



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 5, 2026 – 03:47 AM UTC

PDB ID : 1RNB / pdb_00001rnb
Title : CRYSTAL STRUCTURE OF A BARNASE-D(*GP*C) COMPLEX AT 1.9
ANGSTROMS RESOLUTION
Authors : Janin, J.; Baudet, S.
Deposited on : 1991-03-19
Resolution : 1.90 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	:	4-5-2 with Phenix2.0
Mogul	:	2022.3.0, CSD as543be (2022)
Xtriage (Phenix)	:	NOT EXECUTED
EDS	:	NOT EXECUTED
Percentile statistics	:	20250101.v01 (using entries in the PDB archive January 1st 2025)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.49

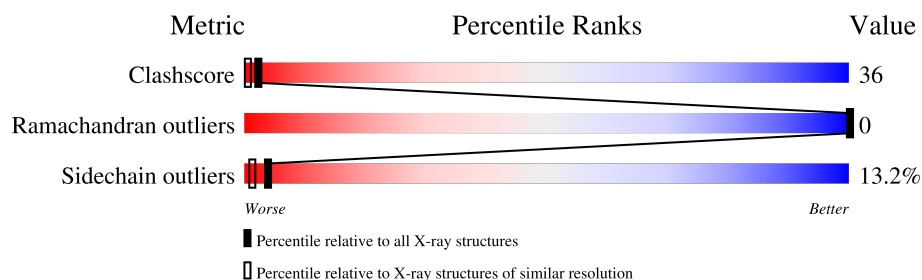
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.90 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	190562	8410 (1.90-1.90)
Ramachandran outliers	187476	8333 (1.90-1.90)
Sidechain outliers	187428	8333 (1.90-1.90)

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 $\leq 5\%$.

Note EDS was not executed.

Mol	Chain	Length	Quality of chain
1	C	2	
2	A	110	

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	SO4	C	150	-	-	X	-

2 Entry composition [i](#)

There are 4 unique types of molecules in this entry. The entry contains 1008 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 DNA chain called DNA (5'-D(*GP*C)-3').

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	C	2	Total	C	N	O	P	0	0	0
			38	19	8	10	1			

- Molecule 2 is a protein called BARNASE.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	A	109	Total	C	N	O		0	0	0
			869	550	151	168				

There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	22	ASN	ASP	conflict	UNP P00648
A	23	ASP	ASN	conflict	UNP P00648

- Molecule 3 is SULFATE ION (CCD ID: SO4) (formula: O₄S).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	C	1	Total	O	S	0	0
			5	4	1		

- Molecule 4 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	C	8	Total	O	0	0
			8	8		
4	A	88	Total	O	0	0
			88	88		

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. 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.

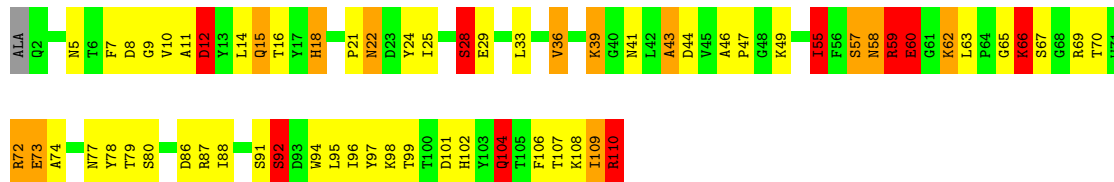
- Molecule 1: DNA (5'-D(*GP*C)-3')

Chain C: 



- Molecule 2: BARNASE

Chain A: 



4 Data and refinement statistics

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

Property	Value	Source
Space group	P 31 2 1	Depositor
Cell constants a, b, c, α , β , γ	57.97Å 57.97Å 85.37Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	(Not available) – 1.90	Depositor
% Data completeness (in resolution range)	(Not available) ((Not available)-1.90)	Depositor
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
Refinement program	PROLSQ	Depositor
R, R_{free}	0.214 , (Not available)	Depositor
Estimated twinning fraction	No twinning to report.	Xtriage
Total number of atoms	1008	wwPDB-VP
Average B, all atoms (Å ²)	31.0	wwPDB-VP

5 Model quality

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: SO4

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	C	1.59	0/42	2.29	2/63 (3.2%)
2	A	1.39	1/890 (0.1%)	2.91	85/1204 (7.1%)
All	All	1.40	1/932 (0.1%)	2.88	87/1267 (6.9%)

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
2	A	1	0

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	70	THR	CB-OG1	5.52	1.52	1.43

All (87) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	12	ASP	CA-CB-CG	-21.56	91.04	112.60
2	A	104	GLN	CB-CG-CD	16.24	140.20	112.60
2	A	109	ILE	N-CA-C	-12.59	101.67	111.62
2	A	91	SER	CA-C-N	12.20	137.00	120.54
2	A	91	SER	C-N-CA	12.20	137.00	120.54
2	A	59	ARG	CB-CA-C	11.59	129.44	110.09
2	A	94	TRP	N-CA-C	11.30	126.70	112.24
2	A	109	ILE	CA-CB-CG1	10.56	128.35	110.40
2	A	43	ALA	CA-C-O	-9.46	108.04	119.49
2	A	44	ASP	CA-CB-CG	8.95	121.55	112.60

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	41	ASN	OD1-CG-ND2	-8.91	113.69	122.60
2	A	109	ILE	N-CA-CB	8.20	118.37	111.64
2	A	58	ASN	CA-C-N	-8.18	109.04	122.54
2	A	58	ASN	C-N-CA	-8.18	109.04	122.54
2	A	104	GLN	OE1-CD-NE2	-8.13	114.47	122.60
2	A	11	ALA	CA-C-O	8.11	129.57	120.90
2	A	25	ILE	CA-C-O	-7.85	113.86	121.63
2	A	28	SER	N-CA-CB	-7.79	98.71	110.01
2	A	79	THR	CA-CB-OG1	-7.75	97.98	109.60
2	A	7	PHE	CA-CB-CG	7.70	121.50	113.80
2	A	110	ARG	CD-NE-CZ	-7.62	113.73	124.40
2	A	14	LEU	O-C-N	7.59	129.88	122.07
2	A	97	TYR	CA-C-O	7.55	130.28	121.44
2	A	77	ASN	CA-C-O	-7.50	111.57	120.57
2	A	12	ASP	CA-C-O	7.48	131.21	120.51
2	A	18	HIS	CA-CB-CG	-7.37	106.43	113.80
1	C	112	DC	C5'-C4'-O4'	7.33	120.39	109.40
2	A	57	SER	N-CA-C	7.30	120.68	111.69
2	A	58	ASN	CA-C-O	-7.23	113.19	121.65
2	A	78	TYR	CA-C-O	-7.22	112.56	120.43
2	A	102	HIS	CA-CB-CG	-7.19	106.61	113.80
2	A	107	THR	CA-CB-CG2	7.12	122.61	110.50
2	A	72	ARG	NE-CZ-NH2	-6.95	112.94	119.20
2	A	69	ARG	O-C-N	-6.95	115.30	123.22
2	A	63	LEU	CD1-CG-CD2	6.83	125.81	110.80
2	A	94	TRP	CA-C-O	-6.77	112.42	120.81
2	A	28	SER	N-CA-C	6.69	118.22	111.07
2	A	57	SER	CA-C-N	-6.61	113.16	122.34
2	A	57	SER	C-N-CA	-6.61	113.16	122.34
2	A	104	GLN	N-CA-C	-6.53	103.44	111.40
2	A	21	PRO	CA-C-N	6.49	130.98	120.60
2	A	21	PRO	C-N-CA	6.49	130.98	120.60
2	A	49	LYS	CA-C-O	6.47	128.92	121.28
2	A	104	GLN	CA-C-O	6.45	127.45	120.55
2	A	67	SER	O-C-N	-6.38	115.04	122.95
2	A	46	ALA	CA-C-O	6.31	127.63	121.32
2	A	46	ALA	CB-CA-C	6.23	119.53	110.87
2	A	41	ASN	N-CA-CB	-6.18	101.14	110.91
2	A	16	THR	CA-C-O	-6.11	114.01	120.55
2	A	36	VAL	O-C-N	6.09	128.62	122.71
2	A	86	ASP	CB-CG-OD1	6.06	132.34	118.40
2	A	59	ARG	CA-C-N	6.05	133.34	122.38

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	59	ARG	C-N-CA	6.05	133.34	122.38
2	A	47	PRO	CB-CA-C	6.05	119.26	111.64
2	A	95	LEU	N-CA-C	-6.01	100.70	110.20
2	A	10	VAL	CB-CA-C	5.99	119.89	112.04
2	A	79	THR	OG1-CB-CG2	5.91	121.11	109.30
2	A	80	SER	O-C-N	5.85	129.14	123.29
2	A	5	ASN	OD1-CG-ND2	-5.76	116.84	122.60
2	A	29	GLU	N-CA-C	-5.72	104.95	111.07
2	A	86	ASP	O-C-N	5.70	129.72	123.22
2	A	55	ILE	CA-C-N	5.68	131.00	123.05
2	A	55	ILE	C-N-CA	5.68	131.00	123.05
2	A	77	ASN	OD1-CG-ND2	-5.67	116.93	122.60
2	A	10	VAL	CA-C-N	5.64	128.16	120.54
2	A	10	VAL	C-N-CA	5.64	128.16	120.54
2	A	78	TYR	O-C-N	5.63	129.63	123.27
2	A	66	LYS	N-CA-CB	5.53	121.14	111.13
2	A	60	GLU	N-CA-C	5.44	119.91	113.16
2	A	22	ASN	N-CA-C	5.43	119.00	112.38
2	A	44	ASP	N-CA-CB	5.43	118.66	110.30
2	A	15	GLN	N-CA-CB	-5.41	102.17	110.12
2	A	28	SER	CA-C-O	5.31	126.40	120.82
1	C	111	DG	OP2-P-O3'	5.28	123.85	108.00
2	A	92	SER	CA-CB-OG	-5.28	100.54	111.10
2	A	87	ARG	CA-C-O	5.28	126.90	120.99
2	A	24	TYR	CA-C-O	-5.26	115.13	120.71
2	A	77	ASN	CB-CG-ND2	5.25	124.28	116.40
2	A	58	ASN	CB-CA-C	-5.24	104.84	111.86
2	A	73	GLU	CG-CD-OE2	5.23	130.44	118.40
2	A	46	ALA	N-CA-CB	-5.19	104.64	111.23
2	A	99	THR	O-C-N	5.12	129.53	123.33
2	A	59	ARG	N-CA-C	-5.07	106.79	113.17
2	A	69	ARG	NE-CZ-NH1	5.04	126.54	121.50
2	A	12	ASP	CA-C-N	5.04	127.34	120.54
2	A	12	ASP	C-N-CA	5.04	127.34	120.54
2	A	11	ALA	N-CA-C	-5.03	105.07	111.11

All (1) chirality outliers are listed below:

Mol	Chain	Res	Type	Atom
2	A	109	ILE	CB

There are no planarity outliers.

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	C	38	0	24	1	0
2	A	869	0	835	62	0
3	C	5	0	0	1	1
4	A	88	0	0	17	2
4	C	8	0	0	2	1
All	All	1008	0	859	64	2

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 36.

All (64) 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)
2:A:15:GLN:NE2	2:A:110:ARG:HG3	1.83	0.92
2:A:15:GLN:HG3	2:A:110:ARG:NH2	1.86	0.91
2:A:15:GLN:HE22	2:A:110:ARG:HG3	1.36	0.90
2:A:36:VAL:HB	2:A:39:LYS:HG2	1.53	0.90
2:A:108:LYS:HE3	2:A:110:ARG:OXT	1.72	0.89
2:A:62:LYS:HB3	4:A:313:HOH:O	1.73	0.88
2:A:92:SER:HB3	4:A:315:HOH:O	1.74	0.87
2:A:62:LYS:CB	4:A:313:HOH:O	2.23	0.87
2:A:15:GLN:HA	2:A:110:ARG:HH21	1.41	0.84
2:A:57:SER:O	2:A:59:ARG:NH2	2.13	0.82
2:A:36:VAL:HB	2:A:39:LYS:CG	2.12	0.79
2:A:8:ASP:OD1	4:A:329:HOH:O	2.01	0.77
2:A:36:VAL:HG11	2:A:39:LYS:HD3	1.68	0.74
2:A:15:GLN:NE2	2:A:110:ARG:CG	2.51	0.73
2:A:15:GLN:HE22	2:A:110:ARG:CG	2.02	0.73
2:A:15:GLN:HA	2:A:110:ARG:NH2	2.03	0.72
2:A:18:HIS:HE1	4:A:260:HOH:O	1.73	0.71
2:A:96:ILE:N	2:A:110:ARG:O	2.18	0.70
2:A:15:GLN:CG	2:A:110:ARG:NH2	2.54	0.70
2:A:36:VAL:CG1	2:A:39:LYS:HD3	2.22	0.69
2:A:96:ILE:HD12	2:A:110:ARG:HE	1.59	0.68
1:C:111:DG:H2'	1:C:111:DG:N3	2.09	0.68

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:C:150:SO4:O4	4:C:257:HOH:O	2.14	0.65
2:A:65:GLY:O	2:A:66:LYS:HD3	1.97	0.65
2:A:15:GLN:NE2	2:A:110:ARG:NE	2.44	0.65
2:A:60:GLU:HB2	2:A:62:LYS:HD2	1.80	0.64
2:A:15:GLN:HG3	2:A:110:ARG:CZ	2.27	0.63
2:A:55:ILE:O	4:A:305:HOH:O	2.15	0.63
2:A:9:GLY:O	2:A:12:ASP:HB3	2.00	0.62
2:A:15:GLN:CA	2:A:110:ARG:HH21	2.11	0.61
2:A:28:SER:HB2	4:A:208:HOH:O	2.01	0.60
2:A:8:ASP:O	2:A:12:ASP:HB2	2.03	0.59
2:A:12:ASP:HB3	4:A:211:HOH:O	2.02	0.59
2:A:15:GLN:CG	2:A:110:ARG:CZ	2.80	0.58
2:A:15:GLN:NE2	2:A:110:ARG:CD	2.67	0.58
2:A:57:SER:O	2:A:58:ASN:CB	2.50	0.56
2:A:98:LYS:O	2:A:106:PHE:HA	2.06	0.55
2:A:15:GLN:CB	2:A:110:ARG:NH2	2.70	0.55
2:A:57:SER:O	2:A:58:ASN:HB3	2.07	0.54
2:A:43:ALA:HA	4:A:328:HOH:O	2.06	0.54
2:A:9:GLY:O	2:A:12:ASP:CB	2.56	0.53
2:A:109:ILE:HG22	2:A:110:ARG:HB2	1.90	0.53
2:A:72:ARG:NE	4:A:212:HOH:O	2.12	0.53
2:A:55:ILE:HD11	2:A:72:ARG:NH2	2.25	0.52
2:A:15:GLN:CD	2:A:110:ARG:CZ	2.84	0.51
2:A:15:GLN:CA	2:A:110:ARG:NH2	2.71	0.50
2:A:55:ILE:HD12	4:A:212:HOH:O	2.12	0.50
2:A:22:ASN:HB2	4:A:230:HOH:O	2.12	0.49
2:A:36:VAL:O	2:A:39:LYS:HG2	2.13	0.48
2:A:73:GLU:HA	2:A:88:ILE:O	2.14	0.48
2:A:18:HIS:CE1	4:A:260:HOH:O	2.58	0.48
2:A:15:GLN:CB	2:A:110:ARG:HH21	2.29	0.46
4:C:257:HOH:O	2:A:104:GLN:NE2	2.46	0.45
2:A:108:LYS:NZ	4:A:250:HOH:O	2.50	0.45
2:A:55:ILE:CD1	4:A:212:HOH:O	2.64	0.45
2:A:59:ARG:HD3	2:A:59:ARG:HA	1.80	0.45
2:A:62:LYS:HB2	4:A:313:HOH:O	2.04	0.44
2:A:62:LYS:H	2:A:62:LYS:HG2	1.36	0.43
2:A:55:ILE:HD11	2:A:72:ARG:CZ	2.49	0.42
2:A:101:ASP:CG	2:A:104:GLN:HB2	2.46	0.41
2:A:62:LYS:HB2	2:A:106:PHE:CE2	2.56	0.41
2:A:92:SER:CB	4:A:315:HOH:O	2.48	0.41
2:A:74:ALA:HB3	2:A:88:ILE:HG22	2.03	0.40

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:A:58:ASN:OD1	2:A:62:LYS:HG2	2.20	0.40

All (2) 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:C:240:HOH:O	4:A:263:HOH:O[5_666]	2.07	0.13
3:C:150:SO4:O4	4:A:273:HOH:O[5_666]	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	
2	A	107/110 (97%)	103 (96%)	4 (4%)	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	
2	A	91/92 (99%)	79 (87%)	12 (13%)	4	1

All (12) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
2	A	12	ASP
2	A	28	SER
2	A	33	LEU
2	A	39	LYS
2	A	55	ILE
2	A	59	ARG
2	A	60	GLU
2	A	62	LYS
2	A	66	LYS
2	A	92	SER
2	A	104	GLN
2	A	110	ARG

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (2) such sidechains are listed below:

Mol	Chain	Res	Type
2	A	15	GLN
2	A	18	HIS

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](#)

1 ligand is modelled in this entry.

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	SO4	C	150	-	4,4,4	0.77	0	6,6,6	0.68	0

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.

1 monomer is involved in 2 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	C	150	SO4	1	1

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.