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Polymeric behavior evaluation of PVP K30-poloxamer binary carrier for solid dispersed nisoldipine by experimental design (Article)

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Abstract

View references (36)

Context: High melting point polymeric carrier without plasticizer is unacceptable for solid dispersion (SD) by melting method. Combined polymer–plasticizer carrier significantly affects drug solubility and tableting property of SD. Objective: To evaluate and optimize the combined effect of a binary carrier consisting PVP K30 and poloxamer 188, on nisoldipine solubility and tensile strength of amorphous SD compact ($SD_{compact}$) by experimental design. Materials and methods: SD of nisoldpine (SD_{nisol}) was prepared by melt mixing with different PVP K30 and poloxamer amount. A 3^2 factorial design was employed using nisoldipine solubility and tensile strength of $SD_{compact}$ as response variables. Statistical optimization by design expert software, and SD_{nisol} characterization using ATR FTIR, DSC and microscopy were done. Results: PVP K30:poloxamer, at a ratio of 3.73:6.63, was selected as the optimized combination of binary polymeric carrier resulting nisoldipine solubility of 115 µg/mL and tensile strength of 1.19 N/m^2. Discussion: PVP K30 had significant positive effect on both responses. Increase in poloxamer concentration after a certain level decreased nisoldipine solubility and tensile strength of $SD_{compact}$. Conclusion: An optimized PVP K30–poloxamer binary composition for SD carrier was developed. Tensile strength of $SD_{compact}$ can be considered as a response for experimental design to optimize SD. © 2015 Informa UK Limited, trading as Taylor & Francis Group.

Author keywords

Factorial design | nisoldipine | solid dispersion | solubility

Indexed keywords

EMTREE drug terms: nisoldipine | poloxamer | povidone | antihypertensive agent | drug carrier | excipient | nisoldipine | plasticizer | poloxamer | povidone | tablet

EMTREE medical terms: Article | concentration (parameters) | differential scanning calorimetry | dispersion | drug delivery system | drug solubility | evaluation study | experimental design | factorial design | infrared spectroscopy | melting point | microscopy | miscibility | physical chemistry | polymerization | priority journal | response surface method | response variable | tensile strength | chemistry | medicinal chemistry | solubility | tablet

MeSH: Antihypertensive Agents | Calorimetry, Differential Scanning | Chemistry, Pharmaceutical | Drug Carriers | Excipients | Nisoldipine | Plasticizers | Poloxamer | Povidone | Solubility | Spectroscopy, Fourier Transform Infrared | Tablets | Tensile Strength

Chemicals and CAS Registry Numbers:

nisoldipine, 63675-72-9; poloxamer, 9003-11-6; povidone, 9003-39-8;

Antihypertensive Agents; Drug Carriers; Excipients; Nisoldipine; Plasticizers; Poloxamer; Povidone; Tablets

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