic released from the dosage form at 18 hours is greater than about 70%.

as measured by an in-vitro dissolution in a USP Apparatus 1 (basket) at 100 rpm in 900 ml simulated gastric fluid without enzymes (SGF) at 37°C.

135. A method of preparing a solid controlled release dosage form comprising:

combining a therapeutically effective amount of hydrocodone or a pharmaceutically acceptable salt thereof, and a controlled release excipient;

wherein the amount of hydrocodone or salt thereof released from the dosage form is proportional within 20% to elapsed time, at any two time points from 8 to 24 hours, as measured by an in-vitro dissolution in a USP Apparatus 1 (basket) at 100 rpm in 900 ml simulated gastric fluid without enzymes (SGF) at 37°C; and

the dosage form can be flattened without breaking, wherein the thickness of the dosage form after flattening corresponds to no more than about 20% of the thickness of the dosage form before flattening; and

the amount of hydrocodone or salt thereof released at 0.5 hour from a flattened dosage form deviates no more than about 20% points from a non-flattened

dosage form as measured by an in-vitro dissolution in a USP Apparatus 1 (basket) at 100 rpm in 900 ml simulated gastric fluid without enzymes (SGF) at 37°C.

136. A method of preparing a solid controlled release dosage form comprising:

combining a therapeutically effective amount of hydrocodone or a pharmaceutically acceptable salt thereof, and a controlled release excipient;

wherein the amount of hydrocodone or salt thereof released from the dosage form at 2 hours is less than about 25%;

the amount of hydrocodone or salt thereof released from the dosage form at 4 hours is from about 10% to about 30%;

the amount of hydrocodone or salt thereof released from the dosage form at 8 hours is from about 20% to about 60%;

the amount of hydrocodone or salt thereof released from the dosage form at 12 hours is from about 40% to about 80%; and

the amount of hydrocodone or salt thereof released from the dosage form at 18 hours is greater than about 70%;

as measured by an in-vitro dissolution in a USP Apparatus 1 (basket) at 100 rpm in 900 ml simulated gastric fluid without enzymes (SGF) at 37° C; and

the dosage form can be flattened without breaking, wherein the thickness of the dosage form after flattening corresponds to no more than about 20% of the thickness of the dosage form before flattening; and

the amount of hydrocodone or salt thereof released at 0.5 hour from a flattened dosage form deviates no more than about 20% points from a non-flattened dosage form as measured by an in-vitro dissolution in a USP Apparatus 1 (basket) at 100 rpm in 900 ml simulated gastric fluid without enzymes (SGF) at 37°C.

137. A method of preparing a solid controlled release dosage form comprising:

dispersing a therapeutically effective amount of hydrocodone or a pharmaceutically acceptable salt thereof in a controlled release excipient; wherein

the inner 60% of the dosage form contains at least 80% of the hydrocodone or salt thereof;

wherein the amount of hydrocodone or salt thereof released from the dosage form is proportional within 20% to elapsed time from 8 to 24 hours, as measured by an in-vitro dissolution in a USP Apparatus 1 (basket) at 100 rpm in 900 ml simulated gastric fluid without enzymes (SGF) at 37°C.

CLAIMS

1. A method of treating pain in a subject in need thereof, comprising administering to the subject a solid controlled release dosage form comprising:

a core comprising a first portion of an opioid analgesic dispersed in a first matrix material; and

a shell encasing the core and comprising a second portion of the opioid analgesic dispersed in a second matrix material;

wherein the amount of opioid analgesic released from the dosage form is proportional within 20% to elapsed time from 8 to 24 hours, as measured by an in-vitro dissolution in a USP Apparatus 1 (basket) at 100 rpm in 900 ml simulated gastric fluid without enzymes (SGF) at 37°C.

2. A method of treating pain in a subject in need thereof, comprising administering to the subject a solid controlled release dosage form comprising:

a core comprising a first portion of an opioid analgesic dispersed in a first matrix material comprising polyethylene oxide; and

a shell encasing the core and comprising a second portion of the opioid analgesic dispersed in a second matrix material comprising polyethylene oxide.

3. A method of treating pain in a subject in need thereof, comprising administering to the subject a solid controlled release dosage form comprising:

a compressed core comprising a first portion of an opioid analgesic dispersed in a first matrix material comprising polyethylene oxide; and

a compression coating encasing the core and comprising a second portion of the opioid analgesic dispersed in a second matrix material comprising polyethylene oxide.

4. A method of treating pain in a subject in need thereof, comprising administering to the subject a solid controlled release dosage form comprising:

a core comprising a first portion of an opioid analgesic dispersed in a first matrix material; and

a shell encasing the core and comprising a second portion of the opioid analgesic dispersed in a second matrix material;

wherein the amount of opioid analgesic released from the dosage form at 2 hours is less than about 25%;

the amount of opioid analgesic released from the dosage form at 4 hours is from about 10% to about 30%;

the amount of opioid analgesic released from the dosage form at 8 hours is from about 20% to about 60%;

the amount of opioid analgesic released from the dosage form at 12 hours is from about 40% to about 90%; and

the amount of opioid analgesic released from the dosage form at 18 hours is greater than about 70%;

as measured by an in-vitro dissolution in a USP Apparatus 1 (basket) at 100 rpm in 900 ml simulated gastric fluid without enzymes (SGF) at 37°C.

5. A method of treating pain in a subject in need thereof, comprising administering to the subject a solid controlled release dosage form comprising:

a therapeutically effective amount of hydrocodone or a pharmaceutically acceptable salt thereof, and a controlled release excipient;

wherein the amount of hydrocodone or salt thereof released from the dosage form is proportional within 20% to elapsed time from 8 to 24 hours, as measured by an in-vitro dissolution in a USP Apparatus 1 (basket) at 100 rpm in 900 ml simulated gastric fluid without enzymes (SGF) at 37°C; and

the dosage form can be flattened without breaking, wherein the thickness of the dosage form after flattening corresponds to no more than about 20% of the thickness of the dosage form before flattening; and

the amount of hydrocodone or salt thereof released at 0.5 hour from a flattened dosage form deviates no more than about 20% points from a non-flattened dosage form as measured by an in-vitro dissolution in a USP Apparatus 1 (basket) at 100 rpm in 900 ml simulated gastric fluid without enzymes (SGF) at 37°C.

6. A method of treating pain in a subject in need thereof, comprising administering to the subject a solid controlled release dosage form comprising:

a therapeutically effective amount of hydrocodone or a pharmaceutically acceptable salt thereof, and a controlled release excipient;

wherein the amount of hydrocodone or salt thereof released from the dosage form at 2 hours is less than about 25%;

the amount of hydrocodone or salt thereof released from the dosage form at 4 hours is from about 10% to about 30%;

the amount of hydrocodone or salt thereof released from the dosage form at 8 hours is from about 20% to about 60%;

the amount of hydrocodone or salt thereof released from the dosage form at 12 hours is from about 40% to about 90%; and

the amount of hydrocodone or salt thereof released from the dosage form at 18 hours is greater than about 70%;

as measured by an in-vitro dissolution in a USP Apparatus 1 (basket) at 100 rpm in 900 ml simulated gastric fluid without enzymes (SGF) at 37°C; and

the dosage form can be flattened without breaking, wherein the thickness of the dosage form after flattening corresponds to no more than about 20% of the thickness of the dosage form before flattening; and

the amount of hydrocodone or salt thereof released at 0.5 hour from a flattened dosage form deviates no more than about 20% points from a non-flattened dosage form as measured by an in-vitro dissolution in a USP Apparatus 1 (basket) at 100 rpm in 900 ml simulated gastric fluid without enzymes (SGF) at 37°C.

7. A method of treating pain in a subject in need thereof, comprising administering to the subject a solid controlled release dosage form comprising:

a therapeutically effective amount of hydrocodone or a pharmaceutically acceptable salt thereof dispersed in a controlled release excipient; wherein the inner 60% of the dosage form contains at least 80% of the hydrocodone or salt thereof;

wherein the amount of hydrocodone or salt thereof released from the dosage form is proportional within 20% to elapsed time from 8 to 24 hours, as measured by an in-vitro

dissolution in a USP Apparatus 1 (basket) at 100 rpm in 900 ml simulated gastric fluid without enzymes (SGF) at 37°C.