Full wwPDB X-ray Structure Validation Report ⓘ

Feb 12, 2017 – 10:18 pm GMT

PDB ID : 4OJ9
Title : Crystal structure of T877A-AR-LBD bound with co-regulator peptide
Authors : Liu, J.S.; Hsu, C.L.; Wu, W.G.
Deposited on : 2014-01-20
Resolution : 3.31 Å(reported)

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

|		
MolProbity	:	4.02b-467
Mogul	:	1.7.2 (RC1), CSD as538be (2017)
Xtriage (Phenix)	:	1.9-1692
EDS	:	trunk28620
Percentile statistics	:	20161228.v01 (using entries in the PDB archive December 28th 2016)
Refmac	:	5.8.0135
CCP4	:	6.5.0
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	recalc28949
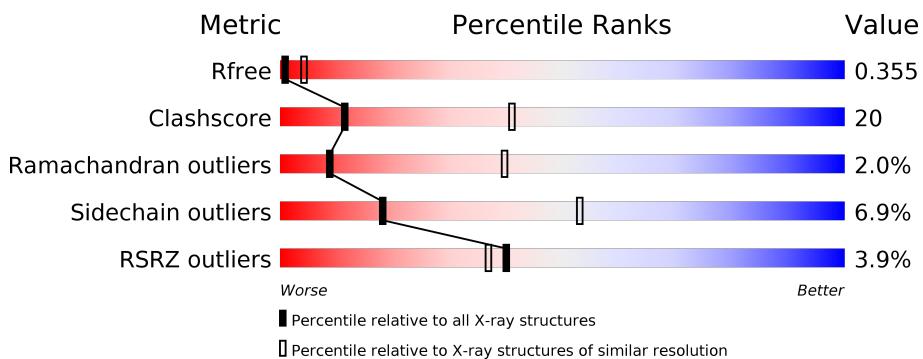
1   Overall quality at a glance   ⓘ

The following experimental techniques were used to determine the structure:
X-RAY DIFFRACTION
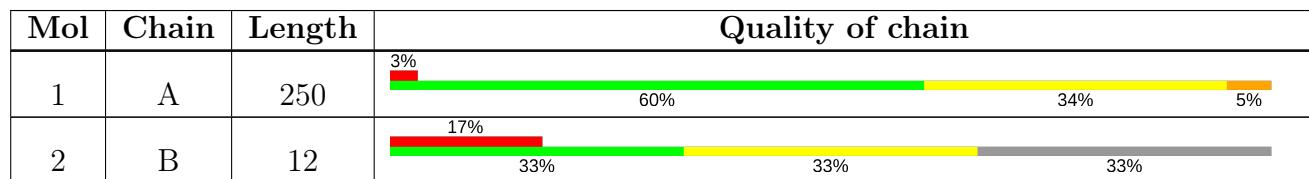
The reported resolution of this entry is 3.31 Å.

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}	100719	1002 (3.38-3.26)
Clashscore	112137	1066 (3.38-3.26)
Ramachandran outliers	110173	1048 (3.38-3.26)
Sidechain outliers	110143	1047 (3.38-3.26)
RSRZ outliers	101464	1007 (3.38-3.26)

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 >=3, 2, 1 and 0 types of geometric quality criteria. 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	250	3% 60% 34% 5%
2	B	12	17% 33% 33% 33%

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
4	SO4	A	1002	-	X	-	-

2 Entry composition ⓘ

There are 6 unique types of molecules in this entry. The entry contains 2143 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 Androgen receptor.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	249	Total 2029	C 1315	N 347	O 349	S 18	0	0	0
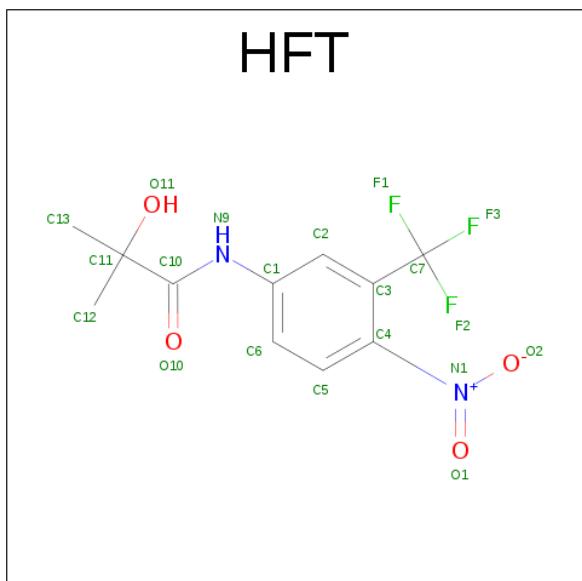
There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	760	ALA	ARG	ENGINEERED MUTATION	UNP P10275
A	877	ALA	THR	ENGINEERED MUTATION	UNP P10275

- Molecule 2 is a protein called co-regulator peptide.
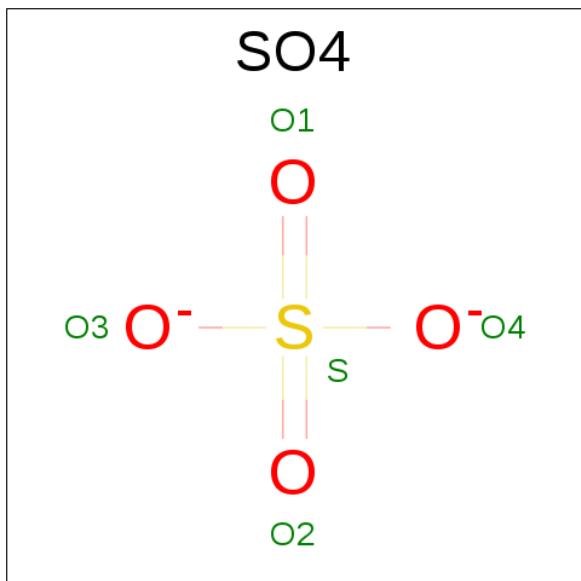
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
2	B	8	Total 70	C 46	N 11	O 13	0	0	0

- Molecule 3 is HYDROXYFLUTAMIDE (three-letter code: HFT) (formula: $C_{11}H_{11}F_3N_2O_4$).
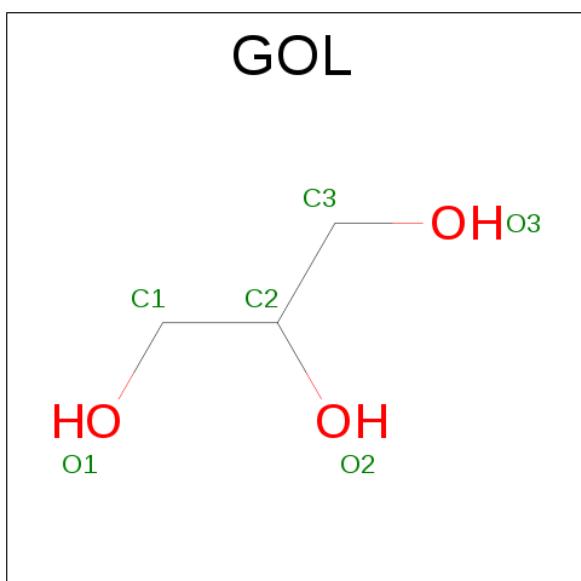
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
3	A	1	Total 20	C 11	F 3	N 2	O 4	0	0

- Molecule 4 is SULFATE ION (three-letter code: SO4) (formula: O_4S).

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

- Molecule 5 is GLYCEROL (three-letter code: GOL) (formula: $C_3H_8O_3$).

Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
5	A	1	Total 6	C 3	O 3	0	0
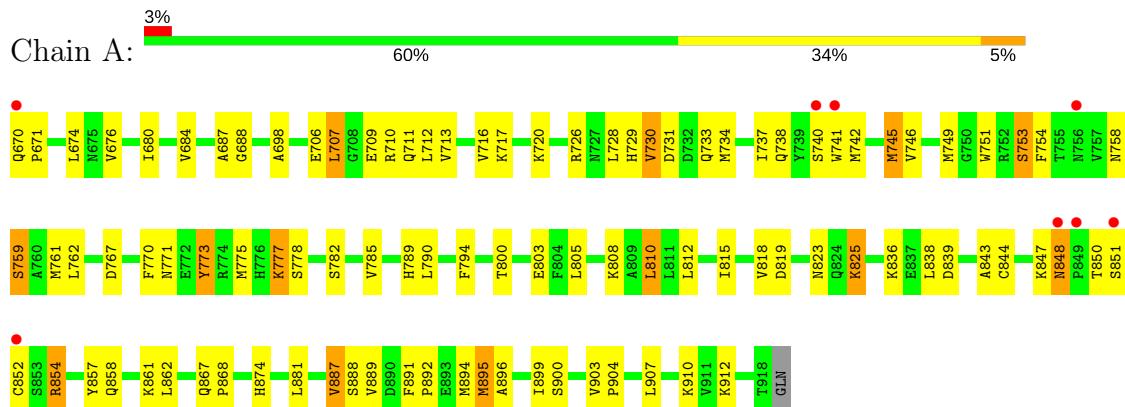
• Molecule 6 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	A	13	Total 13	O 13	0	0
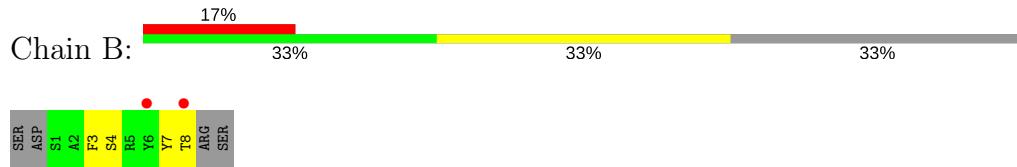
3 Residue-property plots ⓘ

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 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: Androgen receptor

Chain A:

• Molecule 2: co-regulator peptide

Chain B:

4 Data and refinement statistics ⓘ

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α, β, γ	54.38Å 65.75Å 69.49Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	20.00 – 3.31 23.88 – 3.31	Depositor EDS
% Data completeness (in resolution range)	97.8 (20.00-3.31) 98.2 (23.88-3.31)	Depositor EDS
R_{merge}	0.11	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	9.31 (at 3.30Å)	Xtriage
Refinement program	REFMAC 5.7.0029	Depositor
R, R_{free}	0.190 , 0.362 0.193 , 0.355	Depositor DCC
R_{free} test set	178 reflections (4.78%)	DCC
Wilson B-factor (Å^2)	78.5	Xtriage
Anisotropy	0.796	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.31 , 79.0	EDS
L-test for twinning[2]	$< \|L\| > = 0.49, < L^2 > = 0.33$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.94	EDS
Total number of atoms	2143	wwPDB-VP
Average B, all atoms (Å^2)	79.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 7.01% of the height of the origin peak. No significant pseudotranslation is detected.*

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[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 ⓘ

5.1 Standard geometry ⓘ

Bond lengths and bond angles in the following residue types are not validated in this section: GOL, HFT, 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	0.46	0/2080	0.62	0/2810
2	B	0.55	0/72	0.52	0/96
All	All	0.46	0/2152	0.62	0/2906

There are no bond length outliers.

There are no bond angle outliers.

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	2029	0	2048	82	0
2	B	70	0	64	3	0
3	A	20	0	11	2	0
4	A	5	0	0	0	0
5	A	6	0	8	1	0
6	A	13	0	0	3	0
All	All	2143	0	2131	84	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 20.

All (84) 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:895:MET:HA	1:A:895:MET:CE	1.62	1.29
1:A:711:GLN:HB2	1:A:745:MET:HE2	1.24	1.11
1:A:895:MET:HE2	1:A:895:MET:HA	1.33	1.07
1:A:711:GLN:NE2	1:A:745:MET:CG	2.30	0.95
1:A:711:GLN:CB	1:A:745:MET:HE2	1.98	0.92
1:A:711:GLN:NE2	1:A:745:MET:HG3	1.88	0.89
1:A:895:MET:HA	1:A:895:MET:HE3	1.54	0.89
1:A:895:MET:CE	1:A:895:MET:CA	2.54	0.84
1:A:711:GLN:HB2	1:A:745:MET:CE	2.06	0.84
1:A:711:GLN:CB	1:A:745:MET:CE	2.56	0.82
1:A:711:GLN:HE22	1:A:745:MET:HG2	1.46	0.80
1:A:711:GLN:HE21	1:A:745:MET:HG3	1.47	0.80
1:A:709:GLU:HG3	1:A:892:PRO:CB	2.18	0.73
1:A:711:GLN:HB3	1:A:745:MET:HE3	1.69	0.73
1:A:707:LEU:HG	3:A:1001:HFT:H5	1.71	0.73
1:A:730:VAL:O	1:A:734:MET:HG3	1.89	0.72
1:A:848:ASN:HB3	1:A:851:SER:HB3	1.70	0.71
1:A:740:SER:OG	1:A:812:LEU:HD12	1.90	0.71
1:A:712:LEU:O	1:A:716:VAL:HG23	1.93	0.69
1:A:711:GLN:HB3	1:A:745:MET:CE	2.21	0.69
1:A:754:PHE:O	1:A:758:ASN:HA	1.94	0.68
1:A:709:GLU:HG3	1:A:892:PRO:HB2	1.75	0.67
1:A:823:ASN:HD21	1:A:825:LYS:HG3	1.61	0.66
1:A:782:SER:O	1:A:785:VAL:HB	1.96	0.65
1:A:711:GLN:HE22	1:A:745:MET:CG	2.01	0.65
1:A:771:ASN:O	1:A:775:MET:HG3	1.97	0.64
1:A:874:HIS:HB3	1:A:907:LEU:HD21	1.81	0.63
1:A:711:GLN:HE21	1:A:745:MET:CG	2.01	0.62
1:A:823:ASN:ND2	1:A:825:LYS:HG3	2.14	0.62
1:A:711:GLN:HE21	1:A:745:MET:CE	2.11	0.62
1:A:843:ALA:HA	1:A:852:CYS:SG	2.40	0.61
1:A:745:MET:O	1:A:749:MET:HB2	2.01	0.61
1:A:728:LEU:HB2	1:A:733:GLN:HG2	1.81	0.61
1:A:773:TYR:HE2	6:A:1107:HOH:O	1.82	0.60
1:A:836:LYS:O	1:A:839:ASP:HB2	2.01	0.60
1:A:709:GLU:OE1	1:A:894:MET:HB3	2.03	0.59
1:A:742:MET:O	1:A:746:VAL:HG23	2.03	0.58
1:A:867:GLN:HB2	1:A:868:PRO:HD3	1.88	0.55
1:A:710:ARG:HH22	5:A:1003:GOL:H2	1.73	0.54
1:A:895:MET:HE3	1:A:895:MET:CA	2.27	0.54
1:A:810:LEU:HD23	1:A:838:LEU:HD22	1.89	0.54

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:857:TYR:CZ	1:A:861:LYS:HE3	2.44	0.53
1:A:912:LYS:HB2	6:A:1106:HOH:O	2.07	0.53
1:A:738:GLN:O	1:A:741:TRP:HD1	1.91	0.53
1:A:751:TRP:HE3	1:A:794:PHE:CD1	2.27	0.52
1:A:698:ALA:HA	1:A:889:VAL:HG22	1.92	0.51
1:A:740:SER:HG	1:A:812:LEU:HD12	1.76	0.51
1:A:900:SER:O	1:A:904:PRO:HG2	2.10	0.51
2:B:7:TYR:HD2	2:B:8:THR:HG23	1.75	0.51
1:A:800:THR:OG1	1:A:803:GLU:HG3	2.11	0.50
1:A:773:TYR:O	1:A:777:LYS:HB2	2.10	0.50
1:A:737:ILE:O	1:A:741:TRP:HB3	2.11	0.50
3:A:1001:HFT:H2	3:A:1001:HFT:O10	2.11	0.49
1:A:762:LEU:HB2	1:A:770:PHE:HB2	1.94	0.49
1:A:709:GLU:HG3	1:A:892:PRO:HB3	1.95	0.49
1:A:670:GLN:N	1:A:671:PRO:CD	2.76	0.48
1:A:676:VAL:O	1:A:680:ILE:HG12	2.13	0.48
1:A:758:ASN:O	1:A:759:SER:HB2	2.14	0.48
1:A:887:VAL:O	1:A:888:SER:HB2	2.13	0.48
1:A:670:GLN:N	1:A:671:PRO:HD2	2.28	0.48
1:A:881:LEU:HA	1:A:891:PHE:CE1	2.50	0.47
1:A:713:VAL:HG12	1:A:717:LYS:HE2	1.96	0.46
1:A:688:GLY:N	1:A:767:ASP:OD2	2.49	0.46
1:A:891:PHE:HB3	1:A:896:ALA:HB2	1.97	0.46
1:A:711:GLN:NE2	1:A:745:MET:HG2	2.05	0.45
1:A:770:PHE:HE2	1:A:778:SER:HB3	1.81	0.44
1:A:818:VAL:HG22	1:A:910:LYS:O	2.16	0.44
1:A:847:LYS:O	1:A:848:ASN:HB2	2.17	0.44
1:A:850:THR:O	1:A:854:ARG:HB2	2.17	0.44
1:A:805:LEU:O	1:A:808:LYS:HB3	2.17	0.44
1:A:711:GLN:HE21	1:A:745:MET:HE3	1.81	0.43
1:A:733:GLN:HE21	1:A:733:GLN:HB3	1.68	0.43
1:A:761:MET:HG2	1:A:771:ASN:HA	2.01	0.42
1:A:729:HIS:O	1:A:731:ASP:N	2.52	0.42
1:A:753:SER:HB3	1:A:761:MET:O	2.20	0.42
1:A:687:ALA:HB3	1:A:767:ASP:OD2	2.20	0.42
1:A:734:MET:HB3	2:B:3:PHE:HE1	1.84	0.42
1:A:825:LYS:H	1:A:825:LYS:HG2	1.53	0.41
1:A:734:MET:SD	2:B:4:SER:HA	2.61	0.41
1:A:716:VAL:O	1:A:720:LYS:HG3	2.20	0.41
1:A:706:GLU:O	1:A:710:ARG:HG3	2.21	0.41
1:A:773:TYR:CE2	6:A:1107:HOH:O	2.56	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:858:GLN:O	1:A:862:LEU:N	2.53	0.41
1:A:899:ILE:HA	1:A:903:VAL:CG2	2.52	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	247/250 (99%)	225 (91%)	17 (7%)	5 (2%)	9	40
2	B	6/12 (50%)	6 (100%)	0	0	100	100
All	All	253/262 (97%)	231 (91%)	17 (7%)	5 (2%)	9	40

All (5) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	844	CYS
1	A	759	SER
1	A	730	VAL
1	A	815	ILE
1	A	848	ASN

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	225/226 (100%)	209 (93%)	16 (7%)	17	51
2	B	7/11 (64%)	7 (100%)	0	100	100
All	All	232/237 (98%)	216 (93%)	16 (7%)	18	53

All (16) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	674	LEU
1	A	684	VAL
1	A	707	LEU
1	A	726	ARG
1	A	745	MET
1	A	753	SER
1	A	773	TYR
1	A	777	LYS
1	A	789	HIS
1	A	790	LEU
1	A	810	LEU
1	A	819	ASP
1	A	825	LYS
1	A	854	ARG
1	A	887	VAL
1	A	895	MET

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

Mol	Chain	Res	Type
1	A	711	GLN
1	A	727	ASN
1	A	733	GLN
1	A	758	ASN
1	A	823	ASN
1	A	875	GLN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

WORLDWIDE
wwPDB
PROTEIN DATA BANK

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 ⓘ

There are no carbohydrates in this entry.

5.6 Ligand geometry ⓘ

3 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	HFT	A	1001	-	18,20,20	1.88	2 (11%)	23,31,31	4.79	5 (21%)
4	SO4	A	1002	-	4,4,4	0.56	0	6,6,6	3.42	3 (50%)
5	GOL	A	1003	-	5,5,5	0.47	0	5,5,5	0.47	0

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	HFT	A	1001	-	-	0/18/20/20	0/1/1/1
4	SO4	A	1002	-	-	0/0/0/0	0/0/0/0
5	GOL	A	1003	-	-	0/4/4/4	0/0/0/0

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	A	1001	HFT	C1-N9	-2.61	1.36	1.41
3	A	1001	HFT	C4-C3	7.41	1.50	1.40

All (8) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	A	1001	HFT	O11-C11-C12	-12.69	81.40	108.22
3	A	1001	HFT	O11-C11-C13	-11.09	84.78	108.22
3	A	1001	HFT	O11-C11-C10	-10.32	90.71	108.62
4	A	1002	SO4	O4-S-O3	-5.53	84.06	108.96
4	A	1002	SO4	O4-S-O2	-3.94	87.53	109.26
4	A	1002	SO4	O4-S-O1	-3.84	88.08	109.26
3	A	1001	HFT	O10-C10-C11	-2.36	118.46	120.92
3	A	1001	HFT	C13-C11-C12	10.58	121.50	111.13

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

2 monomers are involved in 3 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	A	1001	HFT	2	0
5	A	1003	GOL	1	0

5.7 Other polymers ⓘ

There are no such residues in this entry.

5.8 Polymer linkage issues ⓘ

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	249/250 (99%)	-0.29	8 (3%)	48	46	46, 74, 119, 150	20 (8%)
2	B	8/12 (66%)	0.62	2 (25%)	1	1	84, 94, 107, 119	0
All	All	257/262 (98%)	-0.26	10 (3%)	40	37	46, 74, 119, 150	20 (7%)

All (10) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	849	PRO	5.4
1	A	848	ASN	3.9
1	A	740	SER	3.7
2	B	8	THR	2.8
1	A	851	SER	2.6
2	B	6	TYR	2.5
1	A	670	GLN	2.1
1	A	852	CYS	2.1
1	A	756	ASN	2.0
1	A	741	TRP	2.0

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

There are no non-standard protein/DNA/RNA residues in this entry.

6.3 Carbohydrates ⓘ

There are no carbohydrates 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. LLDF column lists the quality of electron density of the group with respect to its neighbouring residues in protein, DNA or RNA chains. 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	LLDF	B-factors(Å^2)	Q<0.9
5	GOL	A	1003	6/6	0.77	0.28	1.05	67,75,81,82	0
3	HFT	A	1001	20/20	0.96	0.23	0.34	61,72,88,94	0
4	SO4	A	1002	5/5	0.95	0.11	-0.76	112,119,120,121	0

6.5 Other polymers (i)

There are no such residues in this entry.