



Full wwPDB X-ray Structure Validation Report ⓘ

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PDB ID : 1UTH / pdb_00001uth
Title : DntR from Burkholderia sp. strain DNT in complex with Thiocyanate
Authors : Smirnova, I.A.; Dian, C.; Leonard, G.A.; McSweeney, S.; Birse, D.; Brzezinski, P.
Deposited on : 2003-12-09
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	:	4-5-2 with Phenix2.0
Mogul	:	2022.3.0, CSD as543be (2022)
Xtriage (Phenix)	:	2.0
EDS	:	3.0
Percentile statistics	:	20250101.v01 (using entries in the PDB archive January 1st 2025)
CCP4	:	9.0.010 (Gargrove)
Density-Fitness	:	1.0.12
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.49

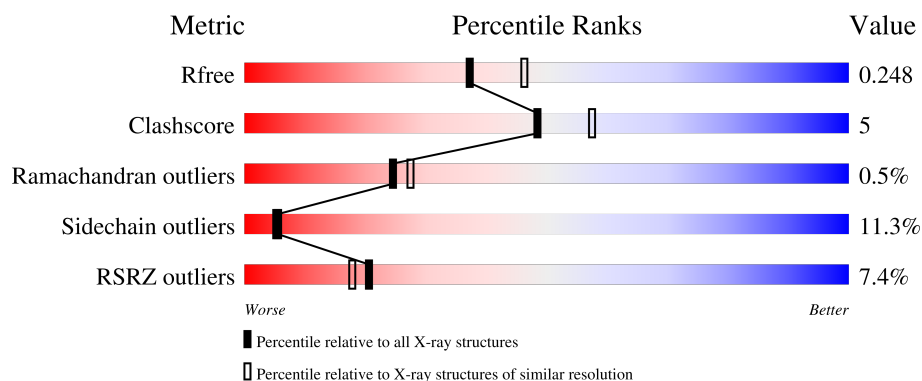
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 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))
R_{free}	180053	6164 (2.20-2.20)
Clashscore	190562	6851 (2.20-2.20)
Ramachandran outliers	187476	6768 (2.20-2.20)
Sidechain outliers	187428	6769 (2.20-2.20)
RSRZ outliers	180081	6166 (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	315	
2	B	315	

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	SCN	B	1307	-	-	X	-

2 Entry composition

There are 4 unique types of molecules in this entry. The entry contains 3697 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 LYSR-TYPE REGULATORY PROTEIN.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	219	Total	C	N	O	S	0	0	0
			1740	1116	315	298	11			

There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	88	ASN	ASP	conflict	UNP Q7WT50
A	192	SER	THR	engineered mutation	UNP Q7WT50

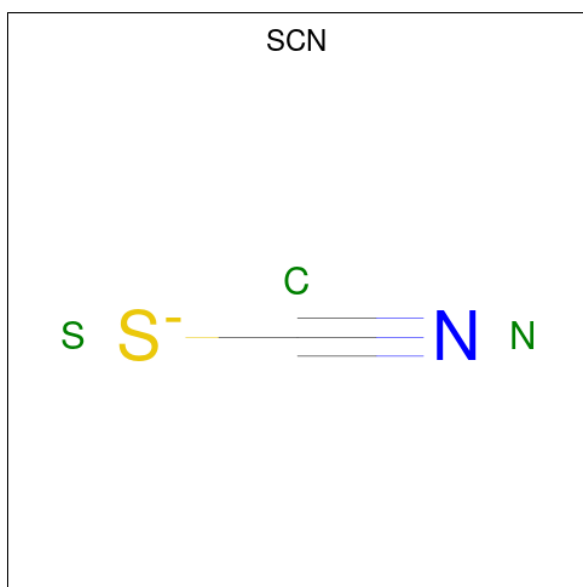
- Molecule 2 is a protein called LYSR-TYPE REGULATORY PROTEIN.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	B	226	Total	C	N	O	S	0	0	0
			1739	1117	307	304	11			

There are 3 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
B	81	GLU	GLN	conflict	UNP Q7WT50
B	134	GLY	ASN	conflict	UNP Q7WT50
B	192	SER	THR	engineered mutation	UNP Q7WT50

- Molecule 3 is THIOCYANATE ION (CCD ID: SCN) (formula: CNS).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
3	A	1	Total	C	N	S	0	0
			3	1	1	1		
3	A	1	Total	C	N	S	0	0
			3	1	1	1		
3	A	1	Total	C	N	S	0	0
			3	1	1	1		
3	A	1	Total	C	N	S	0	0
			3	1	1	1		
3	A	1	Total	C	N	S	0	0
			3	1	1	1		
3	A	1	Total	C	N	S	0	0
			3	1	1	1		
3	A	1	Total	C	N	S	0	0
			3	1	1	1		
3	A	1	Total	C	N	S	0	0
			3	1	1	1		
3	B	1	Total	C	N	S	0	0
			3	1	1	1		
3	B	1	Total	C	N	S	0	0
			3	1	1	1		
3	B	1	Total	C	N	S	0	0
			3	1	1	1		

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Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
3	B	1	Total	C	N	S	0	0
			3	1	1	1		
3	B	1	Total	C	N	S	0	0
			3	1	1	1		
3	B	1	Total	C	N	S	0	0
			3	1	1	1		

- Molecule 4 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	103	Total	O	0	0
			103	103		
4	B	64	Total	O	0	0
			64	64		

4 Data and refinement statistics

Property	Value	Source
Space group	P 65 2 2	Depositor
Cell constants a, b, c, α , β , γ	107.75Å 107.75Å 298.44Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	95.35 – 2.20 93.31 – 2.20	Depositor EDS
% Data completeness (in resolution range)	99.9 (95.35-2.20) 100.0 (93.31-2.20)	Depositor EDS
R_{merge}	0.09	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.30 (at 2.20Å)	Xtriage
Refinement program	REFMAC 5.1.24	Depositor
R, R_{free}	0.223 , 0.252 0.227 , 0.248	Depositor DCC
R_{free} test set	2747 reflections (5.18%)	wwPDB-VP
Wilson B-factor (Å ²)	44.7	Xtriage
Anisotropy	0.248	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.36 , 40.9	EDS
L-test for twinning ²	$\langle L \rangle = 0.46$, $\langle L^2 \rangle = 0.29$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.94	EDS
Total number of atoms	3697	wwPDB-VP
Average B, all atoms (Å ²)	45.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.45% 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

5.1 Standard geometry

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

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	0.99	3/1789 (0.2%)	1.05	2/2425 (0.1%)
2	B	0.96	1/1785 (0.1%)	1.03	3/2425 (0.1%)
All	All	0.98	4/3574 (0.1%)	1.04	5/4850 (0.1%)

All (4) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	174	MET	SD-CE	-9.79	1.55	1.79
1	A	200	VAL	CA-CB	5.69	1.61	1.54
1	A	112	MET	SD-CE	-5.62	1.65	1.79
2	B	199	VAL	CA-CB	5.17	1.60	1.54

All (5) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	197	VAL	CB-CA-C	-10.56	96.09	110.98
1	A	197	VAL	CB-CA-C	-8.97	98.69	110.98
2	B	230	ILE	N-CA-C	6.97	117.68	110.36
1	A	148	ASP	N-CA-C	5.89	117.78	111.36
2	B	245	VAL	N-CA-CB	-5.82	103.06	111.21

There are no chirality outliers.

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	A	1740	0	1728	24	0
2	B	1739	0	1695	14	0
3	A	33	0	0	0	0
3	B	18	0	0	3	0
4	A	103	0	0	3	1
4	B	64	0	0	1	0
All	All	3697	0	3423	38	1

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 5.

All (38) 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:302:HIS:NE2	4:A:2101:HOH:O	2.10	0.81
2:B:277:TRP:HE1	2:B:282:ASN:HD22	1.28	0.79
1:A:223:ARG:HD2	3:B:1307:SCN:S	2.34	0.66
1:A:277:TRP:HE1	1:A:282:ASN:HD22	1.46	0.63
2:B:288:MET:O	2:B:292:GLN:HG3	2.02	0.58
1:A:174:MET:HE2	1:A:259:LEU:HD23	1.84	0.58
1:A:300:GLU:HG3	1:A:303:HIS:NE2	2.20	0.57
1:A:143:GLU:HA	1:A:278:HIS:CD2	2.43	0.54
1:A:197:VAL:HG13	1:A:224:LEU:HB3	1.91	0.53
1:A:275:LEU:HD21	1:A:291:ARG:HG2	1.90	0.52
2:B:158:GLN:O	4:B:2025:HOH:O	2.19	0.52
1:A:127:GLN:NE2	4:A:2019:HOH:O	2.45	0.49
1:A:100:ASN:ND2	1:A:129:SER:OG	2.47	0.48
2:B:196:HIS:CE1	2:B:220:ARG:HG2	2.49	0.48
1:A:223:ARG:HD2	3:B:1307:SCN:C	2.45	0.47
1:A:106:ILE:HD12	1:A:249:PHE:HB2	1.96	0.46
2:B:123:ALA:O	3:B:1307:SCN:S	2.73	0.46
1:A:169:HIS:CE1	4:A:2043:HOH:O	2.68	0.45
1:A:237:HIS:HD2	1:A:257:PHE:O	2.00	0.45
2:B:197:VAL:HG13	2:B:224:LEU:HB3	1.99	0.45
2:B:139:LYS:HG3	2:B:157:LEU:HD23	1.99	0.44
1:A:176:ARG:HA	1:A:259:LEU:HD12	2.00	0.43
1:A:160:GLY:O	1:A:278:HIS:ND1	2.51	0.43
1:A:206:HIS:ND1	1:A:246:PRO:HG3	2.32	0.43
1:A:190:GLN:HG2	1:A:194:LEU:HD22	2.00	0.43
1:A:108:GLU:CD	1:A:132:ARG:HH22	2.26	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:257:PHE:O	1:A:259:LEU:HD13	2.19	0.42
1:A:275:LEU:HD21	1:A:291:ARG:CG	2.50	0.42
2:B:101:LEU:O	2:B:130:THR:HA	2.20	0.42
1:A:206:HIS:CE1	1:A:246:PRO:CG	3.03	0.41
2:B:196:HIS:ND1	2:B:220:ARG:HD2	2.35	0.41
1:A:206:HIS:CD2	1:A:206:HIS:H	2.38	0.41
2:B:165:ARG:HH11	2:B:165:ARG:HG3	1.85	0.41
2:B:109:MET:HE3	2:B:109:MET:HB2	1.99	0.41
2:B:113:PRO:HB2	2:B:114:PRO:HD3	2.03	0.41
2:B:149:LEU:HD12	2:B:290:LEU:HD13	2.04	0.40
2:B:274:ASN:HB2	2:B:276:PHE:CE1	2.57	0.40
1:A:201:ALA:O	1:A:204:THR:HB	2.22	0.40

All (1) 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:2053:HOH:O	4:A:2053:HOH:O[11_755]	1.54	0.66

5.3 Torsion angles ⓘ

5.3.1 Protein backbone ⓘ

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	217/315 (69%)	212 (98%)	4 (2%)	1 (0%)	24	27
2	B	224/315 (71%)	216 (96%)	7 (3%)	1 (0%)	30	34
All	All	441/630 (70%)	428 (97%)	11 (2%)	2 (0%)	24	27

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
2	B	135	ALA

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Mol	Chain	Res	Type
1	A	136	GLY

5.3.2 Protein sidechains ⓘ

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	185/272 (68%)	163 (88%)	22 (12%)	5	4
2	B	177/271 (65%)	158 (89%)	19 (11%)	6	6
All	All	362/543 (67%)	321 (89%)	41 (11%)	5	5

All (41) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	96	THR
1	A	101	LEU
1	A	129	SER
1	A	131	LEU
1	A	166	LEU
1	A	169	HIS
1	A	194	LEU
1	A	197	VAL
1	A	204	THR
1	A	221	ARG
1	A	224	LEU
1	A	241	LEU
1	A	245	VAL
1	A	254	GLU
1	A	259	LEU
1	A	262	SER
1	A	290	LEU
1	A	293	LEU
1	A	300	GLU
1	A	302	HIS
1	A	303	HIS
1	A	304	HIS

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Mol	Chain	Res	Type
2	B	106	ILE
2	B	109	MET
2	B	131	LEU
2	B	139	LYS
2	B	165	ARG
2	B	166	LEU
2	B	170	ARG
2	B	172	VAL
2	B	188	LEU
2	B	194	LEU
2	B	197	VAL
2	B	199	VAL
2	B	208	GLU
2	B	224	LEU
2	B	241	LEU
2	B	245	VAL
2	B	259	LEU
2	B	262	SER
2	B	290	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (7) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	100	ASN
1	A	206	HIS
1	A	237	HIS
1	A	282	ASN
2	B	158	GLN
2	B	163	GLN
2	B	282	ASN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

5.4 Non-standard residues in protein, DNA, RNA chains ⓘ

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](#)

17 ligands are 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	SCN	B	1307	-	1,2,2	0.74	0	0,1,1	-	-
3	SCN	A	1312	-	1,2,2	0.74	0	0,1,1	-	-
3	SCN	A	1306	-	1,2,2	1.19	0	0,1,1	-	-
3	SCN	A	1315	-	1,2,2	1.25	0	0,1,1	-	-
3	SCN	B	1303	-	1,2,2	0.98	0	0,1,1	-	-
3	SCN	A	1313	-	1,2,2	1.64	0	0,1,1	-	-
3	SCN	B	1305	-	1,2,2	1.43	0	0,1,1	-	-
3	SCN	A	1305	-	1,2,2	0.48	0	0,1,1	-	-
3	SCN	A	1309	-	1,2,2	1.30	0	0,1,1	-	-
3	SCN	A	1310	-	1,2,2	0.92	0	0,1,1	-	-
3	SCN	B	1304	-	1,2,2	1.07	0	0,1,1	-	-
3	SCN	A	1314	-	1,2,2	1.79	0	0,1,1	-	-
3	SCN	A	1308	-	1,2,2	1.43	0	0,1,1	-	-
3	SCN	B	1306	-	1,2,2	1.72	0	0,1,1	-	-
3	SCN	A	1307	-	1,2,2	1.67	0	0,1,1	-	-
3	SCN	B	1302	-	1,2,2	0.78	0	0,1,1	-	-
3	SCN	A	1311	-	1,2,2	0.59	0	0,1,1	-	-

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 3 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	B	1307	SCN	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

6.1 Protein, DNA and RNA chains

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	219/315 (69%)	0.45	12 (5%) 30 27	28, 41, 63, 88	12 (5%)
2	B	226/315 (71%)	0.63	21 (9%) 14 12	27, 45, 79, 96	8 (3%)
All	All	445/630 (70%)	0.54	33 (7%) 20 18	27, 43, 68, 96	20 (4%)

All (33) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
2	B	80	LEU	6.4
2	B	76	ALA	6.4
1	A	86	THR	6.0
2	B	79	THR	5.7
1	A	93	PHE	5.0
1	A	87	ARG	4.6
2	B	135	ALA	4.6
2	B	89	SER	4.4
2	B	81	GLU	4.3
2	B	84	LEU	4.2
1	A	304	HIS	4.1
1	A	135	ALA	3.8
2	B	82	THR	3.5
1	A	89	SER	3.5
2	B	83	ALA	3.4
1	A	303	HIS	3.3
1	A	136	GLY	3.3
2	B	77	LEU	3.3
2	B	78	ASN	3.0
2	B	134	GLY	2.9
2	B	88	ASP	2.7
2	B	301	ALA	2.6
2	B	85	THR	2.4
2	B	86	THR	2.4

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Mol	Chain	Res	Type	RSRZ
2	B	203	ASN	2.4
1	A	134	ASN	2.3
1	A	170	ARG	2.2
1	A	88	ASN	2.1
2	B	137	ASN	2.1
1	A	203	ASN	2.1
2	B	251	VAL	2.1
2	B	178	ASP	2.0
2	B	210	ASP	2.0

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 oligosaccharides 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
3	SCN	B	1305	3/3	0.70	0.35	77,77,77,77	0
3	SCN	A	1307	3/3	0.77	0.35	63,63,64,65	0
3	SCN	B	1306	3/3	0.84	0.23	67,67,67,68	0
3	SCN	A	1310	3/3	0.86	0.22	68,68,68,69	0
3	SCN	A	1313	3/3	0.89	0.17	63,63,63,64	0
3	SCN	A	1315	3/3	0.90	0.23	79,79,80,80	0
3	SCN	A	1314	3/3	0.92	0.19	64,64,64,65	0
3	SCN	B	1303	3/3	0.92	0.15	55,55,55,56	0
3	SCN	B	1307	3/3	0.92	0.16	59,59,60,60	0
3	SCN	A	1312	3/3	0.94	0.15	56,56,56,56	0
3	SCN	A	1309	3/3	0.94	0.25	58,58,59,60	0
3	SCN	A	1308	3/3	0.95	0.17	56,56,56,56	0
3	SCN	B	1304	3/3	0.95	0.18	52,52,52,53	0
3	SCN	A	1311	3/3	0.95	0.20	59,59,59,59	0

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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
3	SCN	A	1305	3/3	0.95	0.17	46,46,47,50	0
3	SCN	B	1302	3/3	0.95	0.13	43,43,44,45	0
3	SCN	A	1306	3/3	0.97	0.10	51,51,52,52	0

6.5 Other polymers [i](#)

There are no such residues in this entry.