



Full wwPDB X-ray Structure Validation Report ⓘ

May 29, 2024 – 05:40 PM EDT

PDB ID : 1BTP
Title : UNIQUE BINDING OF A NOVEL SYNTHETIC INHIBITOR, N-[3-[4-[4-(A
MIDINOPHENOXY)-CARBONYL]PHENYL]-2-METHYL-2-PROPENOY
L]-N-ALLYLGLYCINE METHANESULFONATE TO BOVINE TRYPSIN,
REVEALED BY THE CRYSTAL STRUCTURE OF THE COMPLEX
Authors : Odagaki, Y.; Nakai, H.; Senokuchi, K.; Kawamura, M.; Hamanaka, N.; Naka-
mura, M.; Tomoo, K.; Ishida, T.
Deposited on : 1995-08-11
Resolution : 2.20 Å(reported)

This is a Full wwPDB X-ray Structure Validation Report for a publicly released PDB entry.

We welcome your comments at validation@mail.wwpdb.org

A user guide is available at

<https://www.wwpdb.org/validation/2017/XrayValidationReportHelp>

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

<http://www.wwpdb.org/validation/2017/FAQs#types>.

The following versions of software and data (see [references ⓘ](#)) were used in the production of this report:

MolProbity : 4.02b-467
Xtrriage (Phenix) : 1.13
EDS : 2.36.2
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)
Rfmac : 5.8.0158
CCP4 : 7.0.044 (Gargrove)
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.36.2

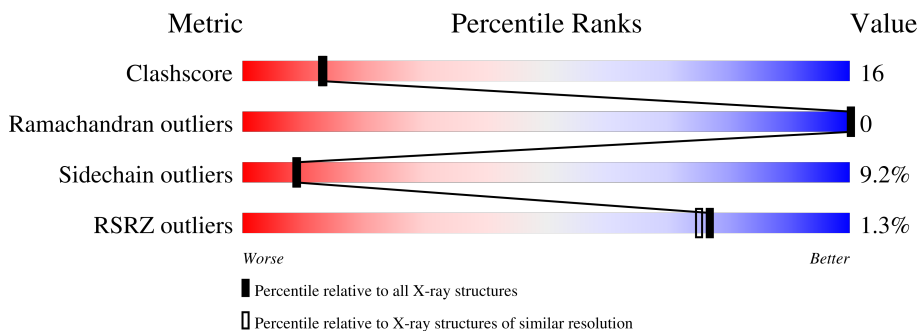
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.20 Å.

Percentile scores (ranging between 0-100) for global validation metrics of the entry are shown in the following graphic. The table shows the number of entries on which the scores are based.



Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
Clashscore	141614	5594 (2.20-2.20)
Ramachandran outliers	138981	5503 (2.20-2.20)
Sidechain outliers	138945	5504 (2.20-2.20)
RSRZ outliers	127900	4800 (2.20-2.20)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments of the lower bar indicate the fraction of residues that contain outliers for ≥ 3 , 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions $\leq 5\%$. The upper red bar (where present) indicates the fraction of residues that have poor fit to the electron density. The numeric value is given above the bar.

Mol	Chain	Length	Quality of chain
1	A	229	

2 Entry composition

There are 3 unique types of molecules in this entry. The entry contains 1759 atoms, of which 0 are hydrogens and 0 are deuteriums.

In the tables below, the ZeroOcc column contains the number of atoms modelled with zero occupancy, the AltConf column contains the number of residues with at least one atom in alternate conformation and the Trace column contains the number of residues modelled with at most 2 atoms.

- Molecule 1 is a protein called BETA-TRYPSIN.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	223	1629	1012	279	324	14	0	0	0

- Molecule 2 is CALCIUM ION (three-letter code: CA) (formula: Ca).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	1	Total	Ca	0	0
			1	1		

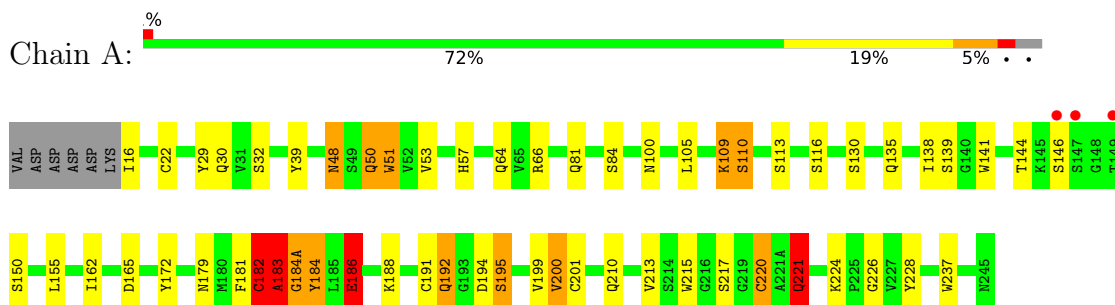
- Molecule 3 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	129	Total	O	0	0
			129	129		

3 Residue-property plots [i](#)

These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron density. Residues are color-coded according to the number of geometric quality criteria for which they contain at least one outlier: green = 0, yellow = 1, orange = 2 and red = 3 or more. A red dot above a residue indicates a poor fit to the electron density ($RSRZ > 2$). Stretches of 2 or more consecutive residues without any outlier are shown as a green connector. Residues present in the sample, but not in the model, are shown in grey.

- Molecule 1: BETA-TRYPSIN



4 Data and refinement statistics i

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	63.74Å 63.08Å 69.38Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	(Not available) – 2.20 44.84 – 2.20	Depositor EDS
% Data completeness (in resolution range)	(Not available) ((Not available)-2.20) 86.5 (44.84-2.20)	Depositor EDS
R_{merge}	0.07	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	3.22 (at 2.20Å)	Xtrriage
Refinement program	X-PLOR 3.1	Depositor
R, R_{free}	0.176 , (Not available) 0.192 , (Not available)	Depositor DCC
R_{free} test set	No test flags present.	wwPDB-VP
Wilson B-factor (Å ²)	18.9	Xtrriage
Anisotropy	0.083	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.32 , 61.5	EDS
L-test for twinning ²	$\langle L \rangle = 0.48$, $\langle L^2 \rangle = 0.31$	Xtrriage
Estimated twinning fraction	0.022 for k,h,-l	Xtrriage
F_o, F_c correlation	0.93	EDS
Total number of atoms	1759	wwPDB-VP
Average B, all atoms (Å ²)	19.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 8.10% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

²Theoretical values of $\langle |L| \rangle$, $\langle L^2 \rangle$ for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

5 Model quality i

5.1 Standard geometry i

Bond lengths and bond angles in the following residue types are not validated in this section: CA

The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 5$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	# Z >5	RMSZ	# Z >5
1	A	1.19	7/1660 (0.4%)	1.66	31/2250 (1.4%)

Chiral center outliers are detected by calculating the chiral volume of a chiral center and verifying if the center is modelled as a planar moiety or with the opposite hand. A planarity outlier is detected by checking planarity of atoms in a peptide group, atoms in a mainchain group or atoms of a sidechain that are expected to be planar.

Mol	Chain	#Chirality outliers	#Planarity outliers
1	A	1	3

All (7) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	182	CYS	C-N	-22.57	0.82	1.34
1	A	186	GLU	C-N	15.15	1.60	1.33
1	A	183	ALA	CA-C	10.91	1.81	1.52
1	A	221	GLN	C-N	-8.06	1.15	1.34
1	A	188	LYS	C-N	-7.78	1.16	1.34
1	A	183	ALA	C-N	6.38	1.44	1.33
1	A	184(A)	GLY	CA-C	-5.56	1.43	1.51

All (31) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	182	CYS	O-C-N	-13.24	101.51	122.70
1	A	220	CYS	O-C-N	11.53	141.14	122.70
1	A	183	ALA	CB-CA-C	11.35	127.13	110.10
1	A	184	TYR	CB-CA-C	10.79	131.97	110.40
1	A	184	TYR	CB-CG-CD2	-9.84	115.10	121.00
1	A	184	TYR	N-CA-CB	9.67	128.01	110.60

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	220	CYS	CA-C-N	-9.57	96.15	117.20
1	A	183	ALA	N-CA-C	-9.07	86.50	111.00
1	A	215	TRP	CD1-CG-CD2	7.96	112.67	106.30
1	A	141	TRP	CD1-CG-CD2	7.85	112.58	106.30
1	A	51	TRP	CD1-CG-CD2	7.54	112.34	106.30
1	A	215	TRP	CE2-CD2-CG	-7.48	101.32	107.30
1	A	51	TRP	CE2-CD2-CG	-7.48	101.32	107.30
1	A	182	CYS	CA-C-N	7.36	133.38	117.20
1	A	237	TRP	CE2-CD2-CG	-7.26	101.49	107.30
1	A	141	TRP	CE2-CD2-CG	-6.91	101.77	107.30
1	A	39	TYR	CB-CG-CD1	-6.91	116.86	121.00
1	A	51	TRP	CG-CD2-CE3	6.66	139.90	133.90
1	A	184(A)	GLY	C-N-CA	6.49	137.91	121.70
1	A	237	TRP	CD1-CG-CD2	6.48	111.49	106.30
1	A	184	TYR	CA-CB-CG	6.04	124.89	113.40
1	A	215	TRP	CG-CD2-CE3	5.90	139.21	133.90
1	A	237	TRP	CG-CD2-CE3	5.86	139.17	133.90
1	A	53	VAL	CG1-CB-CG2	-5.67	101.83	110.90
1	A	184	TYR	CG-CD1-CE1	-5.61	116.81	121.30
1	A	200	VAL	CG1-CB-CG2	-5.58	101.97	110.90
1	A	172	TYR	CB-CG-CD1	-5.56	117.66	121.00
1	A	215	TRP	CB-CG-CD1	-5.51	119.83	127.00
1	A	51	TRP	CB-CG-CD1	-5.38	120.01	127.00
1	A	183	ALA	C-N-CA	5.16	133.14	122.30
1	A	141	TRP	CB-CG-CD1	-5.15	120.31	127.00

All (1) chirality outliers are listed below:

Mol	Chain	Res	Type	Atom
1	A	184	TYR	CA

All (3) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	182	CYS	Mainchain
1	A	183	ALA	Mainchain
1	A	184(A)	GLY	Peptide

5.2 Too-close contacts

In the following table, the Non-H and H(model) columns list the number of non-hydrogen atoms and hydrogen atoms in the chain respectively. The H(added) column lists the number of hydrogen atoms added and optimized by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, whereas Symm-Clashes lists symmetry-related clashes.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	1629	0	1587	47	0
2	A	1	0	0	0	0
3	A	129	0	0	10	0
All	All	1759	0	1587	47	0

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 16.

All (47) close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:183:ALA:CA	1:A:183:ALA:C	1.81	1.47
1:A:182:CYS:O	1:A:183:ALA:N	1.61	1.30
1:A:182:CYS:C	1:A:183:ALA:CA	2.15	1.14
1:A:182:CYS:CA	1:A:183:ALA:N	2.19	1.05
1:A:182:CYS:O	1:A:183:ALA:CA	2.14	0.92
1:A:182:CYS:C	1:A:183:ALA:N	0.82	0.87
1:A:183:ALA:C	1:A:183:ALA:N	2.29	0.84
1:A:162:ILE:HD11	3:A:372:HOH:O	1.81	0.81
1:A:195:SER:HA	1:A:213:VAL:HB	1.70	0.74
1:A:48:ASN:HD22	1:A:50:GLN:H	1.39	0.70
1:A:32:SER:HA	3:A:369:HOH:O	1.90	0.70
1:A:64:GLN:HE22	1:A:66:ARG:HH21	1.40	0.68
1:A:201:CYS:SG	3:A:372:HOH:O	2.54	0.65
1:A:64:GLN:HE21	1:A:66:ARG:HE	1.42	0.65
1:A:186:GLU:OE1	3:A:306:HOH:O	2.14	0.64
1:A:81:GLN:HE22	1:A:113:SER:H	1.48	0.62
1:A:64:GLN:NE2	1:A:66:ARG:HE	2.03	0.56
1:A:48:ASN:ND2	1:A:50:GLN:H	2.04	0.54
1:A:64:GLN:NE2	1:A:66:ARG:HH21	2.03	0.54
1:A:16:ILE:N	3:A:315:HOH:O	2.42	0.52
1:A:100:ASN:HD21	1:A:179:ASN:HD22	1.58	0.51
1:A:221:GLN:HB2	3:A:346:HOH:O	2.11	0.50
1:A:110:SER:HB2	3:A:284:HOH:O	2.10	0.50
1:A:48:ASN:HD22	1:A:50:GLN:N	2.10	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:221:GLN:HB3	1:A:224:LYS:HB2	1.97	0.47
1:A:138:ILE:HG12	1:A:199:VAL:HG22	1.98	0.46
1:A:16:ILE:O	1:A:144:THR:HA	2.17	0.45
1:A:220:CYS:C	1:A:221:GLN:N	2.70	0.45
1:A:182:CYS:HA	1:A:226:GLY:O	2.17	0.44
1:A:213:VAL:HA	1:A:228:TYR:CD1	2.52	0.44
1:A:81:GLN:NE2	1:A:113:SER:H	2.13	0.43
1:A:22:CYS:SG	1:A:155:LEU:HG	2.59	0.43
1:A:162:ILE:HA	1:A:183:ALA:HA	2.00	0.43
1:A:181:PHE:HE1	1:A:183:ALA:HB2	1.84	0.43
1:A:29:TYR:CZ	1:A:200:VAL:HG21	2.54	0.43
1:A:135:GLN:HB2	3:A:270:HOH:O	2.19	0.43
1:A:224:LYS:HA	1:A:224:LYS:HD3	1.83	0.42
1:A:57:HIS:HD2	3:A:271:HOH:O	2.02	0.42
1:A:30:GLN:NE2	1:A:139:SER:OG	2.54	0.41
1:A:192:GLN:H	1:A:192:GLN:HG3	1.66	0.41
1:A:135:GLN:NE2	3:A:270:HOH:O	2.54	0.41
1:A:81:GLN:HE22	1:A:113:SER:N	2.16	0.41
1:A:48:ASN:HD22	1:A:48:ASN:C	2.24	0.40
1:A:84:SER:HB2	1:A:109:LYS:HE2	2.03	0.40
1:A:48:ASN:ND2	1:A:51:TRP:N	2.69	0.40
1:A:191:CYS:O	1:A:194:ASP:HB2	2.21	0.40
1:A:183:ALA:HB3	1:A:228:TYR:CE2	2.57	0.40

There are no symmetry-related clashes.

5.3 Torsion angles [i](#)

5.3.1 Protein backbone [i](#)

In the following table, the Percentiles column shows the percent Ramachandran outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the backbone conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles
1	A	221/229 (96%)	209 (95%)	12 (5%)	0	100 100

There are no Ramachandran outliers to report.

5.3.2 Protein sidechains [i](#)

In the following table, the Percentiles column shows the percent sidechain outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the sidechain conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles
1	A	184/190 (97%)	167 (91%)	17 (9%)	9 9

All (17) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	48	ASN
1	A	50	GLN
1	A	105	LEU
1	A	109	LYS
1	A	110	SER
1	A	116	SER
1	A	130	SER
1	A	146	SER
1	A	150	SER
1	A	165	ASP
1	A	184	TYR
1	A	186	GLU
1	A	192	GLN
1	A	195	SER
1	A	210	GLN
1	A	217	SER
1	A	221	GLN

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (8) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	30	GLN
1	A	48	ASN
1	A	50	GLN
1	A	64	GLN
1	A	81	GLN
1	A	100	ASN
1	A	135	GLN
1	A	221	GLN

5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

5.4 Non-standard residues in protein, DNA, RNA chains [i](#)

There are no non-standard protein/DNA/RNA residues in this entry.

5.5 Carbohydrates [i](#)

There are no monosaccharides in this entry.

5.6 Ligand geometry [i](#)

Of 1 ligands modelled in this entry, 1 is monoatomic - leaving 0 for Mogul analysis.

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

No monomer is involved in short contacts.

5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues [i](#)

The following chains have linkage breaks:

Mol	Chain	Number of breaks
1	A	3

All chain breaks are listed below:

Model	Chain	Residue-1	Atom-1	Residue-2	Atom-2	Distance (Å)
1	A	188:LYS	C	189:ASP	N	1.16
1	A	221:GLN	C	222:LYS	N	1.15

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Model	Chain	Residue-1	Atom-1	Residue-2	Atom-2	Distance (Å)
1	A	182:CYS	C	183:ALA	N	0.82

6 Fit of model and data [i](#)

6.1 Protein, DNA and RNA chains [i](#)

In the following table, the column labelled '#RSRZ > 2' contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 95th percentile and maximum values of the occupancy-weighted average B-factor per residue. The column labelled 'Q < 0.9' lists the number of (and percentage) of residues with an average occupancy less than 0.9.

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å ²)	Q<0.9
1	A	223/229 (97%)	-0.36	3 (1%) 77 75	6, 16, 32, 51	0

All (3) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	149	THR	3.4
1	A	147	SER	2.9
1	A	146	SER	2.6

6.2 Non-standard residues in protein, DNA, RNA chains [i](#)

There are no non-standard protein/DNA/RNA residues in this entry.

6.3 Carbohydrates [i](#)

There are no monosaccharides in this entry.

6.4 Ligands [i](#)

In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q < 0.9' lists the number of atoms with occupancy less than 0.9.

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
2	CA	A	2	1/1	0.86	0.19	2,2,2,2	0

6.5 Other polymers [i](#)

There are no such residues in this entry.