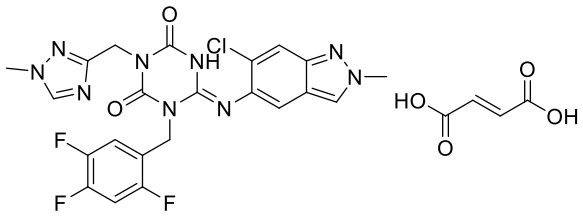
Product data sheet

MedKoo Cat#: 333079 Name: Ensitrelvir fumarate CAS#: 2757470-18-9 (fumarate) Chemical Formula: $C_{26}H_{21}ClF_3N_9O_6$ Molecular Weight: 647.9562	
Product supplied as:	Powder
Purity (by HPLC):	≥ 98%
Shipping conditions	Ambient temperature
Storage conditions:	Powder: -20°C 3 years; 4°C 2 years.
	In solvent: -80°C 3 months; -20°C 2 weeks.

1. Product description:

Ensitrelvir, also known as S-217622, is an antiviral drug developed by Shionogi in partnership with Hokkaido University, which acts as an orally active 3C-like protease inhibitor for the treatment of COVID-19 infection. It is taken by mouth, and has been successfully tested against the recently emerged Omicron variant. It is the first orally active non-covalent, non-peptidic, SARS-CoV-2 3CL protease inhibitor (IC50=13 nM). It became the first Japanese domestic pill to treat COVID-19, third to be regulatorally approved in Japan; in February 2022.

2. CoA, QC data, SDS, and handling instruction

SDS and handling instruction, CoA with copies of QC data (NMR, HPLC and MS analytical spectra) can be downloaded from the product web page under "QC And Documents" section. Note: copies of analytical spectra may not be available if the product is being supplied by MedKoo partners. Whether the product was made by MedKoo or provided by its partners, the quality is 100% guaranteed.

3. Solubility data

Solvent	Max Conc. mg/mL	Max Conc. mM
DMSO	TBD	TBD

4. Stock solution preparation table:

Concentration / Solvent Volume / Mass	**1 mg**	**5 mg**	**10 mg**
1 mM	1.54 mL	7.72 mL	15.43 mL
5 mM	0.31 mL	1.54 mL	3.09 mL
10 mM	0.15 mL	0.77 mL	1.54 mL
50 mM	0.03 mL	0.15 mL	0.31 mL

5. Molarity Calculator, Reconstitution Calculator, Dilution Calculator

Please refer the product web page under section of "Calculator"

6. Recommended literature which reported protocols for in vitro and in vivo study

In vitro study

1. Unoh Y, Uehara S, Nakahara K, Nobori H, Yamatsu Y, Yamamoto S, Maruyama Y, Taoda Y, Kasamatsu K, Suto T, Kouki K, Nakahashi A, Kawashima S, Sanaki T, Toba S, Uemura K, Mizutare T, Ando S, Sasaki M, Orba Y, Sawa H, Sato A, Sato T, Kato T, Tachibana Y. Discovery of S-217622, a Noncovalent Oral SARS-CoV-2 3CL Protease Inhibitor Clinical Candidate for Treating COVID-19. J Med Chem. 2022 May 12;65(9):6499-6512. doi: 10.1021/acs.jmedchem.2c00117. Epub 2022 Mar 30. PMID: 35352927; PMCID: PMC8982737.

2. McKimm-Breschkin JL, Hay AJ, Cao B, Cox RJ, Dunning J, Moen AC, Olson D, Pizzorno A, Hayden FG. COVID-19, Influenza and RSV: Surveillance-informed prevention and treatment - Meeting report from an isirv-WHO virtual conference. Antiviral Res. 2022 Jan;197:105227. doi: 10.1016/j.antiviral.2021.105227. Epub 2021 Dec 18. PMID: 34933044; PMCID: PMC8684224.

In vivo study

1. Kawaoka Y, Uraki R, Kiso M, Iida S, Imai M, Takashita E, Kuroda M, Halfmann P, Loeber S, Maemura T, Yamayoshi S, Fujisaki S, Wang Z, Ito M, Ujie M, Iwatsuki-Horimoto K, Furusawa Y, Wright R, Chong Z, Ozono S, Yasuhara A, Ueki H, Sakai Y, Li R, Liu Y, Larson D, Koga M, Tsutsumi T, Adachi E, Saito M, Yamamoto S, Matsubara S, Hagihara M, Mitamura K, Sato T, Hojo M, Hattori SI, Maeda K, Okuda M, Murakami J, Duong C, Godbole S, Douek D, Watanabe S, Ohmagari N, Yotsuyanagi H, Diamond M, Hasegawa H, Mitsuya H, Suzuki T. Characterization and antiviral susceptibility of SARS-CoV-2 Omicron/BA.2. Res Sq [Preprint].

Product data sheet

2022 Feb 24:rs.3.rs-1375091. doi: 10.21203/rs.3.rs-1375091/v1. PMID: 35233565; PMCID: PMC8887076.
2. Unoh Y, Uehara S, Nakahara K, Nobori H, Yamatsu Y, Yamamoto S, Maruyama Y, Taoda Y, Kasamatsu K, Suto T, Kouki K, Nakahashi A, Kawashima S, Sanaki T, Toba S, Uemura K, Mizutare T, Ando S, Sasaki M, Orba Y, Sawa H, Sato A, Sato T, Kato T, Tachibana Y. Discovery of S-217622, a Noncovalent Oral SARS-CoV-2 3CL Protease Inhibitor Clinical Candidate for Treating COVID-19. J Med Chem. 2022 May 12;65(9):6499-6512. doi: 10.1021/acs.jmedchem.2c00117. Epub 2022 Mar 30. PMID: 35352927; PMCID: PMC8982737.

7. Bioactivity

Biological target:

Ensitrelvir (S-217622) fumarate is an active non-covalent, non-peptidic, SARS-CoV-2 3CL protease inhibitor (IC50=13 nM).

In vitro activity

The antiviral activities were evaluated as per their inhibitory ability of the cytopathic effects elicited in SARS-CoV-2-infected VeroE6/TMPRSS2 cells. S-217622 exhibited similar antiviral activities against all tested SARS-CoV-2 variants, including the Omicron strain, which is responsible for the current wave of the pandemic, indicating its potential broad usability as a therapeutic agent for treating COVID-19 (half-maximal effective concentration [EC50] = 0.29–0.50 μM. Antiviral activity of S-217622 against SARS-CoV (EC50 = 0.21 μM). was also comparable to that against SARS-CoV-2, where the sequence homology of 3CLpro between SARS-CoV-2 and SARS-CoV was well-conserved. S-217622 also exhibited potent antiviral activity against MERS-CoV (EC50 = 1.4 μM), HCoV-OC43 (EC90 = 0.074 μM), and HCoV-229E (EC50 = 5.5 μM). S-217622 showed no inhibitory activity against host-cell proteases, such as caspase-2, chymotrypsin, cathepsin B/D/G/L, and thrombin at up to 100 μM, suggesting its high selectivity for coronavirus proteases. S-217622 exhibited no safety concerns in vitro in studies involving ether-a-go-go-related gene inhibition, mutagenicity/clastogenicity, and phototoxicity.

Reference: J Med Chem. 2022 May 12;65(9):6499-6512. https://pubmed.ncbi.nlm.nih.gov/35352927/

In vivo activity

The antiviral efficacy of S-217622 was evaluated in vivo in mice infected with SARS-CoV-2 Gamma strain. Five-week-old BALB/c mice were intranasally inoculated with SARS-CoV-2 Gamma strain (hCoV-19/Japan/TY7-501/2021), and S-217622 was administered orally as a 0.5% methylcellulose suspension immediately and 12 hours after infection. S-217622 treatment reduced the intrapulmonary viral titers dose-dependently. The mean viral titer was significantly lower in the S-217622 treatment groups than in the vehicle treatment group (2 mg/kg vs vehicle, $p = 0.0289$; 8, 16, and 32 mg/kg vs vehicle, $p < 0.0001$). Viral titers reached near the lower limit of quantification (1.80 – log10 50% tissue culture infectious dose [TCID50]/mL) at 16 and 32 mg/kg in the S-217622 treatment group. Although twice-daily treatment was applied in this mouse model, a once-daily treatment model could be applicable in clinical treatment because S-217622 showed a much lower clearance and longer elimination half-lives in nonrodents than in rodents.

Reference: J Med Chem. 2022 May 12;65(9):6499-6512. https://pubmed.ncbi.nlm.nih.gov/35352927/