

Highlights

- **Extensive data on TMP from research studies and approved medical use in Asia**
- **TMP coforms with CBD to form a stable cocrystal known as ART12.11**
- **Artelo has intellectual property protection for ART12.11 through 2038**

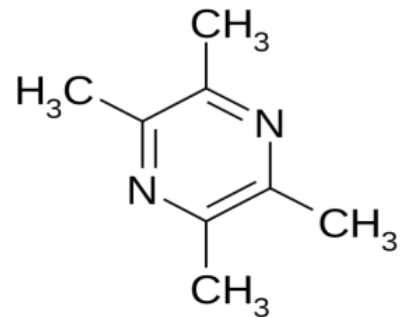
TMP

Artelo's patented, novel, cocrystal, solid form of CBD (cannabidiol), known as ART12.11, uses TMP (tetramethylpyrazine) as the cofomer (to form the cocrystal). TMP (also called ligustrazine) is a plant-derived compound that is widely used in Chinese medicine. TMP is also used as a food flavoring with the taste profile of cocoa, coffee, mocha, and roast. The European Food Safety Authority considers TMP safe when used according to its approved application as a food flavor enhancer.

Scientists at Artelo believe TMP is the optimal conformer for a CBD cocrystal

Facts supporting the use of TMP in the CBD Cocrystal ART12.11

- The alkaloid TMP is the active ingredient in the ligusticum species (Umbelliferae) which has been widely used in traditional medicine in China
- TMP has been used for the prevention and treatment of cardiovascular diseases for more than 30 years (Guo et al., 2016)
- Additional potential therapeutic benefits include neuroprotection, anti-alzheimer's, anxiolytic, liver damage protection and anti-cancer effects (Donkor et al., 2016; Zou et al., 2019)
- TMP has a favorable safety profile: LD₅₀ 1910 mg/kg



TMP Structure

References

- Guo et al., 2016: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4893570/>
- Donkor et al., 2016: <https://www.ncbi.nlm.nih.gov/pubmed/27729283>
- Zou et al., 2019: <https://www.ncbi.nlm.nih.gov/pubmed/31293426>
- Reference to LD50 in this report:
http://www.efsa.europa.eu/sites/default/files/scientific_output/files/main_documents/295.pdf