



# Full wwPDB X-ray Structure Validation Report ⓘ

May 24, 2020 – 11:45 am BST

PDB ID : 1TRM  
Title : THE THREE-DIMENSIONAL STRUCTURE OF ASN102 MUTANT OF TRYPSIN. ROLE OF ASP102 IN SERINE PROTEASE CATALYSIS  
Authors : Sprang, S.; Standing, T.; Fletterick, R.J.  
Deposited on : 1987-10-21  
Resolution : 2.30 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.

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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 : 1.8.5 (274361), CSD as541be (2020)  
Xtrriage (Phenix) : **NOT EXECUTED**  
EDS : **NOT EXECUTED**  
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.11

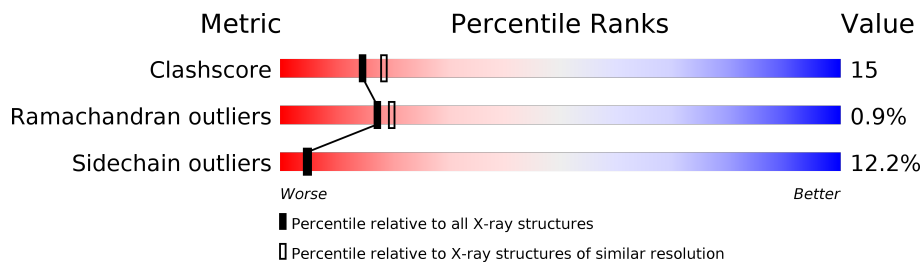
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 2.30 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	5643 (2.30-2.30)
Ramachandran outliers	138981	5575 (2.30-2.30)
Sidechain outliers	138945	5575 (2.30-2.30)

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 on 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	
1	B	223	

The following table lists non-polymeric compounds, carbohydrate monomers and non-standard residues in protein, DNA, RNA chains that are outliers for geometric or electron-density-fit criteria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
3	BEN	B	246	-	X	-	-

## 2 Entry composition

There are 4 unique types of molecules in this entry. The entry contains 3594 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	1672	1045	288	325	14	0	1	0
1	B	223	1672	1045	288	325	14	0	1	0

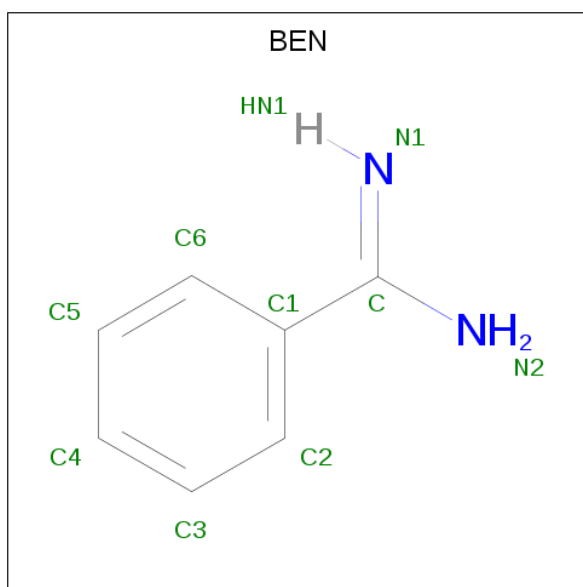
There are 2 discrepancies between the modelled and reference sequences:

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

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

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

- Molecule 4 is water.

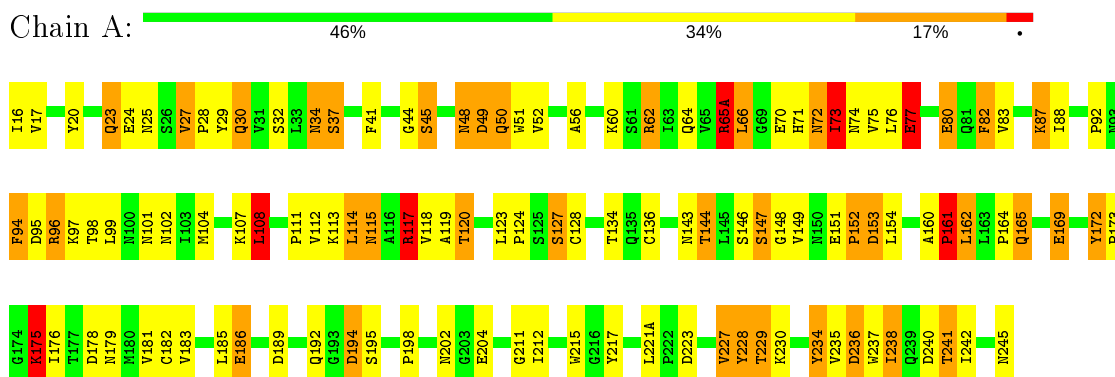
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	A	115	Total O 115 115	0	0
4	B	115	Total O 115 115	0	0

### 3 Residue-property plots [i](#)

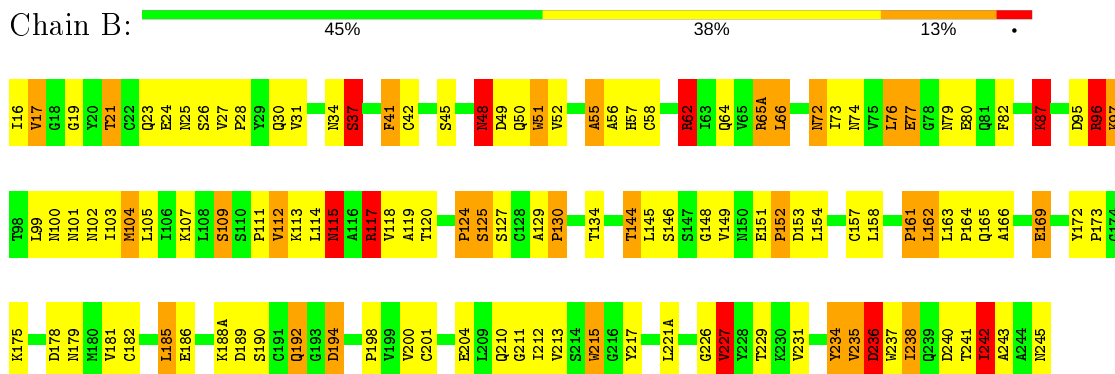
These plots are drawn for all protein, RNA and DNA chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry. Residues are color-coded according 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: TRYP SIN



- Molecule 1: TRYP SIN



## 4 Data and refinement statistics

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

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	40.40 Å 92.00 Å 127.30 Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	6.00 – 2.30	Depositor
% Data completeness (in resolution range)	(Not available) (6.00-2.30)	Depositor
$R_{merge}$	(Not available)	Depositor
$R_{sym}$	(Not available)	Depositor
Refinement program	PROLSQ	Depositor
R, $R_{free}$	0.160 , (Not available)	Depositor
Estimated twinning fraction	No twinning to report.	Xtrriage
Total number of atoms	3594	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	14.0	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: CA, BEN

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	1.58	19/1708 (1.1%)	2.43	97/2328 (4.2%)
1	B	1.58	16/1708 (0.9%)	2.50	119/2328 (5.1%)
All	All	1.58	35/3416 (1.0%)	2.46	216/4656 (4.6%)

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	2	2
1	B	1	7
All	All	3	9

All (35) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	186	GLU	CD-OE2	7.98	1.34	1.25
1	B	186	GLU	CD-OE2	7.38	1.33	1.25
1	B	151	GLU	CD-OE2	7.29	1.33	1.25
1	A	77	GLU	CD-OE2	7.13	1.33	1.25
1	A	161	PRO	N-CD	7.08	1.57	1.47
1	A	51	TRP	CD2-CE2	7.05	1.49	1.41
1	A	45	SER	CB-OG	-6.97	1.33	1.42
1	B	204	GLU	CD-OE2	6.89	1.33	1.25
1	B	161	PRO	N-CD	6.68	1.57	1.47
1	B	245	ASN	C-OXT	6.59	1.35	1.23
1	B	24	GLU	CD-OE2	6.47	1.32	1.25
1	A	70	GLU	CD-OE2	6.44	1.32	1.25
1	B	37	SER	CA-CB	6.35	1.62	1.52
1	B	169	GLU	CD-OE2	6.32	1.32	1.25

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	111	PRO	N-CD	6.26	1.56	1.47
1	A	182	CYS	CB-SG	-6.07	1.72	1.82
1	B	245	ASN	C-O	6.02	1.34	1.23
1	A	24	GLU	CD-OE2	6.00	1.32	1.25
1	A	195	SER	CB-OG	-5.96	1.34	1.42
1	A	151	GLU	CD-OE2	5.95	1.32	1.25
1	A	169	GLU	CD-OE2	5.92	1.32	1.25
1	B	111	PRO	N-CD	5.45	1.55	1.47
1	B	51	TRP	CG-CD1	5.41	1.44	1.36
1	A	148	GLY	N-CA	-5.36	1.38	1.46
1	B	130	PRO	N-CD	5.35	1.55	1.47
1	B	80	GLU	CD-OE2	5.34	1.31	1.25
1	A	127	SER	CA-CB	5.29	1.60	1.52
1	A	245	ASN	C-OXT	5.25	1.33	1.23
1	B	201	CYS	CB-SG	-5.20	1.73	1.81
1	A	204	GLU	CD-OE2	5.18	1.31	1.25
1	A	94	PHE	CG-CD2	5.15	1.46	1.38
1	B	51	TRP	CD2-CE2	5.11	1.47	1.41
1	A	94	PHE	CB-CG	5.08	1.59	1.51
1	B	100	ASN	C-O	5.05	1.32	1.23
1	A	149	VAL	CB-CG1	5.04	1.63	1.52

All (216) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	96	ARG	NE-CZ-NH1	23.69	132.14	120.30
1	A	117	ARG	NE-CZ-NH1	16.61	128.60	120.30
1	A	94	PHE	CB-CG-CD2	-15.69	109.82	120.80
1	A	96	ARG	NE-CZ-NH1	14.22	127.41	120.30
1	A	117	ARG	NE-CZ-NH2	-13.76	113.42	120.30
1	A	95	ASP	CB-CG-OD2	-13.43	106.21	118.30
1	B	117	ARG	NE-CZ-NH2	-13.41	113.59	120.30
1	B	240	ASP	CB-CG-OD1	12.79	129.81	118.30
1	A	189	ASP	CB-CG-OD1	12.60	129.64	118.30
1	B	189	ASP	CB-CG-OD1	11.92	129.03	118.30
1	B	217	TYR	CB-CG-CD2	-11.62	114.03	121.00
1	B	245	ASN	CA-C-O	-11.36	96.25	120.10
1	B	117	ARG	NE-CZ-NH1	11.33	125.96	120.30
1	A	27	VAL	CA-CB-CG2	10.96	127.33	110.90
1	A	104	MET	CA-CB-CG	10.91	131.84	113.30
1	A	95	ASP	CB-CG-OD1	10.62	127.85	118.30
1	B	95	ASP	CB-CG-OD1	10.62	127.85	118.30

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	234	TYR	CB-CG-CD2	-10.50	114.70	121.00
1	B	240	ASP	CB-CG-OD2	-10.21	109.11	118.30
1	B	236	ASP	CB-CG-OD2	-10.21	109.11	118.30
1	B	115	ASN	CB-CG-OD1	10.08	141.76	121.60
1	A	96	ARG	CD-NE-CZ	9.93	137.50	123.60
1	B	235	VAL	O-C-N	-9.71	107.17	122.70
1	B	227	VAL	CA-CB-CG2	9.63	125.35	110.90
1	B	144	THR	CA-CB-CG2	9.61	125.86	112.40
1	B	96	ARG	NE-CZ-NH2	-9.60	115.50	120.30
1	B	185	LEU	CB-CG-CD1	9.38	126.95	111.00
1	B	235	VAL	CA-CB-CG1	-9.25	97.02	110.90
1	B	37	SER	N-CA-CB	-9.15	96.77	110.50
1	A	240	ASP	CB-CG-OD1	9.09	126.48	118.30
1	A	144	THR	CA-CB-CG2	9.01	125.01	112.40
1	B	80	GLU	OE1-CD-OE2	-8.92	112.60	123.30
1	B	235	VAL	CA-C-O	8.89	138.78	120.10
1	A	217	TYR	CB-CG-CD2	-8.87	115.68	121.00
1	B	172	TYR	CB-CG-CD2	-8.86	115.68	121.00
1	A	124	PRO	N-CA-CB	-8.85	92.69	103.30
1	B	227	VAL	CB-CA-C	8.81	128.15	111.40
1	A	236	ASP	CB-CA-C	8.81	128.02	110.40
1	B	62	ARG	NE-CZ-NH1	8.75	124.67	120.30
1	B	112	VAL	CG1-CB-CG2	-8.73	96.93	110.90
1	A	124	PRO	CA-N-CD	8.72	123.91	111.70
1	B	65(A)	ARG	NE-CZ-NH1	8.68	124.64	120.30
1	B	242	ILE	CA-CB-CG1	8.53	127.20	111.00
1	A	77	GLU	CG-CD-OE2	-8.39	101.52	118.30
1	B	241	THR	CA-CB-OG1	-8.37	91.43	109.00
1	B	235	VAL	N-CA-CB	-8.21	93.43	111.50
1	A	181	VAL	CG1-CB-CG2	-8.19	97.79	110.90
1	A	65(A)	ARG	NE-CZ-NH2	-8.14	116.23	120.30
1	A	24	GLU	N-CA-CB	8.11	125.19	110.60
1	A	241	THR	CA-CB-OG1	-7.95	92.30	109.00
1	A	175	LYS	CB-CA-C	7.92	126.25	110.40
1	A	227	VAL	CA-CB-CG2	7.87	122.71	110.90
1	B	178	ASP	CB-CG-OD1	7.83	125.35	118.30
1	B	27	VAL	CA-CB-CG2	7.75	122.52	110.90
1	A	80	GLU	OE1-CD-OE2	-7.71	114.04	123.30
1	B	124	PRO	CB-CA-C	7.69	131.23	112.00
1	A	186	GLU	CA-CB-CG	7.62	130.17	113.40
1	B	235	VAL	CG1-CB-CG2	-7.62	98.71	110.90
1	B	217	TYR	CB-CG-CD1	7.62	125.57	121.00

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	241	THR	OG1-CB-CG2	-7.53	92.67	110.00
1	A	185	LEU	CB-CG-CD1	7.43	123.64	111.00
1	B	82	PHE	CB-CG-CD2	7.31	125.92	120.80
1	B	245	ASN	CB-CA-C	-7.22	95.96	110.40
1	B	96	ARG	NH1-CZ-NH2	-7.19	111.49	119.40
1	B	237	TRP	CB-CG-CD1	7.16	136.30	127.00
1	B	42	CYS	CA-CB-SG	7.08	126.74	114.00
1	B	145	LEU	CB-CG-CD2	7.06	123.00	111.00
1	A	94	PHE	CB-CG-CD1	7.05	125.73	120.80
1	B	24	GLU	N-CA-CB	7.04	123.28	110.60
1	A	62	ARG	NE-CZ-NH2	7.04	123.82	120.30
1	A	217	TYR	CB-CG-CD1	6.95	125.17	121.00
1	B	172	TYR	CB-CG-CD1	6.94	125.16	121.00
1	B	234	TYR	CA-C-O	-6.90	105.61	120.10
1	B	234	TYR	CA-C-N	6.89	132.35	117.20
1	A	194	ASP	CB-CG-OD1	6.86	124.47	118.30
1	B	153	ASP	CB-CG-OD2	-6.83	112.15	118.30
1	A	153	ASP	CB-CG-OD2	-6.79	112.19	118.30
1	B	115	ASN	CB-CA-C	6.77	123.94	110.40
1	A	245	ASN	CA-C-O	-6.74	105.94	120.10
1	A	77	GLU	CG-CD-OE1	6.73	131.76	118.30
1	B	109	SER	CA-CB-OG	-6.72	93.04	111.20
1	B	151	GLU	CG-CD-OE1	6.68	131.66	118.30
1	A	73	ILE	CG1-CB-CG2	6.67	126.08	111.40
1	A	234	TYR	CB-CG-CD1	6.65	124.99	121.00
1	B	237	TRP	CB-CA-C	6.63	123.66	110.40
1	A	60	LYS	N-CA-CB	6.62	122.53	110.60
1	A	73	ILE	CA-CB-CG2	6.55	124.01	110.90
1	B	240	ASP	N-CA-CB	6.51	122.33	110.60
1	A	161	PRO	O-C-N	6.50	133.09	122.70
1	A	45	SER	N-CA-CB	6.43	120.14	110.50
1	A	221(A)	LEU	CB-CG-CD1	-6.43	100.07	111.00
1	B	204	GLU	OE1-CD-OE2	-6.42	115.60	123.30
1	A	202	ASN	C-N-CA	6.41	135.76	122.30
1	A	30	GLN	CA-CB-CG	6.37	127.40	113.40
1	A	223	ASP	CB-CG-OD2	6.36	124.02	118.30
1	B	49	ASP	CB-CG-OD1	6.34	124.00	118.30
1	A	83	VAL	CG1-CB-CG2	-6.33	100.78	110.90
1	B	175	LYS	C-N-CA	6.33	137.51	121.70
1	A	24	GLU	CA-CB-CG	6.32	127.30	113.40
1	B	236	ASP	N-CA-CB	-6.30	99.27	110.60
1	A	102	ASN	CB-CA-C	6.29	122.99	110.40

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	245	ASN	CB-CG-OD1	6.26	134.12	121.60
1	A	235	VAL	CA-CB-CG1	-6.26	101.51	110.90
1	A	236	ASP	C-N-CA	6.25	137.33	121.70
1	A	49	ASP	CB-CG-OD1	6.25	123.92	118.30
1	B	41	PHE	CD1-CE1-CZ	-6.24	112.61	120.10
1	B	80	GLU	CA-CB-CG	6.23	127.10	113.40
1	A	228	TYR	CB-CG-CD2	6.22	124.73	121.00
1	A	127	SER	CB-CA-C	-6.22	98.28	110.10
1	A	23	GLN	CB-CG-CD	6.21	127.76	111.60
1	A	147	SER	O-C-N	-6.21	112.64	123.20
1	A	172	TYR	CB-CG-CD2	-6.19	117.29	121.00
1	A	178	ASP	CB-CG-OD1	6.19	123.87	118.30
1	B	77	GLU	CG-CD-OE1	6.19	130.67	118.30
1	A	176	ILE	CB-CG1-CD1	6.18	131.21	113.90
1	B	190	SER	CB-CA-C	6.15	121.78	110.10
1	B	77	GLU	CG-CD-OE2	-6.09	106.13	118.30
1	B	115	ASN	OD1-CG-ND2	-6.08	107.90	121.90
1	A	96	ARG	N-CA-CB	6.08	121.55	110.60
1	B	234	TYR	CB-CG-CD1	6.05	124.63	121.00
1	A	146	SER	CB-CA-C	6.04	121.57	110.10
1	B	118	VAL	O-C-N	-6.04	113.04	122.70
1	A	82	PHE	CB-CG-CD2	6.03	125.02	120.80
1	B	17	VAL	CA-CB-CG2	6.01	119.92	110.90
1	A	99	LEU	CB-CA-C	6.01	121.61	110.20
1	A	242	ILE	CA-CB-CG1	5.98	122.36	111.00
1	B	118	VAL	CA-C-O	5.98	132.66	120.10
1	B	105	LEU	CB-CG-CD2	5.96	121.14	111.00
1	A	236	ASP	CA-CB-CG	5.96	126.51	113.40
1	A	41	PHE	CD1-CE1-CZ	-5.95	112.96	120.10
1	B	66	LEU	CB-CG-CD1	5.95	121.12	111.00
1	B	231	VAL	CB-CA-C	5.89	122.59	111.40
1	A	124	PRO	CA-CB-CG	5.87	115.94	104.80
1	A	127	SER	C-N-CA	-5.84	107.09	121.70
1	B	166	ALA	N-CA-CB	-5.84	101.92	110.10
1	B	181	VAL	CG1-CB-CG2	-5.84	101.56	110.90
1	A	234	TYR	CB-CG-CD2	-5.81	117.51	121.00
1	B	204	GLU	CA-CB-CG	5.80	126.16	113.40
1	B	37	SER	CA-CB-OG	-5.78	95.60	111.20
1	B	55	ALA	CB-CA-C	5.77	118.76	110.10
1	A	66	LEU	CB-CG-CD1	5.76	120.79	111.00
1	B	194	ASP	CB-CG-OD2	-5.75	113.12	118.30
1	B	104	MET	N-CA-CB	-5.74	100.28	110.60

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	17	VAL	CA-CB-CG2	5.72	119.48	110.90
1	B	125	SER	CA-CB-OG	-5.71	95.78	111.20
1	B	37	SER	CB-CA-C	-5.71	99.25	110.10
1	B	149	VAL	CB-CA-C	5.70	122.23	111.40
1	B	117	ARG	N-CA-CB	5.68	120.82	110.60
1	B	243	ALA	N-CA-CB	5.67	118.04	110.10
1	A	235	VAL	CA-CB-CG2	-5.64	102.44	110.90
1	B	87	LYS	CA-CB-CG	5.63	125.79	113.40
1	A	120	THR	OG1-CB-CG2	5.62	122.92	110.00
1	A	195	SER	C-N-CA	5.61	134.09	122.30
1	B	189	ASP	OD1-CG-OD2	-5.61	112.64	123.30
1	A	108	LEU	CB-CG-CD1	5.60	120.52	111.00
1	B	169	GLU	CB-CG-CD	5.58	129.28	114.20
1	B	37	SER	C-N-CA	5.58	134.01	122.30
1	B	52	VAL	CG1-CB-CG2	-5.57	101.98	110.90
1	B	117	ARG	CA-CB-CG	5.57	125.65	113.40
1	A	37	SER	C-N-CA	5.54	133.94	122.30
1	B	178	ASP	CB-CG-OD2	-5.51	113.34	118.30
1	A	123	LEU	CB-CG-CD2	5.51	120.36	111.00
1	B	221(A)	LEU	CB-CG-CD1	-5.51	101.64	111.00
1	B	96	ARG	CD-NE-CZ	5.48	131.27	123.60
1	A	44	GLY	O-C-N	5.46	131.44	122.70
1	B	56	ALA	N-CA-CB	5.46	117.74	110.10
1	B	48	ASN	N-CA-CB	5.42	120.35	110.60
1	A	178	ASP	CB-CA-C	5.39	121.19	110.40
1	B	130	PRO	N-CD-CG	-5.39	95.11	103.20
1	A	241	THR	O-C-N	5.38	131.31	122.70
1	B	151	GLU	OE1-CD-OE2	-5.37	116.86	123.30
1	B	148	GLY	CA-C-N	-5.36	105.41	117.20
1	A	52	VAL	CG1-CB-CG2	-5.36	102.33	110.90
1	B	76	LEU	CB-CG-CD1	-5.35	101.91	111.00
1	B	56	ALA	CB-CA-C	5.34	118.11	110.10
1	A	34	ASN	CB-CA-C	5.33	121.06	110.40
1	B	76	LEU	CB-CA-C	5.29	120.26	110.20
1	A	165	GLN	CG-CD-OE1	-5.28	111.03	121.60
1	A	186	GLU	CB-CG-CD	5.28	128.45	114.20
1	B	210	GLN	N-CA-CB	-5.27	101.12	110.60
1	A	143	ASN	CA-C-O	5.26	131.16	120.10
1	B	51	TRP	CH2-CZ2-CE2	-5.25	112.15	117.40
1	B	215	TRP	CE3-CZ3-CH2	-5.25	115.43	121.20
1	B	152	PRO	CB-CA-C	-5.23	98.93	112.00
1	A	227	VAL	CA-CB-CG1	5.21	118.72	110.90

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	96	ARG	NH1-CZ-NH2	-5.21	113.67	119.40
1	A	87	LYS	CA-CB-CG	5.21	124.85	113.40
1	B	34	ASN	CB-CA-C	5.20	120.80	110.40
1	A	235	VAL	C-N-CA	5.19	134.68	121.70
1	A	76	LEU	N-CA-CB	5.19	120.78	110.40
1	B	145	LEU	CB-CG-CD1	5.17	119.79	111.00
1	B	120	THR	N-CA-CB	-5.17	100.48	110.30
1	A	228	TYR	CD1-CE1-CZ	-5.16	115.15	119.80
1	B	21	THR	O-C-N	5.15	130.94	122.70
1	B	37	SER	O-C-N	-5.14	114.45	123.20
1	A	237	TRP	NE1-CE2-CZ2	-5.14	124.74	130.40
1	B	99	LEU	CB-CG-CD1	-5.14	102.27	111.00
1	B	200	VAL	CB-CA-C	5.13	121.15	111.40
1	B	237	TRP	NE1-CE2-CZ2	-5.13	124.76	130.40
1	A	241	THR	CA-CB-CG2	-5.12	105.24	112.40
1	B	213	VAL	CG1-CB-CG2	5.11	119.08	110.90
1	B	235	VAL	CA-CB-CG2	-5.11	103.23	110.90
1	A	215	TRP	C-N-CA	5.07	132.95	122.30
1	B	97	LYS	CA-CB-CG	5.06	124.54	113.40
1	A	229	THR	OG1-CB-CG2	-5.06	98.37	110.00
1	A	128	CYS	N-CA-CB	-5.05	101.52	110.60
1	B	124	PRO	CA-C-N	-5.04	106.10	117.20
1	B	173	PRO	CB-CA-C	5.04	124.61	112.00
1	A	41	PHE	CB-CG-CD1	-5.04	117.27	120.80
1	B	21	THR	N-CA-CB	5.04	119.87	110.30
1	B	103	ILE	O-C-N	5.04	130.76	122.70
1	B	30	GLN	N-CA-CB	-5.03	101.54	110.60
1	B	153	ASP	CB-CG-OD1	5.03	122.83	118.30
1	A	147	SER	C-N-CA	5.03	132.85	122.30
1	B	30	GLN	O-C-N	-5.02	114.67	122.70
1	B	231	VAL	CA-CB-CG1	5.01	118.42	110.90

All (3) chirality outliers are listed below:

Mol	Chain	Res	Type	Atom
1	A	120	THR	CB
1	A	175	LYS	CA
1	B	120	THR	CB

All (9) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	114	LEU	Mainchain
1	A	65(A)	ARG	Sidechain
1	B	104	MET	Mainchain
1	B	112	VAL	Mainchain
1	B	117	ARG	Sidechain
1	B	234	TYR	Mainchain
1	B	238	ILE	Mainchain
1	B	62	ARG	Sidechain
1	B	96	ARG	Sidechain

## 5.2 Too-close contacts [\(i\)](#)

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	1672	0	1604	53	8
1	B	1672	0	1605	48	7
2	A	1	0	0	0	0
2	B	1	0	0	0	0
3	A	9	0	7	0	0
3	B	9	0	7	0	0
4	A	115	0	0	5	13
4	B	115	0	0	3	14
All	All	3594	0	3223	101	25

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 15.

All (101) 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:B:72:ASN:HD22	1:B:74:ASN:H	1.13	0.91
1:A:92:PRO:HG2	4:A:281:HOH:O	1.71	0.90
1:B:72:ASN:ND2	1:B:74:ASN:H	1.73	0.86
1:A:64:GLN:NE2	1:A:65(A):ARG:HE	1.87	0.73
1:A:115:ASN:HD22	1:A:117:ARG:H	1.36	0.72
1:A:64:GLN:HE22	1:A:65(A):ARG:HH21	1.37	0.72
1:B:79:ASN:OD1	1:B:117:ARG:HD2	1.92	0.69

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:72:ASN:HD22	1:A:74:ASN:H	1.41	0.69
1:B:144:THR:HG23	1:B:152:PRO:HD3	1.75	0.68
1:B:101:ASN:H	1:B:179:ASN:HD21	1.42	0.67
1:A:165:GLN:HG3	1:A:169:GLU:OE2	1.95	0.67
1:A:30:GLN:HE22	1:A:198:PRO:HD2	1.60	0.66
1:A:64:GLN:HE21	1:A:65(A):ARG:HE	1.43	0.65
1:B:64:GLN:HE22	1:B:65(A):ARG:HH21	1.43	0.65
1:B:28:PRO:HB2	1:B:119:ALA:HB3	1.78	0.65
1:B:87:LYS:HB2	1:B:107:LYS:HB3	1.80	0.63
1:A:72:ASN:ND2	1:A:74:ASN:H	1.97	0.62
1:B:64:GLN:HE21	1:B:65(A):ARG:HE	1.46	0.62
1:B:72:ASN:C	1:B:72:ASN:HD22	2.04	0.61
1:A:212:ILE:HB	1:A:229:THR:HB	1.83	0.61
1:B:215:TRP:NE1	1:B:227:VAL:HG22	2.15	0.60
1:A:28:PRO:HB2	1:A:119:ALA:HB3	1.84	0.59
1:B:48:ASN:HD22	1:B:50:GLN:H	1.50	0.58
1:A:75:VAL:O	1:A:77:GLU:HG3	2.03	0.58
1:A:234:TYR:O	1:A:238:ILE:HG13	2.04	0.58
1:A:165:GLN:O	1:A:169:GLU:HG3	2.03	0.57
1:B:165:GLN:O	1:B:169:GLU:HG3	2.04	0.57
1:B:134:THR:O	1:B:161:PRO:HA	2.04	0.57
1:B:64:GLN:NE2	1:B:65(A):ARG:HE	2.01	0.57
1:B:16:ILE:O	1:B:144:THR:HA	2.05	0.56
1:B:101:ASN:H	1:B:179:ASN:ND2	2.02	0.56
1:A:101:ASN:H	1:A:179:ASN:HD21	1.51	0.56
1:B:64:GLN:HE22	1:B:65(A):ARG:NH2	2.04	0.56
1:A:115:ASN:ND2	1:A:118:VAL:H	2.05	0.55
1:B:31:VAL:HG12	1:B:66:LEU:HD23	1.89	0.54
1:B:130:PRO:HD2	1:B:134:THR:OG1	2.07	0.54
1:B:45:SER:OG	1:B:198:PRO:HB3	2.07	0.54
1:A:72:ASN:HD22	1:A:72:ASN:C	2.11	0.53
1:A:50:GLN:O	1:A:107:LYS:HA	2.08	0.53
1:B:23:GLN:HB3	1:B:26:SER:HB3	1.91	0.52
1:A:27:VAL:HG13	1:A:29:TYR:CZ	2.45	0.52
1:B:21:THR:HG21	1:B:154:LEU:HD13	1.90	0.52
1:A:108:LEU:HD23	1:A:112:VAL:HG13	1.92	0.52
1:A:101:ASN:H	1:A:179:ASN:ND2	2.07	0.51
1:B:96:ARG:HD2	4:B:258:HOH:O	2.10	0.51
1:A:71:HIS:NE2	1:A:154:LEU:HD13	2.26	0.51
1:B:115:ASN:C	1:B:115:ASN:HD22	2.13	0.50
1:B:211:GLY:HA2	1:B:229:THR:O	2.12	0.50

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:72:ASN:HD21	1:B:74:ASN:HB2	1.78	0.49
1:A:73:ILE:HG12	4:A:254:HOH:O	2.13	0.49
1:A:25:ASN:ND2	1:A:117:ARG:HD3	2.28	0.49
1:B:238:ILE:O	1:B:242:ILE:HD13	2.13	0.48
1:A:62:ARG:HA	4:A:318:HOH:O	2.12	0.48
1:A:56:ALA:HB3	1:A:94:PHE:CD2	2.50	0.47
1:A:64:GLN:HE22	1:A:65(A):ARG:NH2	2.10	0.47
1:A:64:GLN:NE2	1:A:65(A):ARG:NE	2.59	0.47
1:A:25:ASN:CG	1:A:117:ARG:HD3	2.35	0.47
1:B:37:SER:HB2	1:B:41:PHE:CD2	2.49	0.47
1:A:134:THR:O	1:A:161:PRO:HA	2.14	0.47
1:B:212:ILE:HB	1:B:229:THR:HB	1.97	0.46
1:A:183:VAL:HG23	1:A:228:TYR:CD2	2.51	0.46
1:B:55:ALA:O	1:B:58:CYS:HB2	2.15	0.46
1:B:64:GLN:NE2	1:B:65(A):ARG:HH21	2.12	0.46
1:B:57[A]:HIS:HD2	4:B:317:HOH:O	1.98	0.46
1:A:136:CYS:SG	1:A:162:LEU:HD12	2.57	0.45
1:A:101:ASN:HA	1:A:234:TYR:OH	2.16	0.45
1:A:144:THR:HG23	1:A:152:PRO:HD3	1.99	0.45
1:A:48:ASN:C	1:A:48:ASN:HD22	2.20	0.45
1:B:72:ASN:HD22	1:B:74:ASN:N	1.96	0.44
1:B:64:GLN:NE2	1:B:65(A):ARG:NE	2.65	0.44
1:B:17:VAL:O	1:B:188(A):LYS:HA	2.16	0.44
1:B:19:GLY:HA2	1:B:158:LEU:HD12	2.00	0.43
1:B:162:LEU:HD23	4:B:334:HOH:O	2.17	0.43
1:B:129:ALA:HA	1:B:130:PRO:HD3	1.80	0.43
1:A:211:GLY:HA2	1:A:229:THR:O	2.19	0.43
1:A:241:THR:HA	4:A:359:HOH:O	2.17	0.43
1:B:19:GLY:HA3	1:B:157:CYS:O	2.19	0.43
1:A:101:ASN:HA	1:A:234:TYR:HH	1.84	0.42
1:A:20:TYR:CD2	1:A:20:TYR:N	2.87	0.42
1:B:57[B]:HIS:CE1	1:B:102:ASN:HD21	2.37	0.42
1:B:182:CYS:HA	1:B:226:GLY:O	2.19	0.42
1:B:51:TRP:CE2	1:B:107:LYS:HG3	2.55	0.42
1:A:87:LYS:C	1:A:88:ILE:HG13	2.38	0.42
1:B:16:ILE:N	1:B:194:ASP:OD1	2.53	0.42
1:B:163:LEU:HA	1:B:164:PRO:HD3	1.94	0.42
1:A:115:ASN:HD22	1:A:117:ARG:N	2.12	0.41
1:B:25:ASN:HB3	1:B:117:ARG:HB3	2.01	0.41
1:A:74:ASN:ND2	1:A:153:ASP:OD1	2.53	0.41
1:A:32:SER:OG	1:A:73:ILE:HD11	2.20	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:115:ASN:ND2	1:A:117:ARG:H	2.09	0.41
1:A:32:SER:CB	1:A:73:ILE:HD11	2.51	0.41
1:B:192:GLN:NE2	1:B:192:GLN:H	2.18	0.41
1:A:120:THR:HG21	4:A:311:HOH:O	2.20	0.41
1:A:66:LEU:HD22	1:A:118:VAL:HG13	2.02	0.41
1:A:115:ASN:ND2	1:A:118:VAL:N	2.67	0.41
1:B:21:THR:HG21	1:B:154:LEU:CD1	2.50	0.41
1:A:160:ALA:HA	1:A:161:PRO:HD3	1.83	0.40
1:A:66:LEU:O	1:A:80:GLU:HA	2.21	0.40
1:A:172:TYR:HB3	1:A:175:LYS:HG2	2.02	0.40
1:A:65(A):ARG:HD3	1:A:82:PHE:CE2	2.56	0.40
1:A:16:ILE:N	1:A:194:ASP:OD1	2.54	0.40

All (25) symmetry-related close contacts are listed below. The label for Atom-2 includes the symmetry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
4:A:358:HOH:O	4:B:311:HOH:O[4_466]	0.28	1.92
4:A:348:HOH:O	4:B:362:HOH:O[4_566]	0.60	1.60
4:A:361:HOH:O	4:B:349:HOH:O[4_466]	0.89	1.31
1:B:23:GLN:OE1	1:B:96:ARG:NH2[1_655]	1.07	1.13
1:B:23:GLN:CD	1:B:96:ARG:NH2[1_655]	1.34	0.86
1:A:23:GLN:OE1	1:A:96:ARG:NH2[1_655]	1.39	0.81
4:A:310:HOH:O	4:B:359:HOH:O[4_566]	1.44	0.76
4:A:327:HOH:O	4:B:329:HOH:O[3_546]	1.51	0.69
4:A:327:HOH:O	4:B:328:HOH:O[3_546]	1.58	0.62
1:A:23:GLN:OE1	1:A:96:ARG:CZ[1_655]	1.73	0.47
1:B:23:GLN:OE1	1:B:96:ARG:CZ[1_655]	1.73	0.47
1:B:23:GLN:NE2	1:B:96:ARG:NH2[1_655]	1.77	0.43
4:A:311:HOH:O	4:B:360:HOH:O[4_566]	1.78	0.42
4:A:349:HOH:O	4:B:361:HOH:O[4_566]	1.83	0.37
4:A:314:HOH:O	4:B:282:HOH:O[4_566]	1.93	0.27
1:A:236:ASP:OD2	1:B:114:LEU:O[4_466]	1.94	0.26
1:A:23:GLN:CD	1:A:96:ARG:NH2[1_655]	1.97	0.23
4:A:360:HOH:O	4:B:350:HOH:O[4_466]	1.98	0.22
1:A:49:ASP:OD1	4:B:282:HOH:O[4_566]	2.01	0.19
1:A:23:GLN:OE1	1:A:96:ARG:NE[1_655]	2.05	0.15
4:A:359:HOH:O	4:B:312:HOH:O[4_466]	2.10	0.10
4:A:326:HOH:O	4:B:329:HOH:O[3_546]	2.11	0.09
1:A:114:LEU:O	1:B:236:ASP:OD2[4_566]	2.12	0.08

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:147:SER:OG	1:B:146:SER:O[3_546]	2.17	0.03
4:A:281:HOH:O	4:B:315:HOH:O[4_466]	2.18	0.02

### 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	222/223 (100%)	207 (93%)	12 (5%)	3 (1%)	11	11
1	B	222/223 (100%)	212 (96%)	9 (4%)	1 (0%)	29	35
All	All	444/446 (100%)	419 (94%)	21 (5%)	4 (1%)	17	20

All (4) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	235	VAL
1	A	173	PRO
1	A	238	ILE
1	A	161	PRO

#### 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%)	162 (88%)	23 (12%)	4	5
1	B	185/185 (100%)	163 (88%)	22 (12%)	5	5

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles
All	All	370/370 (100%)	325 (88%)	45 (12%)	<b>5</b> <b>5</b>

All (45) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	34	ASN
1	A	37	SER
1	A	45	SER
1	A	48	ASN
1	A	50	GLN
1	A	72	ASN
1	A	73	ILE
1	A	77	GLU
1	A	97	LYS
1	A	98	THR
1	A	108	LEU
1	A	113	LYS
1	A	115	ASN
1	A	117	ARG
1	A	127	SER
1	A	152	PRO
1	A	162	LEU
1	A	164	PRO
1	A	175	LYS
1	A	186	GLU
1	A	192	GLN
1	A	227	VAL
1	A	230	LYS
1	B	37	SER
1	B	48	ASN
1	B	62	ARG
1	B	72	ASN
1	B	73	ILE
1	B	76	LEU
1	B	77	GLU
1	B	87	LYS
1	B	97	LYS
1	B	109	SER
1	B	113	LYS
1	B	115	ASN
1	B	117	ARG
1	B	124	PRO

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Mol	Chain	Res	Type
1	B	125	SER
1	B	127	SER
1	B	162	LEU
1	B	185	LEU
1	B	192	GLN
1	B	227	VAL
1	B	236	ASP
1	B	242	ILE

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (22) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	30	GLN
1	A	34	ASN
1	A	48	ASN
1	A	50	GLN
1	A	64	GLN
1	A	72	ASN
1	A	101	ASN
1	A	115	ASN
1	A	165	GLN
1	A	179	ASN
1	A	192	GLN
1	A	210	GLN
1	B	25	ASN
1	B	30	GLN
1	B	48	ASN
1	B	50	GLN
1	B	64	GLN
1	B	72	ASN
1	B	165	GLN
1	B	179	ASN
1	B	192	GLN
1	B	210	GLN

### 5.3.3 RNA

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 carbohydrates in this entry.

## 5.6 Ligand geometry [i](#)

Of 4 ligands modelled in this entry, 2 are monoatomic - leaving 2 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	B	246	-	9,9,9	2.57	5 (55%)	7,11,11	1.74	2 (28%)
3	BEN	A	246	-	9,9,9	2.70	5 (55%)	7,11,11	1.55	2 (28%)

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	B	246	-	-	3/4/4/4	0/1/1/1
3	BEN	A	246	-	-	1/4/4/4	0/1/1/1

All (10) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	B	246	BEN	C1-C	-4.20	1.39	1.47
3	A	246	BEN	C1-C	-3.98	1.40	1.47
3	A	246	BEN	C6-C1	3.80	1.45	1.39
3	B	246	BEN	C4-C3	3.52	1.47	1.38
3	A	246	BEN	C4-C3	3.51	1.47	1.38
3	A	246	BEN	C3-C2	2.98	1.45	1.38

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	B	246	BEN	C6-C1	2.87	1.44	1.39
3	B	246	BEN	C3-C2	2.86	1.45	1.38
3	A	246	BEN	C5-C6	2.66	1.44	1.38
3	B	246	BEN	C5-C6	2.40	1.44	1.38

All (4) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	A	246	BEN	C1-C-N2	3.31	123.05	118.05
3	B	246	BEN	C5-C4-C3	-3.10	114.17	119.93
3	B	246	BEN	C1-C-N2	2.79	122.26	118.05
3	A	246	BEN	C5-C4-C3	-2.33	115.60	119.93

There are no chirality outliers.

All (4) torsion outliers are listed below:

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

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](#)

There are no chain breaks in this entry.

## 6 Fit of model and data

### 6.1 Protein, DNA and RNA chains

EDS was not executed - this section is therefore empty.

### 6.2 Non-standard residues in protein, DNA, RNA chains

EDS was not executed - this section is therefore empty.

### 6.3 Carbohydrates

EDS was not executed - this section is therefore empty.

### 6.4 Ligands

EDS was not executed - this section is therefore empty.

### 6.5 Other polymers

EDS was not executed - this section is therefore empty.