Full wwPDB X-ray Structure Validation Report (i)

Aug 2, 2023 – 08:34 AM EDT

PDB ID	:	1D5T
Title	:	GUANINE NUCLEOTIDE DISSOCIATION INHIBITOR, ALPHA-ISOFORM
Authors	:	Peng, L.; Zeng, K.; Heine, A.; Moyer, B.; Greasley, S.E.; Kuhn, P.; Balch, W.E.; Wilson, I.A.
Deposited on	:	1999-10-11
Resolution	:	1.04 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 (i) 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 (i)) were used in the production of this report:

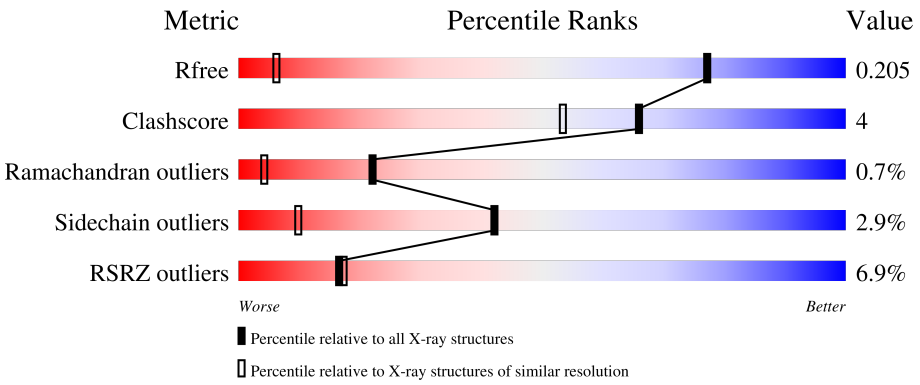
MolProbity	:	4.02b-467
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	2.34
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.34

1 Overall quality at a glance (i)

The following experimental techniques were used to determine the structure:
X-RAY DIFFRACTION

The reported resolution of this entry is 1.04 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}	130704	1596 (1.10-0.98)
Clashscore	141614	1677 (1.10-0.98)
Ramachandran outliers	138981	1591 (1.10-0.98)
Sidechain outliers	138945	1589 (1.10-0.98)
RSRZ outliers	127900	1557 (1.10-0.98)

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 <=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	433	7% 84% 14%

2 Entry composition (i)

There are 3 unique types of molecules in this entry. The entry contains 3827 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.

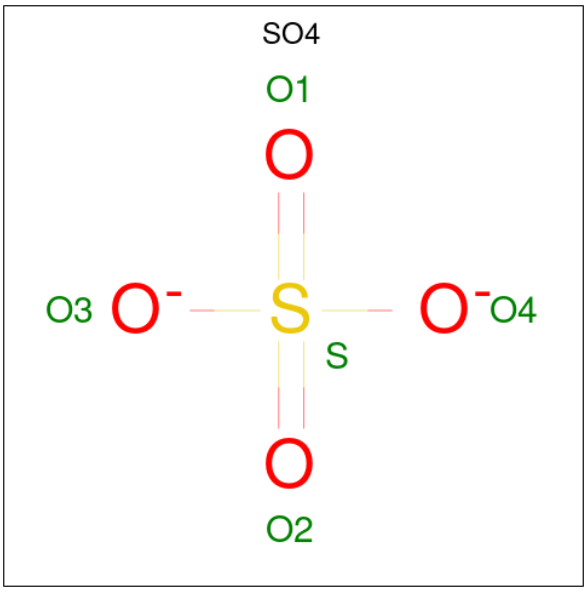
- Molecule 1 is a protein called GUANINE NUCLEOTIDE DISSOCIATION INHIBITOR.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	433	3430	2182	564	658	26	0	3	0

There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-2	HIS	-	conflict	UNP P21856
A	-1	HIS	-	conflict	UNP P21856

- Molecule 2 is SULFATE ION (three-letter code: SO4) (formula: O_4S).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
			Total	O	S		
2	A	1	5	4	1	0	0
2	A	1	5	4	1	0	0

- Molecule 3 is water.

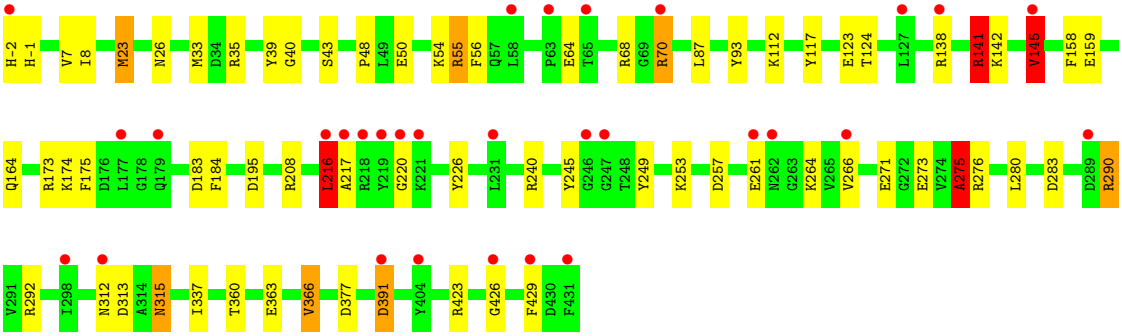
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
			Total	O		
3	A	387	387	387	0	0

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: GUANINE NUCLEOTIDE DISSOCIATION INHIBITOR

Chain A:



4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α, β, γ	89.29Å 42.74Å 61.78Å 90.00° 104.55° 90.00°	Depositor
Resolution (Å)	10.00 – 1.04 34.77 – 1.04	Depositor EDS
% Data completeness (in resolution range)	91.0 (10.00-1.04) 92.1 (34.77-1.04)	Depositor EDS
R_{merge}	0.07	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	1.28 (at 1.04Å)	Xtriage
Refinement program	SHELXL-97	Depositor
R, R_{free}	0.173 , 0.209 0.175 , 0.205	Depositor DCC
R_{free} test set	10372 reflections (5.01%)	wwPDB-VP
Wilson B-factor (Å^2)	11.0	Xtriage
Anisotropy	0.091	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.38 , 47.3	EDS
L-test for twinning[2]	$< \|L\| > = 0.48$, $< L^2 > = 0.31$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.95	EDS
Total number of atoms	3827	wwPDB-VP
Average B, all atoms (Å^2)	17.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 6.10% of the height of the origin peak. No significant pseudotranslation is detected.*

[1]Intensities estimated from amplitudes.

[2]Theoretical values of $< |L| >$, $< L^2 >$ 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: 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	A	0.98	4/3513 (0.1%)	1.50	53/4752 (1.1%)

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	2

All (4) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	275	ALA	C-O	37.82	1.95	1.23
1	A	208	ARG	CD-NE	-6.09	1.36	1.46
1	A	275	ALA	C-N	-5.38	1.21	1.34
1	A	40	GLY	N-CA	-5.09	1.38	1.46

All (53) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	A	216	LEU	C-N-CA	22.36	177.61	121.70
1	A	275	ALA	CA-C-N	16.96	154.52	117.20
1	A	208	ARG	CD-NE-CZ	16.07	146.10	123.60
1	A	275	ALA	O-C-N	-15.29	98.23	122.70
1	A	138	ARG	NE-CZ-NH1	14.27	127.43	120.30
1	A	23	MET	CG-SD-CE	13.84	122.34	100.20
1	A	138	ARG	CD-NE-CZ	13.28	142.19	123.60
1	A	391	ASP	CB-CG-OD1	11.28	128.45	118.30
1	A	366	VAL	CA-CB-CG2	-10.57	95.04	110.90

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	A	39	TYR	C-N-CA	10.27	143.87	122.30
1	A	55	ARG	NE-CZ-NH1	9.30	124.95	120.30
1	A	141	ARG	NE-CZ-NH2	9.16	124.88	120.30
1	A	145	VAL	CA-CB-CG1	8.94	124.31	110.90
1	A	292	ARG	CD-NE-CZ	8.19	135.07	123.60
1	A	275	ALA	C-N-CA	8.08	141.90	121.70
1	A	360	THR	C-N-CA	8.02	141.75	121.70
1	A	141	ARG	NE-CZ-NH1	-7.82	116.39	120.30
1	A	275	ALA	CA-C-O	-7.80	103.72	120.10
1	A	208	ARG	NE-CZ-NH2	7.63	124.11	120.30
1	A	183	ASP	CB-CG-OD1	-7.54	111.51	118.30
1	A	313	ASP	CB-CG-OD2	7.24	124.81	118.30
1	A	290	ARG	CD-NE-CZ	7.13	133.59	123.60
1	A	195	ASP	O-C-N	-7.07	111.39	122.70
1	A	158	PHE	CB-CG-CD1	6.96	125.67	120.80
1	A	39	TYR	O-C-N	-6.92	111.44	123.20
1	A	249	TYR	CG-CD2-CE2	6.70	126.66	121.30
1	A	240	ARG	CD-NE-CZ	6.35	132.50	123.60
1	A	423	ARG	NE-CZ-NH2	6.27	123.43	120.30
1	A	50	GLU	OE1-CD-OE2	-6.26	115.79	123.30
1	A	93	TYR	CB-CG-CD1	-6.25	117.25	121.00
1	A	423	ARG	NE-CZ-NH1	-6.15	117.22	120.30
1	A	245	TYR	CB-CG-CD1	6.14	124.68	121.00
1	A	26	ASN	CB-CG-OD1	6.07	133.73	121.60
1	A	240	ARG	NE-CZ-NH2	5.98	123.29	120.30
1	A	35	ARG	NE-CZ-NH2	-5.90	117.35	120.30
1	A	124	THR	O-C-N	-5.90	113.26	122.70
1	A	377	ASP	CB-CG-OD1	-5.87	113.01	118.30
1	A	56	PHE	CB-CG-CD2	5.86	124.90	120.80
1	A	175	PHE	CB-CG-CD1	5.77	124.84	120.80
1	A	173	ARG	CD-NE-CZ	5.59	131.43	123.60
1	A	226	TYR	CB-CG-CD2	-5.51	117.69	121.00
1	A	70	ARG	NE-CZ-NH1	-5.47	117.56	120.30
1	A	35	ARG	CD-NE-CZ	5.40	131.16	123.60
1	A	26	ASN	OD1-CG-ND2	-5.35	109.60	121.90
1	A	158	PHE	CB-CG-CD2	-5.23	117.14	120.80
1	A	164	GLN	CA-CB-CG	5.16	124.74	113.40
1	A	117	TYR	CB-CG-CD1	5.08	124.05	121.00
1	A	257	ASP	CB-CG-OD1	5.08	122.88	118.30
1	A	184	PHE	CG-CD2-CE2	5.07	126.37	120.80
1	A	429	PHE	CB-CG-CD2	-5.06	117.25	120.80
1	A	68	ARG	CD-NE-CZ	5.05	130.67	123.60

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	A	117	TYR	CG-CD2-CE2	5.03	125.32	121.30
1	A	124	THR	C-N-CA	5.03	134.27	121.70

There are no chirality outliers.

All (2) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	216	LEU	Peptide
1	A	275	ALA	Mainchain

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	3430	0	3383	27	0
2	A	10	0	0	0	0
3	A	387	0	0	13	0
All	All	3827	0	3383	27	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 4.

All (27) 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:275:ALA:C	1:A:275:ALA:O	1.95	1.05
1:A:-1:HIS:HB3	3:A:1114:HOH:O	1.84	0.76
1:A:363:GLU:O	1:A:366:VAL:HG22	1.86	0.76
1:A:261:GLU:OE1	1:A:266:VAL:HG11	1.88	0.74
1:A:264:LYS:HE2	3:A:1111:HOH:O	1.93	0.69
1:A:271:GLU:HB2	3:A:1166:HOH:O	1.93	0.68
1:A:54:LYS:HD2	3:A:1235:HOH:O	1.96	0.66
1:A:141:ARG:O	1:A:145:VAL:HG13	1.97	0.65
1:A:43:SER:HB2	3:A:1234:HOH:O	1.98	0.63
1:A:8:ILE:O	1:A:280:LEU:HD22	1.99	0.62

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:70:ARG:HG2	3:A:1079:HOH:O	2.00	0.61
1:A:264:LYS:HG2	3:A:1111:HOH:O	2.02	0.60
1:A:-1:HIS:HA	1:A:273:GLU:OE1	2.05	0.56
1:A:123:GLU:CD	1:A:145:VAL:HG12	2.31	0.51
1:A:264:LYS:HE3	3:A:1250:HOH:O	2.12	0.50
1:A:315:ASN:C	1:A:315:ASN:HD22	2.16	0.48
1:A:426:GLY:HA2	3:A:1374:HOH:O	2.14	0.48
1:A:48:PRO:HG3	1:A:70:ARG:CZ	2.45	0.47
1:A:275:ALA:O	1:A:276:ARG:N	2.44	0.47
1:A:55:ARG:NH2	3:A:1262:HOH:O	2.48	0.46
1:A:253:LYS:NZ	3:A:1166:HOH:O	2.49	0.46
1:A:290:ARG:NH1	1:A:391:ASP:OD1	2.50	0.45
1:A:142:LYS:O	1:A:145:VAL:HG22	2.17	0.44
1:A:145:VAL:HG22	3:A:1140:HOH:O	2.17	0.44
1:A:159:GLU:O	1:A:174:LYS:HE3	2.18	0.43
1:A:7:VAL:HG21	1:A:23:MET:CE	2.50	0.41
1:A:145:VAL:HG21	3:A:1284:HOH:O	2.21	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	434/433 (100%)	426 (98%)	5 (1%)	3 (1%)	22 4

All (3) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	216	LEU
1	A	217	ALA
1	A	220	GLY

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	381/380 (100%)	369 (97%)	12 (3%)	40 8

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

Mol	Chain	Res	Type
1	A	-2	HIS
1	A	33[A]	MET
1	A	33[B]	MET
1	A	64	GLU
1	A	87	LEU
1	A	112	LYS
1	A	141	ARG
1	A	145	VAL
1	A	283	ASP
1	A	312	ASN
1	A	315	ASN
1	A	337	ILE

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (6) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	26	ASN
1	A	130	ASN
1	A	207	ASN
1	A	315	ASN
1	A	325	GLN
1	A	346	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)

2 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	$\#\|Z\| > 2$
2	SO4	A	501	-	4,4,4	0.50	0	6,6,6	0.16	0
2	SO4	A	502	-	4,4,4	0.33	0	6,6,6	0.28	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.

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 (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	433/433 (100%)	0.90	30 (6%) 16 17	8, 14, 32, 60	0

All (30) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	219	TYR	15.9
1	A	217	ALA	11.5
1	A	218	ARG	10.8
1	A	220	GLY	8.7
1	A	247	GLY	5.4
1	A	216	LEU	5.2
1	A	431	PHE	3.5
1	A	221	LYS	3.5
1	A	261	GLU	3.1
1	A	289	ASP	3.0
1	A	262	ASN	2.9
1	A	179	GLN	2.9
1	A	58	LEU	2.7
1	A	127	LEU	2.6
1	A	145	VAL	2.6
1	A	391	ASP	2.5
1	A	-2	HIS	2.5
1	A	426	GLY	2.4
1	A	312	ASN	2.3
1	A	231	LEU	2.2
1	A	70	ARG	2.2
1	A	138	ARG	2.2
1	A	298	ILE	2.1
1	A	63	PRO	2.1
1	A	404	TYR	2.1
1	A	429	PHE	2.1
1	A	246	GLY	2.0

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Mol	Chain	Res	Type	RSRZ
1	A	177	LEU	2.0
1	A	65	THR	2.0
1	A	266	VAL	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 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	SO4	A	501	5/5	0.95	0.08	15,17,23,25	0
2	SO4	A	502	5/5	0.97	0.09	13,13,19,20	0

6.5 Other polymers (i)

There are no such residues in this entry.