

## Synthesis and Characterization of Two Impurities in (S)-Pantoprazole as a Chiral Proton Pump Inhibitor

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**SUMMARY.** (S)-Pantoprazole is one of the proton pump inhibitors (PPIs) used for the clinical treatment of gastric ulcer, duodenal ulcer, reflux esophagitis and peptic system diseases. As known the study in impurities of (S)-pantoprazole provides a reliable methodology for the improvement of synthetic process and quality of drugs. The synthesis and characterization of two impurities in (S)-pantoprazole were described in this article. All of the two impurities are known as 5-(difluoromethoxy)-1-[(3,4-dimethoxy-pyridin-2-yl)methyl]-2-[[3,4-dimethoxy-pyridin-2-yl)methyl]thio}-1*H*-benzo[d]imidazole (impurity-1), 5-(difluoromethoxy)-1-[(3,4-dimethoxy-pyridin-2-yl)methyl]-2-[[3,4-dimethoxy-pyridin-2-yl)methyl]sulfinyl}-1*H*-benzo[d]imidazole (impurity-2), whose structures are confirmed by MS, IR, <sup>1</sup>H-NMR and elemental analyses, and the corresponding purities are above 99% by HPLC analysis, which means the target compounds can be used as the reference substances in (S)-pantoprazole research and quality control.

**RESUMEN.** (S)-pantoprazol es uno de los inhibidores de la bomba de protones (IBP) utilizados para el tratamiento clínico de la úlcera gástrica, la úlcera duodenal, la esofagitis por reflujo y las enfermedades del sistema péptico. Como es sabido, el estudio sobre las impurezas del (S)-pantoprazol proporciona una metodología confiable para mejorar el proceso sintético y la calidad de los medicamentos. La síntesis y caracterización de dos impurezas en (S)-pantoprazol se describen en este artículo. Las dos impurezas son 5-(difluorometoxi)-1-[(3,4-dimetoxipiridin-2-il)metil]-2-[[3,4-dimetoxipiridin-2-il)metil]tio}-1*H*-benzo[d]imidazol (impureza-1) y 5-(difluorometoxi)-1-[(3,4-dimetoxipiridin-2-il)metil]-2-[[3,4-dimetoxipiridin-2-yl)metil]sulfinil}-1*H*-benzo[d]imidazol (impureza-2), cuyas estructuras se confirmaron mediante MS, IR, <sup>1</sup>H-RMN y análisis elementales. Las purezas correspondientes están por encima del 99% por análisis de HPLC, lo que significa los compuestos diana se pueden usar como las sustancias de referencia en la investigación de (S)-pantoprazol y el control de calidad.

**KEY WORDS:** characterization, impurity, proton pump inhibitor, (S)-pantoprazole, synthesis.

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