



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 9, 2026 – 06:17 AM UTC

PDB ID : 6FUR / pdb_00006fur
Title : F11 T-Cell Receptor Recognising PKYVKQNTLKLAT Peptide Presented by HLA-DR*0101
Authors : Rizkallah, P.J.; Cole, D.K.
Deposited on : 2018-02-27
Resolution : 1.73 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

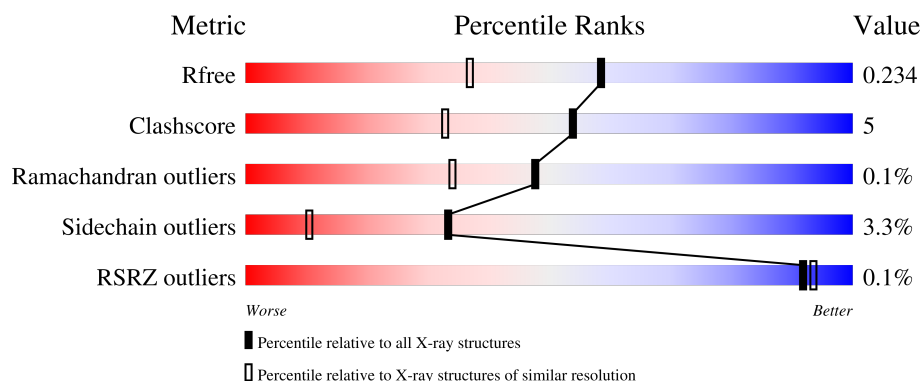
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.73 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	1187 (1.74-1.74)
Clashscore	190562	1207 (1.74-1.74)
Ramachandran outliers	187476	1200 (1.74-1.74)
Sidechain outliers	187428	1200 (1.74-1.74)
RSRZ outliers	180081	1188 (1.74-1.74)

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	202	87% 11% .
1	C	202	87% 11% .
2	B	240	92% 8% .
2	D	240	89% 10% .

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	EDO	D	308	-	-	X	-

2 Entry composition [i](#)

There are 6 unique types of molecules in this entry. The entry contains 7912 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.

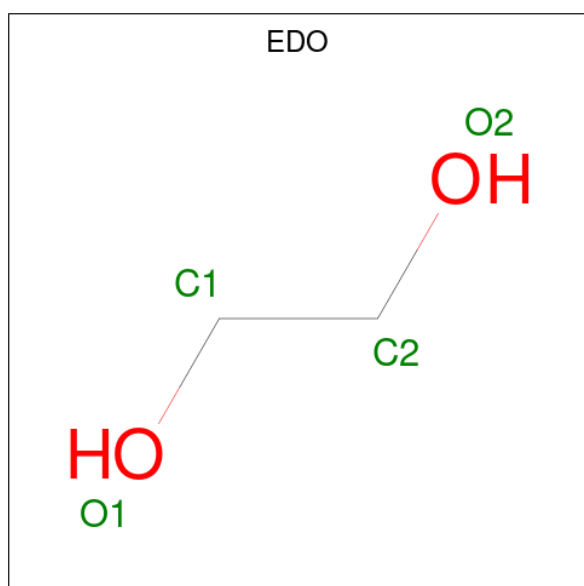
- Molecule 1 is a protein called Human F11 T-Cell Receptor alpha chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	202	Total	C	N	O	S	0	4	0
			1604	1014	261	318	11			
1	C	202	Total	C	N	O	S	0	4	0
			1606	1014	262	321	9			

- Molecule 2 is a protein called Human F11 T-Cell Receptor.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	B	240	Total	C	N	O	S	0	7	0
			1962	1227	341	384	10			
2	D	240	Total	C	N	O	S	0	3	0
			1930	1210	336	375	9			

- Molecule 3 is 1,2-ETHANEDIOL (CCD ID: EDO) (formula: C₂H₆O₂).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	A	1	Total C O 4 2 2	0	0
3	A	1	Total C O 4 2 2	0	0
3	B	1	Total C O 4 2 2	0	0
3	B	1	Total C O 4 2 2	0	0
3	C	1	Total C O 4 2 2	0	0
3	C	1	Total C O 4 2 2	0	0
3	C	1	Total C O 4 2 2	0	0
3	D	1	Total C O 4 2 2	0	0
3	D	1	Total C O 4 2 2	0	0
3	D	1	Total C O 4 2 2	0	0
3	D	1	Total C O 4 2 2	0	0
3	D	1	Total C O 4 2 2	0	0
3	D	1	Total C O 4 2 2	0	0
3	D	1	Total C O 4 2 2	0	0
3	D	1	Total C O 4 2 2	0	0
3	D	1	Total C O 4 2 2	0	0
3	D	1	Total C O 4 2 2	0	0

- Molecule 4 is SULFATE ION (CCD ID: SO4) (formula: O₄S).



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

- Molecule 5 is GLYCEROL (CCD ID: GOL) (formula: C₃H₈O₃).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
5	A	1	Total	C	O	0	0
			6	3	3		
5	A	1	Total	C	O	0	0
			6	3	3		
5	B	1	Total	C	O	0	0
			6	3	3		
5	B	1	Total	C	O	0	0
			6	3	3		
5	B	1	Total	C	O	0	0
			6	3	3		
5	C	1	Total	C	O	0	0
			6	3	3		
5	C	1	Total	C	O	0	0
			6	3	3		
5	C	1	Total	C	O	0	0
			6	3	3		
5	D	1	Total	C	O	0	0
			6	3	3		
5	D	1	Total	C	O	0	0
			6	3	3		

- Molecule 6 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	A	158	Total	O	0	0
			158	158		
6	B	174	Total	O	0	0
			174	174		

Continued on next page...

Continued from previous page...

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	C	144	Total 144	O 144	0	0
6	D	161	Total 161	O 161	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.

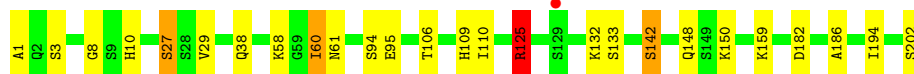
- Molecule 1: Human F11 T-Cell Receptor alpha chain

Chain A:  87% 11% .



- Molecule 1: Human F11 T-Cell Receptor alpha chain

Chain C:  87% 11% .



- Molecule 2: Human F11 T-Cell Receptor

Chain B:  92% 8% .



- Molecule 2: Human F11 T-Cell Receptor

Chain D:  89% 10% .



4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	50.65Å 114.86Å 85.33Å 90.00° 91.01° 90.00°	Depositor
Resolution (Å)	46.34 – 1.73 46.34 – 1.73	Depositor EDS
% Data completeness (in resolution range)	94.8 (46.34-1.73) 90.1 (46.34-1.73)	Depositor EDS
R_{merge}	0.07	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.26 (at 1.73Å)	Xtriage
Refinement program	REFMAC 5.8.0189	Depositor
R, R_{free}	0.189 , 0.226 0.197 , 0.234	Depositor DCC
R_{free} test set	4819 reflections (5.01%)	wwPDB-VP
Wilson B-factor (Å ²)	21.0	Xtriage
Anisotropy	0.248	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.34 , 24.7	EDS
L-test for twinning ²	$\langle L \rangle = 0.48$, $\langle L^2 \rangle = 0.30$	Xtriage
Estimated twinning fraction	0.317 for h,-k,-l	Xtriage
F_o, F_c correlation	0.97	EDS
Total number of atoms	7912	wwPDB-VP
Average B, all atoms (Å ²)	27.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.70% 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 [i](#)

5.1 Standard geometry [i](#)

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

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	1.14	1/1647 (0.1%)	1.07	4/2234 (0.2%)
1	C	1.14	1/1646 (0.1%)	1.08	5/2232 (0.2%)
2	B	1.10	0/2016	1.01	1/2737 (0.0%)
2	D	1.13	2/1984 (0.1%)	1.04	4/2695 (0.1%)
All	All	1.13	4/7293 (0.1%)	1.05	14/9898 (0.1%)

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	1
2	B	0	1
2	D	0	2
All	All	0	4

All (4) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	D	2	ASP	CA-C	6.56	1.61	1.52
1	A	27	SER	CA-C	-6.56	1.44	1.52
1	C	27	SER	N-CA	6.01	1.53	1.46
2	D	52	LYS	CA-C	5.67	1.60	1.52

All (14) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	D	2	ASP	N-CA-C	-11.83	87.97	108.20
1	A	3	SER	N-CA-C	7.01	117.84	108.38

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	27	SER	N-CA-C	-6.14	98.25	108.32
2	D	149	ASP	N-CA-C	6.11	120.45	113.19
1	C	27	SER	N-CA-C	6.05	119.13	110.24
1	A	61	ASN	N-CA-C	5.66	119.77	112.86
2	D	150	HIS	N-CA-C	5.65	117.73	108.52
1	C	125	ARG	NE-CZ-NH1	5.44	126.94	121.50
1	A	182	ASP	N-CA-C	5.43	119.65	113.19
1	C	3	SER	N-CA-C	5.39	115.66	108.38
2	D	52	LYS	N-CA-C	5.23	121.94	110.80
1	C	182	ASP	N-CA-C	5.13	119.29	113.19
1	C	142	SER	CB-CA-C	5.07	119.74	110.36
2	B	17	ARG	CG-CD-NE	-5.05	100.89	112.00

There are no chirality outliers.

All (4) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	129	SER	Peptide
2	B	1	ALA	Peptide
2	D	1	ALA	Peptide
2	D	239	ALA	Peptide

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	1604	0	1540	16	0
1	C	1606	0	1536	20	0
2	B	1962	0	1865	18	0
2	D	1930	0	1847	25	0
3	A	8	0	12	1	0
3	B	8	0	12	3	0
3	C	12	0	18	1	0
3	D	40	0	60	5	0
4	A	5	0	0	0	0
4	B	15	0	0	0	0
4	C	5	0	0	0	0

Continued on next page...

Continued from previous page...

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
4	D	20	0	0	0	0
5	A	12	0	16	0	0
5	B	18	0	24	0	0
5	C	18	0	24	2	0
5	D	12	0	16	0	0
6	A	158	0	0	2	0
6	B	174	0	0	1	0
6	C	144	0	0	2	0
6	D	161	0	0	3	0
All	All	7912	0	6970	70	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 5.

All (70) 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:D:12[A]:THR:HG21	2:D:18:ILE:HD11	1.48	0.93
1:C:38:GLN:HE22	2:D:36:GLN:HE22	1.16	0.93
1:A:20:LEU:CD2	1:A:77:THR:HG22	2.02	0.88
2:D:1:ALA:HB1	6:D:458:HOH:O	1.77	0.84
2:D:1:ALA:HB3	2:D:26:LYS:HG2	1.66	0.78
1:A:20:LEU:HD23	1:A:77:THR:HG22	1.63	0.77
1:A:38:GLN:HE22	2:B:36:GLN:HE22	1.32	0.77
2:D:4:THR:HA	3:D:308:EDO:C2	2.23	0.69
2:D:4:THR:HA	3:D:308:EDO:H21	1.77	0.67
1:C:125:ARG:HH11	1:C:125:ARG:HG3	1.61	0.66
2:D:144:THR:HG22	2:D:185:SER:OG	1.97	0.65
2:B:11:ILE:HD11	2:B:211:TYR:O	1.98	0.63
1:A:1:ALA:O	1:A:95:GLU:HG3	1.99	0.61
2:D:1:ALA:HB2	6:D:418:HOH:O	2.01	0.61
1:A:20:LEU:HD22	1:A:77:THR:HG22	1.82	0.61
2:D:12[A]:THR:CG2	2:D:18:ILE:HD11	2.28	0.61
1:A:129:SER:HA	6:A:404:HOH:O	2.02	0.59
1:C:1:ALA:CB	1:C:94:SER:O	2.52	0.57
2:B:65:VAL:C	3:B:302:EDO:H21	2.30	0.57
3:C:301:EDO:O1	5:C:307:GOL:H11	2.05	0.56
2:D:35:ARG:HD3	2:D:59:ILE:HD12	1.88	0.56
2:B:11:ILE:CD1	2:B:211:TYR:O	2.55	0.55
2:D:1:ALA:HB3	2:D:26:LYS:CG	2.37	0.55
2:D:4:THR:HA	3:D:308:EDO:H22	1.88	0.54

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:D:103:SER:OG	3:D:308:EDO:C1	2.56	0.54
1:C:1:ALA:HA	1:C:27:SER:HB2	1.90	0.54
2:D:35:ARG:HD3	2:D:59:ILE:CD1	2.37	0.54
1:C:159:LYS:NZ	6:C:404:HOH:O	2.42	0.52
1:C:38:GLN:HE22	2:D:36:GLN:NE2	1.98	0.51
1:A:38:GLN:HE22	2:B:36:GLN:NE2	2.06	0.51
2:B:35:ARG:HD3	2:B:59:ILE:HD12	1.93	0.51
1:C:10:HIS:ND1	1:C:109:HIS:HE1	2.09	0.51
1:A:38:GLN:NE2	2:B:36:GLN:HE22	2.07	0.50
1:C:1:ALA:HB2	1:C:94:SER:O	2.11	0.49
1:C:1:ALA:HB3	1:C:94:SER:O	2.12	0.49
1:A:10:HIS:ND1	1:A:109:HIS:HE1	2.10	0.49
1:C:60:ILE:H	1:C:60:ILE:HD13	1.78	0.49
2:D:173:LEU:C	2:D:173:LEU:HD12	2.38	0.49
1:A:7:LEU:HD22	1:C:186:ALA:HB1	1.96	0.48
2:B:175:GLU:OE2	2:B:185[B]:SER:OG	2.32	0.47
2:D:199:ASN:HD21	2:D:201:ARG:NH2	2.12	0.47
2:B:221:GLN:NE2	6:B:405:HOH:O	2.47	0.46
1:C:38:GLN:NE2	2:D:36:GLN:HE22	1.97	0.46
2:D:199:ASN:HD21	2:D:201:ARG:CZ	2.28	0.46
2:D:1:ALA:H2	2:D:25:THR:H	1.64	0.46
2:B:35:ARG:HG2	2:B:59:ILE:HD11	1.98	0.45
2:B:173:LEU:HD12	2:B:173:LEU:C	2.41	0.45
6:A:446:HOH:O	1:C:142:SER:HB2	2.17	0.45
2:B:11:ILE:CD1	2:B:211:TYR:C	2.90	0.44
1:A:148:GLN:OE1	1:C:148:GLN:NE2	2.50	0.44
2:B:35:ARG:HD3	2:B:59:ILE:CD1	2.48	0.44
1:C:125:ARG:NH2	2:D:127:SER:HA	2.32	0.44
2:B:68[A]:GLN:CD	2:B:74:SER:HG	2.25	0.43
2:B:21[A]:GLU:OE1	2:B:23:SER:OG	2.36	0.43
2:B:156:TRP:CH2	3:B:301:EDO:H12	2.53	0.43
1:A:161[B]:VAL:HG22	1:A:172:ASN:OD1	2.18	0.43
1:C:133:SER:O	6:C:401:HOH:O	2.21	0.43
2:D:68:GLN:HG3	6:D:456:HOH:O	2.20	0.42
2:D:103:SER:OG	3:D:308:EDO:H12	2.20	0.42
1:A:169:PHE:CZ	3:A:301:EDO:H21	2.54	0.42
1:A:35:TRP:CE2	1:A:76:LEU:HB2	2.55	0.41
2:B:68[A]:GLN:OE1	2:B:74:SER:OG	2.31	0.41
2:B:156:TRP:CZ3	3:B:301:EDO:H12	2.56	0.41
1:C:110:ILE:H	5:C:307:GOL:C3	2.33	0.41
1:A:11:VAL:HA	1:C:194:ILE:O	2.21	0.41

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:20:LEU:HD23	1:A:77:THR:CG2	2.42	0.41
2:D:1:ALA:HA	2:D:3:VAL:HG23	2.03	0.41
1:C:1:ALA:HA	1:C:27:SER:CB	2.51	0.40
2:D:1:ALA:N	2:D:25:THR:H	2.18	0.40
1:C:8:GLY:O	1:C:106:THR:HG23	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	205/202 (102%)	195 (95%)	10 (5%)	0	100	100
1	C	204/202 (101%)	195 (96%)	9 (4%)	0	100	100
2	B	245/240 (102%)	239 (98%)	6 (2%)	0	100	100
2	D	241/240 (100%)	236 (98%)	4 (2%)	1 (0%)	30	16
All	All	895/884 (101%)	865 (97%)	29 (3%)	1 (0%)	48	34

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
2	D	52	LYS

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	185/180 (103%)	177 (96%)	8 (4%)	26	6
1	C	184/180 (102%)	174 (95%)	10 (5%)	20	4
2	B	217/210 (103%)	210 (97%)	7 (3%)	34	11
2	D	213/210 (101%)	209 (98%)	4 (2%)	50	28
All	All	799/780 (102%)	770 (96%)	29 (4%)	33	9

All (29) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	29	VAL
1	A	41	ASN
1	A	58	LYS
1	A	95	GLU
1	A	150	LYS
1	A	165	ARG
1	A	182	ASP
1	A	202	SER
2	B	68[A]	GLN
2	B	68[B]	GLN
2	B	110	VAL
2	B	142	LEU
2	B	179	LEU
2	B	185[A]	SER
2	B	185[B]	SER
1	C	29	VAL
1	C	58	LYS
1	C	60	ILE
1	C	61	ASN
1	C	95[A]	GLU
1	C	95[B]	GLU
1	C	125	ARG
1	C	132	LYS
1	C	150	LYS
1	C	202	SER
2	D	16	LYS
2	D	21	GLU
2	D	142	LEU
2	D	179	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (21) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	2	GLN
1	A	24	ASN
1	A	38	GLN
1	A	61	ASN
1	A	109	HIS
1	A	143	GLN
1	A	190	ASN
1	A	191	ASN
2	B	163	HIS
2	B	180	ASN
2	B	221	GLN
2	B	229	GLN
1	C	38	GLN
1	C	109	HIS
1	C	145	ASN
1	C	190	ASN
1	C	191	ASN
2	D	9	ASN
2	D	135	GLN
2	D	199	ASN
2	D	221	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 oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

36 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
5	GOL	D	316	-	5,5,5	0.59	0	5,5,5	0.49	0
5	GOL	C	305	-	5,5,5	0.71	0	5,5,5	0.41	0
5	GOL	A	305	-	5,5,5	0.53	0	5,5,5	0.99	0
4	SO4	B	305	-	4,4,4	0.42	0	6,6,6	0.16	0
4	SO4	D	311	-	4,4,4	0.44	0	6,6,6	0.21	0
3	EDO	D	302	-	3,3,3	0.42	0	2,2,2	0.39	0
3	EDO	D	303	-	3,3,3	0.36	0	2,2,2	0.24	0
5	GOL	B	308	-	5,5,5	0.51	0	5,5,5	0.75	0
5	GOL	A	304	-	5,5,5	0.44	0	5,5,5	0.59	0
4	SO4	A	303	-	4,4,4	0.42	0	6,6,6	0.15	0
4	SO4	D	313	-	4,4,4	0.46	0	6,6,6	0.23	0
3	EDO	B	301	-	3,3,3	0.45	0	2,2,2	0.45	0
3	EDO	D	308	-	3,3,3	0.34	0	2,2,2	0.70	0
3	EDO	C	303	-	3,3,3	0.61	0	2,2,2	0.18	0
3	EDO	D	301	-	3,3,3	0.52	0	2,2,2	0.13	0
5	GOL	B	307	-	5,5,5	0.60	0	5,5,5	0.66	0
4	SO4	C	304	-	4,4,4	0.45	0	6,6,6	0.06	0
3	EDO	C	301	-	3,3,3	0.37	0	2,2,2	0.50	0
5	GOL	C	306	-	5,5,5	0.34	0	5,5,5	0.59	0
4	SO4	B	303	-	4,4,4	0.48	0	6,6,6	0.40	0
5	GOL	C	307	-	5,5,5	0.34	0	5,5,5	0.87	0
3	EDO	C	302	-	3,3,3	0.41	0	2,2,2	0.23	0
4	SO4	B	304	-	4,4,4	0.53	0	6,6,6	0.24	0
5	GOL	B	306	-	5,5,5	0.40	0	5,5,5	0.46	0
4	SO4	D	312	-	4,4,4	0.45	0	6,6,6	0.42	0
3	EDO	D	309	-	3,3,3	0.36	0	2,2,2	0.56	0
3	EDO	D	307	-	3,3,3	0.54	0	2,2,2	0.22	0
3	EDO	D	306	-	3,3,3	0.42	0	2,2,2	0.48	0
4	SO4	D	314	-	4,4,4	0.49	0	6,6,6	0.34	0
5	GOL	D	315	-	5,5,5	0.50	0	5,5,5	1.34	1 (20%)
3	EDO	B	302	-	3,3,3	0.36	0	2,2,2	0.31	0
3	EDO	A	302	-	3,3,3	0.53	0	2,2,2	0.14	0
3	EDO	D	304	-	3,3,3	0.46	0	2,2,2	0.33	0
3	EDO	D	305	-	3,3,3	0.53	0	2,2,2	0.17	0
3	EDO	A	301	-	3,3,3	0.35	0	2,2,2	0.38	0
3	EDO	D	310	-	3,3,3	0.33	0	2,2,2	0.56	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
5	GOL	D	316	-	-	4/4/4/4	-
5	GOL	C	305	-	-	4/4/4/4	-
5	GOL	A	305	-	-	2/4/4/4	-
3	EDO	D	302	-	-	1/1/1/1	-
3	EDO	D	303	-	-	1/1/1/1	-
5	GOL	B	308	-	-	4/4/4/4	-
5	GOL	A	304	-	-	3/4/4/4	-
3	EDO	B	301	-	-	1/1/1/1	-
3	EDO	D	308	-	-	0/1/1/1	-
3	EDO	C	303	-	-	1/1/1/1	-
3	EDO	D	301	-	-	0/1/1/1	-
5	GOL	B	307	-	-	2/4/4/4	-
3	EDO	C	301	-	-	1/1/1/1	-
5	GOL	C	306	-	-	2/4/4/4	-
5	GOL	C	307	-	-	0/4/4/4	-
3	EDO	C	302	-	-	1/1/1/1	-
5	GOL	B	306	-	-	4/4/4/4	-
3	EDO	D	309	-	-	0/1/1/1	-
3	EDO	D	307	-	-	1/1/1/1	-
3	EDO	D	306	-	-	1/1/1/1	-
5	GOL	D	315	-	-	2/4/4/4	-
3	EDO	B	302	-	-	1/1/1/1	-
3	EDO	A	302	-	-	0/1/1/1	-
3	EDO	D	304	-	-	0/1/1/1	-
3	EDO	D	305	-	-	1/1/1/1	-
3	EDO	A	301	-	-	1/1/1/1	-
3	EDO	D	310	-	-	0/1/1/1	-

There are no bond length outliers.

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	D	315	GOL	O2-C2-C3	-2.10	100.47	109.18

There are no chirality outliers.

All (38) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
5	A	304	GOL	O1-C1-C2-C3
5	A	305	GOL	O1-C1-C2-O2
5	A	305	GOL	O1-C1-C2-C3
5	B	306	GOL	O1-C1-C2-C3
5	B	308	GOL	O1-C1-C2-C3
5	C	305	GOL	O1-C1-C2-O2
5	C	305	GOL	O1-C1-C2-C3
5	C	305	GOL	C1-C2-C3-O3
5	C	306	GOL	C1-C2-C3-O3
5	D	315	GOL	C1-C2-C3-O3
5	D	316	GOL	O1-C1-C2-C3
5	D	316	GOL	C1-C2-C3-O3
5	B	308	GOL	O1-C1-C2-O2
5	B	306	GOL	C1-C2-C3-O3
5	B	307	GOL	C1-C2-C3-O3
5	B	308	GOL	C1-C2-C3-O3
5	A	304	GOL	O1-C1-C2-O2
5	B	308	GOL	O2-C2-C3-O3
5	D	316	GOL	O1-C1-C2-O2
5	D	316	GOL	O2-C2-C3-O3
3	D	305	EDO	O1-C1-C2-O2
5	B	306	GOL	O1-C1-C2-O2
5	C	305	GOL	O2-C2-C3-O3
5	C	306	GOL	O2-C2-C3-O3
5	D	315	GOL	O2-C2-C3-O3
3	B	301	EDO	O1-C1-C2-O2
3	C	301	EDO	O1-C1-C2-O2
3	C	303	EDO	O1-C1-C2-O2
3	D	307	EDO	O1-C1-C2-O2
3	C	302	EDO	O1-C1-C2-O2
5	B	307	GOL	O2-C2-C3-O3
5	A	304	GOL	C1-C2-C3-O3
5	B	306	GOL	O2-C2-C3-O3
3	B	302	EDO	O1-C1-C2-O2
3	D	302	EDO	O1-C1-C2-O2
3	D	303	EDO	O1-C1-C2-O2
3	D	306	EDO	O1-C1-C2-O2
3	A	301	EDO	O1-C1-C2-O2

There are no ring outliers.

6 monomers are involved in 11 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	B	301	EDO	2	0
3	D	308	EDO	5	0
3	C	301	EDO	1	0
5	C	307	GOL	2	0
3	B	302	EDO	1	0
3	A	301	EDO	1	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 [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	202/202 (100%)	-1.15	0 100 100	8, 23, 54, 79	4 (1%)
1	C	202/202 (100%)	-1.15	1 (0%) 87 91	12, 23, 52, 76	4 (1%)
2	B	240/240 (100%)	-1.21	0 100 100	9, 23, 43, 78	7 (2%)
2	D	240/240 (100%)	-1.23	0 100 100	11, 23, 40, 73	3 (1%)
All	All	884/884 (100%)	-1.19	1 (0%) 92 93	8, 23, 48, 79	18 (2%)

All (1) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	C	129	SER	2.5

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	EDO	D	302	4/4	0.95	0.08	71,72,72,72	0

Continued on next page...

Continued from previous page...

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
3	EDO	A	302	4/4	0.96	0.10	71,72,73,73	0
4	SO4	C	304	5/5	0.96	0.08	89,90,93,96	0
4	SO4	D	312	5/5	0.96	0.10	91,92,95,99	0
3	EDO	D	307	4/4	0.97	0.10	51,56,56,57	0
3	EDO	D	309	4/4	0.97	0.06	44,47,47,49	0
3	EDO	C	303	4/4	0.97	0.07	40,42,44,49	0
3	EDO	D	305	4/4	0.97	0.08	54,54,54,56	0
5	GOL	B	306	6/6	0.97	0.07	41,43,45,45	0
3	EDO	D	310	4/4	0.98	0.05	38,39,41,41	0
4	SO4	A	303	5/5	0.98	0.08	83,84,86,86	0
4	SO4	B	305	5/5	0.98	0.10	82,85,88,90	0
3	EDO	D	306	4/4	0.98	0.05	47,47,49,52	0
4	SO4	D	311	5/5	0.98	0.05	63,66,68,68	0
3	EDO	C	302	4/4	0.98	0.06	52,52,53,54	0
4	SO4	D	313	5/5	0.98	0.06	67,68,75,76	0
4	SO4	D	314	5/5	0.98	0.06	61,65,66,74	0
5	GOL	A	304	6/6	0.98	0.06	37,46,51,55	0
5	GOL	A	305	6/6	0.98	0.05	50,53,53,54	0
3	EDO	D	301	4/4	0.98	0.06	42,44,46,46	0
5	GOL	C	305	6/6	0.98	0.06	35,44,47,50	0
5	GOL	D	316	6/6	0.98	0.06	39,42,44,47	0
3	EDO	B	302	4/4	0.99	0.05	46,47,47,54	0
3	EDO	D	308	4/4	0.99	0.04	40,40,40,40	0
3	EDO	C	301	4/4	0.99	0.05	40,44,45,47	0
3	EDO	D	303	4/4	0.99	0.04	37,39,40,49	0
3	EDO	D	304	4/4	0.99	0.04	36,39,39,41	0
4	SO4	B	303	5/5	0.99	0.04	44,50,51,53	0
4	SO4	B	304	5/5	0.99	0.04	46,49,50,51	0
5	GOL	B	307	6/6	0.99	0.03	27,33,36,36	0
5	GOL	B	308	6/6	0.99	0.05	29,41,44,46	0
3	EDO	A	301	4/4	0.99	0.06	30,31,33,34	0
5	GOL	C	306	6/6	0.99	0.04	40,42,46,46	0
5	GOL	C	307	6/6	0.99	0.05	28,33,35,35	0
5	GOL	D	315	6/6	0.99	0.05	35,37,38,40	0
3	EDO	B	301	4/4	0.99	0.05	39,43,45,47	0

6.5 Other polymers

There are no such residues in this entry.