



# Full wwPDB X-ray Structure Validation Report ⓘ

Nov 2, 2024 – 01:31 PM EDT

PDB ID : 2TRM  
Title : THE THREE-DIMENSIONAL STRUCTURE OF ASN102 MUTANT OF TRYPSIN. ROLE OF ASP102 IN SERINE PROTEASE CATALYSIS  
Authors : Stroud, R.M.; Finer-Moore, J.  
Deposited on : 1988-04-25  
Resolution : 2.80 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](mailto: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>.

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

MolProbity : 4.02b-467  
Mogul : 2022.3.0, CSD as543be (2022)  
Xtrriage (Phenix) : **NOT EXECUTED**  
EDS : **NOT EXECUTED**  
Percentile statistics : 20231227.v01 (using entries in the PDB archive December 27th 2023)  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.39

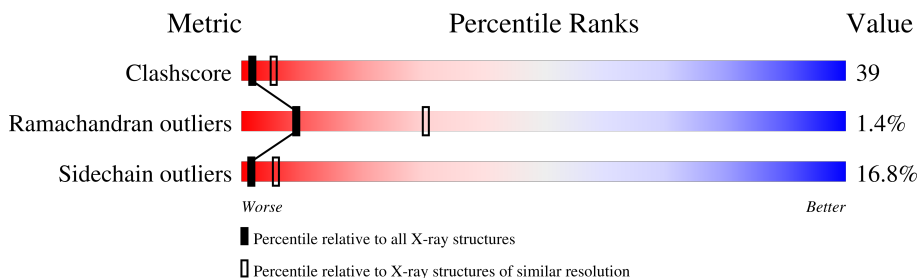
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 2.80 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	180529	4123 (2.80-2.80)
Ramachandran outliers	177936	4071 (2.80-2.80)
Sidechain outliers	177891	4073 (2.80-2.80)

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  $\geq 3$ , 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  $\leq 5\%$ .

Note EDS was not executed.

Mol	Chain	Length	Quality of chain
1	A	223	 33% 48% 17% •

## 2 Entry composition [i](#)

There are 4 unique types of molecules in this entry. The entry contains 1798 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 TRYPSIN.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	223	1666	1041	286	325	14	0	0	0

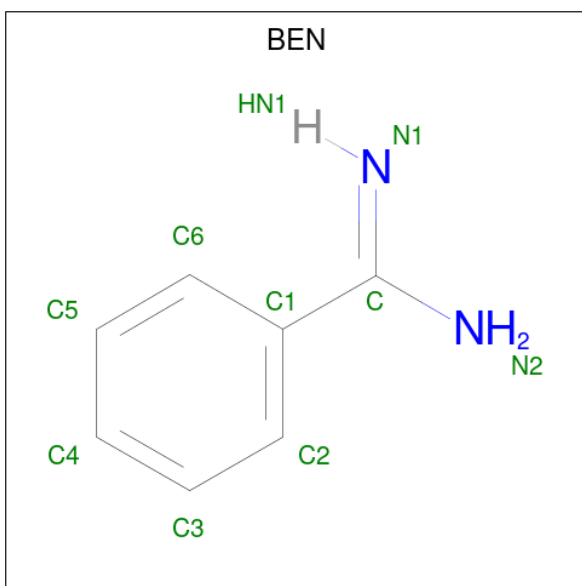
There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	102	ASN	ASP	conflict	UNP P00763

- 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 BENZAMIDINE (three-letter code: BEN) (formula: C<sub>7</sub>H<sub>8</sub>N<sub>2</sub>).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	A	1	Total	C	N	0	0
			9	7	2		

- Molecule 4 is water.

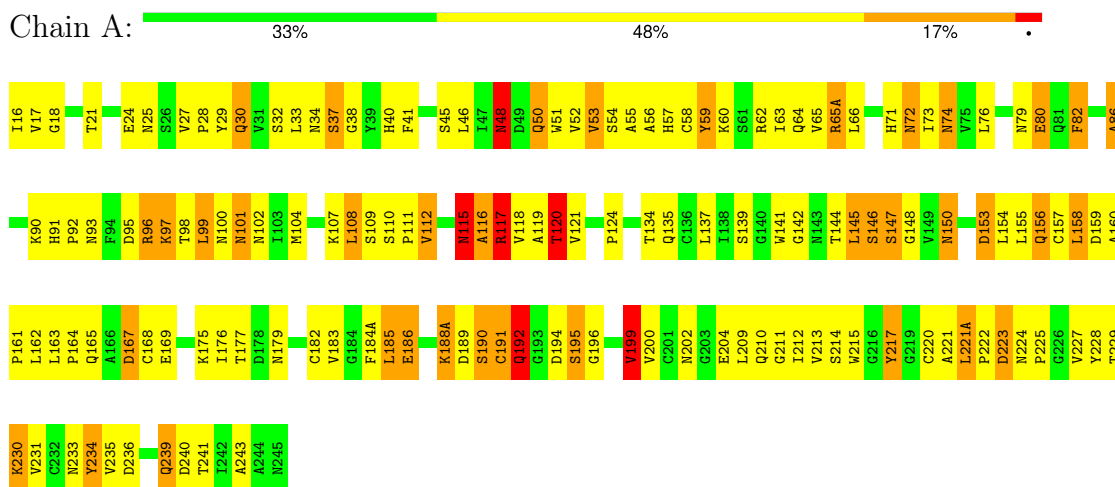
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	122	Total	O	0	0
			122	122		

### 3 Residue-property plots

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. 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. 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.

Note EDS was not executed.

- Molecule 1: TRYPSIN



## 4 Data and refinement statistics

Xtrriage (Phenix) and EDS were not executed - this section is therefore incomplete.

Property	Value	Source
Space group	I 2 3	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	124.38Å 124.38Å 124.38Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	7.00 – 2.80	Depositor
% Data completeness (in resolution range)	(Not available) (7.00-2.80)	Depositor
$R_{merge}$	(Not available)	Depositor
$R_{sym}$	(Not available)	Depositor
Refinement program	PROLSQ	Depositor
R, $R_{free}$	0.157 , (Not available)	Depositor
Estimated twinning fraction	No twinning to report.	Xtrriage
Total number of atoms	1798	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	9.0	wwPDB-VP

## 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: BEN, 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	0.77	0/1701	2.02	54/2318 (2.3%)

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	0	1

There are no bond length outliers.

All (54) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	62	ARG	NE-CZ-NH1	13.89	127.25	120.30
1	A	117	ARG	NE-CZ-NH1	12.08	126.34	120.30
1	A	96	ARG	CD-NE-CZ	10.21	137.89	123.60
1	A	199	VAL	CB-CA-C	9.02	128.54	111.40
1	A	96	ARG	NE-CZ-NH1	8.56	124.58	120.30
1	A	95	ASP	CB-CG-OD2	-8.48	110.66	118.30
1	A	182	CYS	CA-CB-SG	8.04	128.47	114.00
1	A	185	LEU	CB-CA-C	8.01	125.42	110.20
1	A	153	ASP	CB-CG-OD2	-7.85	111.24	118.30
1	A	95	ASP	CB-CG-OD1	7.78	125.30	118.30
1	A	117	ARG	N-CA-CB	7.18	123.52	110.60
1	A	117	ARG	NE-CZ-NH2	-7.03	116.79	120.30
1	A	115	ASN	CB-CA-C	6.89	124.17	110.40
1	A	156	GLN	CA-CB-CG	-6.82	98.40	113.40
1	A	148	GLY	N-CA-C	-6.40	97.10	113.10
1	A	62	ARG	NE-CZ-NH2	-6.40	117.10	120.30

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	120	THR	N-CA-CB	-6.29	98.34	110.30
1	A	240	ASP	CB-CA-C	6.17	122.74	110.40
1	A	217	TYR	CB-CG-CD1	6.15	124.69	121.00
1	A	190	SER	CB-CA-C	6.15	121.78	110.10
1	A	53	VAL	CA-CB-CG1	6.09	120.04	110.90
1	A	65(A)	ARG	NE-CZ-NH2	-6.06	117.27	120.30
1	A	86	ALA	CB-CA-C	6.02	119.13	110.10
1	A	116	ALA	CB-CA-C	5.86	118.89	110.10
1	A	30	GLN	CA-CB-CG	5.81	126.18	113.40
1	A	185	LEU	N-CA-CB	-5.78	98.84	110.40
1	A	108	LEU	CA-CB-CG	5.78	128.58	115.30
1	A	223	ASP	CB-CG-OD2	-5.77	113.11	118.30
1	A	230	LYS	N-CA-CB	-5.71	100.32	110.60
1	A	96	ARG	CG-CD-NE	5.70	123.78	111.80
1	A	71	HIS	N-CA-CB	5.58	120.65	110.60
1	A	135	GLN	N-CA-CB	5.58	120.64	110.60
1	A	192	GLN	CB-CA-C	5.56	121.53	110.40
1	A	30	GLN	CB-CG-CD	5.56	126.06	111.60
1	A	135	GLN	CB-CG-CD	5.55	126.02	111.60
1	A	48	ASN	N-CA-CB	5.53	120.56	110.60
1	A	97	LYS	N-CA-CB	5.53	120.56	110.60
1	A	234	TYR	N-CA-C	5.50	125.85	111.00
1	A	167	ASP	CB-CG-OD2	-5.44	113.41	118.30
1	A	157	CYS	O-C-N	5.44	131.40	122.70
1	A	182	CYS	N-CA-CB	5.39	120.31	110.60
1	A	118	VAL	CA-CB-CG2	5.33	118.90	110.90
1	A	221(A)	LEU	CA-CB-CG	5.31	127.51	115.30
1	A	147	SER	N-CA-CB	5.31	118.46	110.50
1	A	236	ASP	CB-CG-OD2	-5.23	113.59	118.30
1	A	185	LEU	CB-CG-CD2	-5.22	102.12	111.00
1	A	117	ARG	CA-CB-CG	5.16	124.75	113.40
1	A	202	ASN	CA-CB-CG	-5.12	102.15	113.40
1	A	82	PHE	CB-CG-CD2	5.08	124.36	120.80
1	A	59	TYR	CB-CG-CD2	-5.06	117.97	121.00
1	A	74	ASN	CA-CB-CG	-5.05	102.29	113.40
1	A	80	GLU	CB-CA-C	-5.05	100.31	110.40
1	A	82	PHE	CB-CG-CD1	-5.04	117.27	120.80
1	A	199	VAL	N-CA-C	-5.03	97.41	111.00

There are no chirality outliers.

All (1) planarity outliers are listed below:



Mol	Chain	Res	Type	Group
1	A	117	ARG	Sidechain

## 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	1666	0	1605	129	0
2	A	1	0	0	0	0
3	A	9	0	7	3	0
4	A	122	0	0	7	0
All	All	1798	0	1612	129	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 39.

All (129) 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:79:ASN:HB3	1:A:117:ARG:HG3	1.39	1.02
1:A:214:SER:HG	1:A:215:TRP:HD1	1.10	0.99
1:A:115:ASN:HD22	1:A:116:ALA:H	1.10	0.96
1:A:72:ASN:ND2	1:A:74:ASN:H	1.82	0.77
1:A:48:ASN:ND2	1:A:51:TRP:HB2	2.01	0.74
1:A:72:ASN:HD22	1:A:74:ASN:H	1.34	0.74
1:A:115:ASN:ND2	1:A:116:ALA:H	1.87	0.72
1:A:192:GLN:HG2	3:A:246:BEN:H4	1.73	0.70
1:A:212:ILE:HD12	1:A:231:VAL:HG22	1.73	0.69
1:A:115:ASN:HD22	1:A:116:ALA:N	1.87	0.69
1:A:86:ALA:HB2	1:A:109:SER:HA	1.74	0.68
1:A:64:GLN:NE2	1:A:65(A):ARG:HE	1.91	0.68
1:A:212:ILE:CD1	1:A:231:VAL:HG22	2.27	0.64
1:A:79:ASN:ND2	1:A:117:ARG:HH11	1.96	0.63
1:A:192:GLN:HG2	3:A:246:BEN:C4	2.28	0.62
1:A:184(A):PHE:HB3	1:A:186:GLU:OE2	2.00	0.62
1:A:99:LEU:O	1:A:102:ASN:HB2	1.99	0.61
1:A:101:ASN:ND2	1:A:234:TYR:OH	2.33	0.61
1:A:46:LEU:HD13	1:A:66:LEU:HD21	1.83	0.61

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:34:ASN:ND2	1:A:38:GLY:H	1.98	0.60
1:A:56:ALA:HB1	1:A:90:LYS:HB3	1.84	0.60
1:A:144:THR:OG1	1:A:150:ASN:ND2	2.34	0.60
1:A:46:LEU:HD22	1:A:66:LEU:CD2	2.31	0.60
1:A:134:THR:O	1:A:161:PRO:HA	2.03	0.59
1:A:27:VAL:HG12	1:A:30:GLN:HB2	1.84	0.58
1:A:72:ASN:HD22	1:A:74:ASN:N	2.01	0.58
1:A:99:LEU:HD13	1:A:102:ASN:ND2	2.19	0.58
1:A:37:SER:HB2	1:A:41:PHE:CD2	2.39	0.58
1:A:141:TRP:CH2	1:A:155:LEU:HD13	2.40	0.57
1:A:32:SER:OG	1:A:40:HIS:HD2	1.88	0.57
1:A:16:ILE:N	4:A:251:HOH:O	2.37	0.56
1:A:79:ASN:HB2	4:A:265:HOH:O	2.05	0.56
1:A:164:PRO:HD2	1:A:167:ASP:OD1	2.05	0.56
1:A:48:ASN:HD21	1:A:51:TRP:HB2	1.67	0.56
1:A:145:LEU:HD22	1:A:150:ASN:CB	2.36	0.56
1:A:64:GLN:NE2	4:A:336:HOH:O	2.39	0.56
1:A:79:ASN:CG	1:A:117:ARG:HH11	2.09	0.56
1:A:165:GLN:O	1:A:169:GLU:HG3	2.07	0.55
1:A:64:GLN:HE21	1:A:65(A):ARG:HE	1.54	0.55
1:A:233:ASN:ND2	4:A:286:HOH:O	2.39	0.55
1:A:145:LEU:HD22	1:A:150:ASN:HB3	1.88	0.55
1:A:51:TRP:CH2	1:A:107:LYS:HB2	2.42	0.55
1:A:124:PRO:HD3	1:A:209:LEU:O	2.06	0.54
1:A:79:ASN:OD1	1:A:117:ARG:HD3	2.08	0.54
1:A:37:SER:OG	1:A:60:LYS:HD3	2.07	0.54
1:A:210:GLN:NE2	1:A:210:GLN:HA	2.23	0.54
1:A:195:SER:HA	1:A:213:VAL:HB	1.89	0.54
1:A:115:ASN:ND2	1:A:116:ALA:N	2.50	0.54
1:A:33:LEU:HD22	1:A:65:VAL:HG22	1.90	0.54
1:A:65(A):ARG:NH1	4:A:308:HOH:O	2.34	0.53
1:A:46:LEU:HD21	1:A:112:VAL:HG21	1.91	0.53
1:A:93:ASN:HB2	1:A:101:ASN:OD1	2.09	0.52
1:A:141:TRP:CZ2	1:A:155:LEU:HD13	2.45	0.52
1:A:100:ASN:CG	1:A:177:THR:HG21	2.29	0.52
1:A:52:VAL:HG23	1:A:108:LEU:HD21	1.90	0.52
1:A:243:ALA:HB3	4:A:313:HOH:O	2.08	0.52
1:A:54:SER:HB3	1:A:104:MET:HE2	1.92	0.52
1:A:86:ALA:HB2	1:A:109:SER:CA	2.40	0.52
1:A:220:CYS:O	1:A:221:ALA:HB3	2.10	0.51
1:A:79:ASN:ND2	1:A:117:ARG:NH1	2.58	0.51

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:222:PRO:O	1:A:223:ASP:HB2	2.11	0.51
1:A:79:ASN:CG	1:A:117:ARG:HD3	2.31	0.51
1:A:21:THR:HG21	1:A:154:LEU:HD12	1.92	0.51
1:A:189:ASP:OD2	1:A:190:SER:N	2.39	0.50
1:A:100:ASN:O	1:A:101:ASN:HB2	2.12	0.50
1:A:50:GLN:CD	1:A:111:PRO:HG3	2.32	0.50
1:A:29:TYR:HA	1:A:119:ALA:O	2.11	0.50
1:A:209:LEU:HD23	1:A:231:VAL:HG11	1.95	0.49
1:A:37:SER:HB2	1:A:41:PHE:CE2	2.49	0.48
1:A:57:HIS:CD2	1:A:57:HIS:O	2.66	0.48
1:A:46:LEU:O	1:A:120:THR:HA	2.13	0.48
1:A:48:ASN:HD21	1:A:51:TRP:CB	2.26	0.48
1:A:159:ASP:O	1:A:160:ALA:HB2	2.13	0.48
1:A:65:VAL:HB	1:A:108:LEU:HD11	1.95	0.48
1:A:98:THR:C	1:A:100:ASN:H	2.17	0.47
1:A:217:TYR:HB3	1:A:224:ASN:OD1	2.14	0.47
1:A:52:VAL:HG23	1:A:108:LEU:CD2	2.45	0.47
1:A:200:VAL:HA	1:A:204:GLU:O	2.15	0.47
1:A:162:LEU:HD12	1:A:183:VAL:HG22	1.97	0.46
1:A:101:ASN:HA	1:A:234:TYR:OH	2.15	0.46
1:A:191:CYS:C	3:A:246:BEN:C5	2.84	0.46
1:A:59:TYR:CG	1:A:90:LYS:HE2	2.51	0.46
1:A:72:ASN:ND2	1:A:74:ASN:N	2.58	0.46
1:A:162:LEU:HD12	1:A:183:VAL:CG2	2.46	0.45
1:A:228:TYR:CD2	1:A:228:TYR:N	2.83	0.45
1:A:57:HIS:CE1	1:A:195:SER:HB3	2.52	0.45
1:A:96:ARG:HG3	4:A:258:HOH:O	2.16	0.45
1:A:211:GLY:N	1:A:231:VAL:HG23	2.32	0.45
1:A:27:VAL:CG1	1:A:30:GLN:HB2	2.44	0.45
1:A:72:ASN:HD22	1:A:72:ASN:C	2.19	0.45
1:A:55:ALA:O	1:A:58:CYS:HB2	2.17	0.45
1:A:183:VAL:HB	1:A:228:TYR:CE2	2.52	0.45
1:A:220:CYS:H	1:A:221(A):LEU:HG	1.80	0.45
1:A:163:LEU:HD13	1:A:185:LEU:HD13	2.00	0.44
1:A:175:LYS:HE2	1:A:215:TRP:CZ3	2.53	0.44
1:A:155:LEU:C	1:A:156:GLN:HG2	2.36	0.44
1:A:210:GLN:C	1:A:231:VAL:HG23	2.38	0.44
1:A:80:GLU:HB3	1:A:82:PHE:CE2	2.52	0.44
1:A:73:ILE:HD13	1:A:141:TRP:CE2	2.52	0.44
1:A:158:LEU:CD1	1:A:188(A):LYS:HB3	2.47	0.43
1:A:210:GLN:HA	1:A:210:GLN:HE21	1.82	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:18:GLY:O	1:A:188(A):LYS:HD3	2.18	0.43
1:A:74:ASN:ND2	1:A:153:ASP:OD1	2.42	0.43
1:A:139:SER:HA	1:A:156:GLN:O	2.17	0.43
1:A:158:LEU:HD13	1:A:188(A):LYS:HB3	2.01	0.43
1:A:41:PHE:CE1	1:A:60:LYS:HD2	2.53	0.43
1:A:211:GLY:HA2	1:A:229:THR:O	2.18	0.43
1:A:56:ALA:C	1:A:58:CYS:H	2.21	0.43
1:A:168:CYS:SG	1:A:176:ILE:HD12	2.59	0.42
1:A:50:GLN:HG3	1:A:111:PRO:HA	2.02	0.42
1:A:29:TYR:HB2	1:A:121:VAL:HB	2.01	0.42
1:A:27:VAL:HG13	1:A:29:TYR:CE2	2.55	0.42
1:A:137:LEU:HD12	1:A:137:LEU:HA	1.85	0.42
1:A:24:GLU:O	1:A:25:ASN:HB2	2.20	0.42
1:A:185:LEU:CD1	1:A:225:PRO:HG3	2.50	0.42
1:A:210:GLN:HE21	1:A:210:GLN:CA	2.32	0.42
1:A:86:ALA:HB3	1:A:107:LYS:O	2.20	0.41
1:A:191:CYS:O	1:A:194:ASP:HB2	2.19	0.41
1:A:199:VAL:HG13	1:A:211:GLY:CA	2.49	0.41
1:A:142:GLY:HA3	1:A:194:ASP:OD2	2.20	0.41
1:A:196:GLY:O	1:A:212:ILE:HG23	2.21	0.41
1:A:66:LEU:HD13	1:A:112:VAL:HG11	2.03	0.41
1:A:28:PRO:HB2	1:A:119:ALA:HB3	2.03	0.41
1:A:41:PHE:HZ	1:A:63:ILE:HG12	1.86	0.41
1:A:54:SER:HB3	1:A:104:MET:CE	2.50	0.41
1:A:91:HIS:CG	1:A:92:PRO:HD2	2.56	0.41
1:A:17:VAL:O	1:A:188(A):LYS:HA	2.21	0.41
1:A:51:TRP:CZ3	1:A:107:LYS:HB2	2.55	0.40
1:A:160:ALA:HA	1:A:161:PRO:HD3	1.70	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	221/223 (99%)	192 (87%)	26 (12%)	3 (1%)	9 30

All (3) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	239	GLN
1	A	146	SER
1	A	110	SER

### 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	185/185 (100%)	154 (83%)	31 (17%)	1 6

All (31) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	37	SER
1	A	45	SER
1	A	48	ASN
1	A	50	GLN
1	A	53	VAL
1	A	72	ASN
1	A	76	LEU
1	A	97	LYS
1	A	99	LEU
1	A	101	ASN
1	A	112	VAL
1	A	115	ASN
1	A	117	ARG
1	A	120	THR
1	A	145	LEU
1	A	146	SER
1	A	147	SER
1	A	150	ASN

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Mol	Chain	Res	Type
1	A	158	LEU
1	A	179	ASN
1	A	186	GLU
1	A	188(A)	LYS
1	A	191	CYS
1	A	192	GLN
1	A	195	SER
1	A	199	VAL
1	A	227	VAL
1	A	230	LYS
1	A	235	VAL
1	A	239	GLN
1	A	241	THR

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (12) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	34	ASN
1	A	40	HIS
1	A	48	ASN
1	A	64	GLN
1	A	72	ASN
1	A	79	ASN
1	A	93	ASN
1	A	101	ASN
1	A	115	ASN
1	A	150	ASN
1	A	165	GLN
1	A	210	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 oligosaccharides in this entry.

## 5.6 Ligand geometry [i](#)

Of 2 ligands modelled in this entry, 1 is monoatomic - leaving 1 for Mogul analysis.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. 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  $|Z| > 2$  is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
3	BEN	A	246	-	9,9,9	2.19	4 (44%)	7,11,11	2.44	3 (42%)

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
3	BEN	A	246	-	-	2/4/4/4	0/1/1/1

All (4) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	A	246	BEN	C1-C	-3.53	1.40	1.47
3	A	246	BEN	C3-C2	3.01	1.44	1.38
3	A	246	BEN	C6-C1	2.38	1.43	1.39
3	A	246	BEN	C2-C1	-2.08	1.36	1.39

All (3) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	A	246	BEN	C3-C2-C1	-5.10	115.35	120.36
3	A	246	BEN	C5-C4-C3	-2.88	115.92	119.87
3	A	246	BEN	C4-C3-C2	-2.17	117.56	120.24

There are no chirality outliers.

All (2) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	A	246	BEN	N2-C-C1-C2
3	A	246	BEN	N1-C-C1-C6

There are no ring outliers.

1 monomer is involved in 3 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	A	246	BEN	3	0

## 5.7 Other polymers [i](#)

There are no such residues in this entry.

## 5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.



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

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

EDS was not executed - this section is therefore empty.

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

EDS was not executed - this section is therefore empty.

### 6.3 Carbohydrates [i](#)

EDS was not executed - this section is therefore empty.

### 6.4 Ligands [i](#)

EDS was not executed - this section is therefore empty.

### 6.5 Other polymers [i](#)

EDS was not executed - this section is therefore empty.