



wwPDB X-ray Structure Validation Summary Report ⓘ

Dec 25, 2024 – 12:10 PM JST

PDB ID : 8XUB
Title : Crystal structure of Y-50 TCR
Authors : Asa, M.; Nagae, M.; Yamasaki, S.
Deposited on : 2024-01-12
Resolution : 2.50 Å(reported)

This is a wwPDB X-ray Structure Validation Summary 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 : 4.02b-467
Mogul : 1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix) : 1.21
EDS : 3.0
Percentile statistics : 20231227.v01 (using entries in the PDB archive December 27th 2023)
CCP4 : 9.0.004 (Gargrove)
Density-Fitness : 1.0.11
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.40

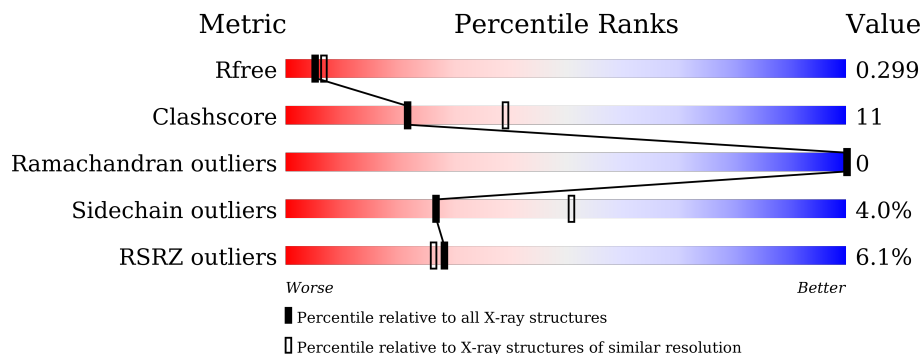
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.50 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.



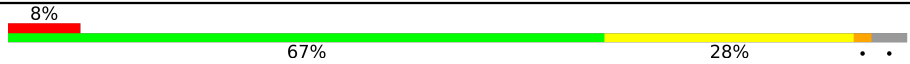

Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	164625	5504 (2.50-2.50)
Clashscore	180529	6282 (2.50-2.50)
Ramachandran outliers	177936	6191 (2.50-2.50)
Sidechain outliers	177891	6193 (2.50-2.50)
RSRZ outliers	164620	5504 (2.50-2.50)

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	205	 85% 13% .
1	C	205	 70% 29% .
1	E	205	 68% 26% . .
1	G	205	 72% 26% .
2	B	249	 76% 23% .
2	D	249	 78% 19% . .

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Mol	Chain	Length	Quality of chain
2	F	249	
2	H	249	

2 Entry composition [i](#)

There are 5 unique types of molecules in this entry. The entry contains 14371 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 Y-50 alpha.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	204	1616	1009	272	324	11	0	0	0
1	C	204	1616	1009	272	324	11	0	0	0
1	E	198	1569	979	265	314	11	0	0	0
1	G	204	1616	1009	272	324	11	0	0	0

- Molecule 2 is a protein called Y-50 beta.

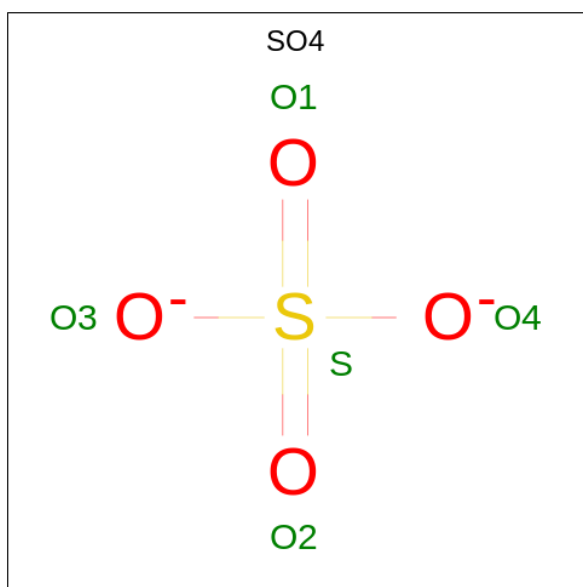
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
2	B	248	1974	1251	342	370	11	0	0	0
2	D	243	1945	1232	337	365	11	0	0	0
2	F	240	1929	1224	334	360	11	0	0	0
2	H	240	1930	1224	334	361	11	0	0	0

- Molecule 3 is 2-acetamido-2-deoxy-beta-D-glucopyranose (three-letter code: NAG) (formula: $C_8H_{15}NO_6$).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
			Total	C	N	O		
3	A	1	Total 14	8	1	5	0	0
3	B	1	Total 14	8	1	5	0	0
3	D	1	Total 14	8	1	5	0	0
3	E	1	Total 14	8	1	5	0	0
3	E	1	Total 14	8	1	5	0	0
3	F	1	Total 14	8	1	5	0	0
3	G	1	Total 14	8	1	5	0	0
3	H	1	Total 14	8	1	5	0	0

- Molecule 4 is SULFATE ION (three-letter code: 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	C	1	Total	O	S	0	0
			5	4	1		
4	D	1	Total	O	S	0	0
			5	4	1		
4	E	1	Total	O	S	0	0
			5	4	1		
4	G	1	Total	O	S	0	0
			5	4	1		

- Molecule 5 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	4	Total	O	0	0
			4	4		
5	B	11	Total	O	0	0
			11	11		
5	C	5	Total	O	0	0
			5	5		
5	D	5	Total	O	0	0
			5	5		
5	E	2	Total	O	0	0
			2	2		
5	F	2	Total	O	0	0
			2	2		

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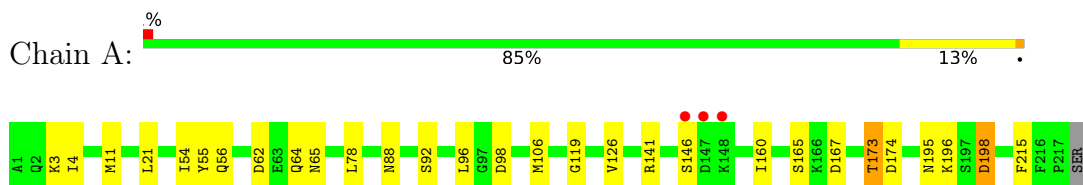
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Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	H	5	Total	O	0	0
			5	5		

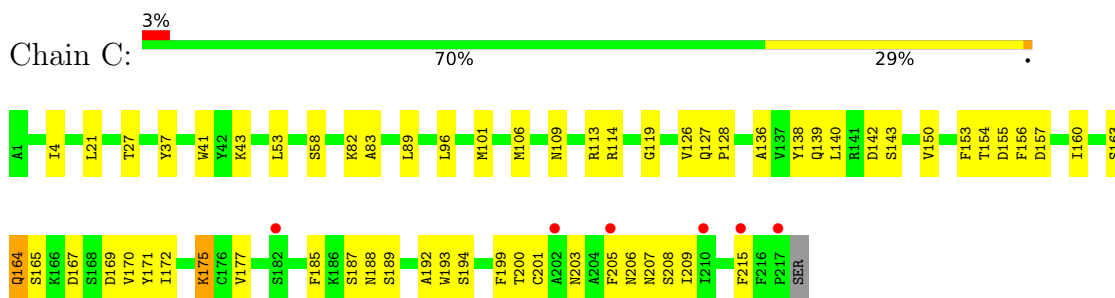
3 Residue-property plots [i](#)

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.

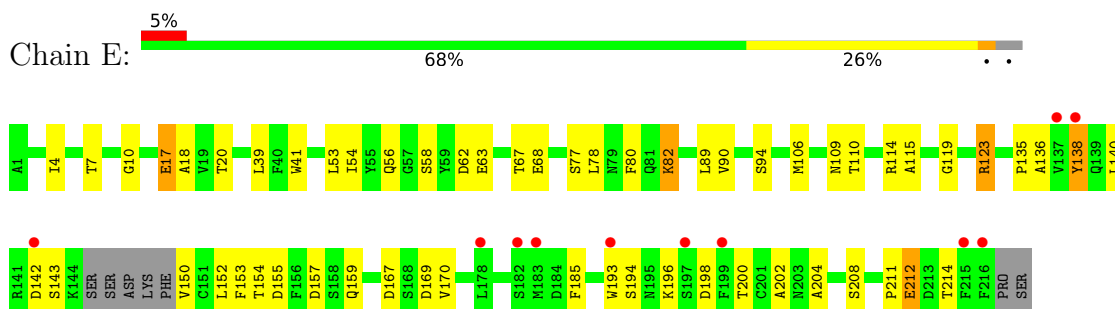
- Molecule 1: Y-50 alpha



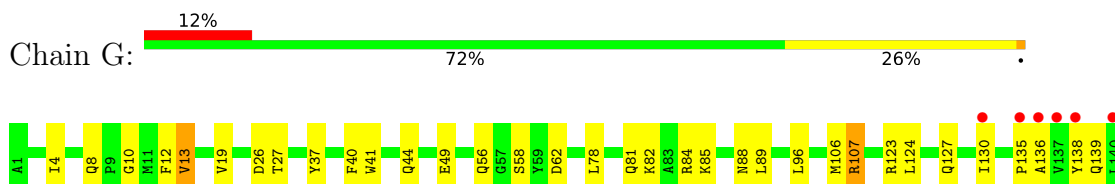
- Molecule 1: Y-50 alpha

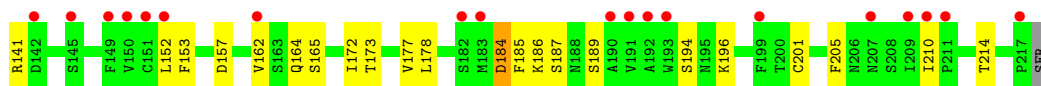


- Molecule 1: Y-50 alpha

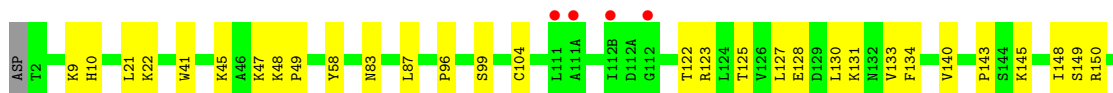
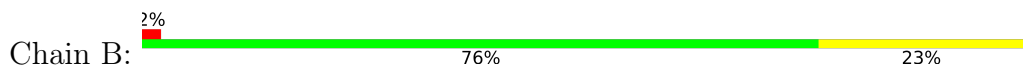


- Molecule 1: Y-50 alpha

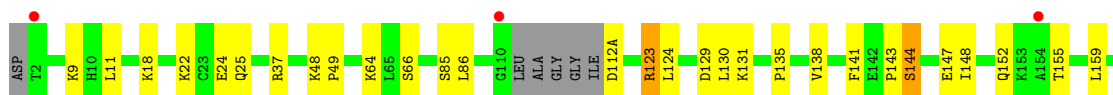
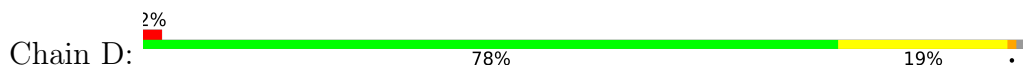




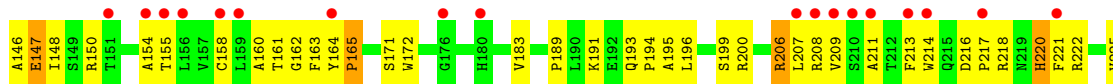
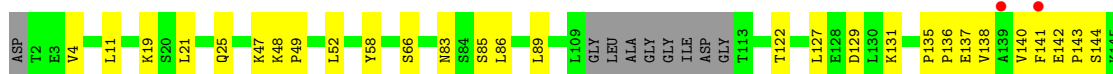
- Molecule 2: Y-50 beta



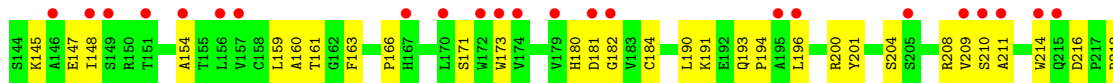
- Molecule 2: Y-50 beta



- Molecule 2: Y-50 beta



- Molecule 2: Y-50 beta





4 Data and refinement statistics i

Property	Value	Source
Space group	P 2 21 21	Depositor
Cell constants a, b, c, α , β , γ	68.11Å 168.69Å 173.12Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	44.03 – 2.50 44.03 – 2.50	Depositor EDS
% Data completeness (in resolution range)	100.0 (44.03-2.50) 100.0 (44.03-2.50)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.74 (at 2.51Å)	Xtrriage
Refinement program	PHENIX 1.20.1_4487	Depositor
R, R_{free}	0.226 , 0.299 0.226 , 0.299	Depositor DCC
R_{free} test set	3387 reflections (4.84%)	wwPDB-VP
Wilson B-factor (Å ²)	59.7	Xtrriage
Anisotropy	0.326	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.31 , 40.8	EDS
L-test for twinning ²	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.33$	Xtrriage
Estimated twinning fraction	0.015 for -h,l,k	Xtrriage
F_o, F_c correlation	0.94	EDS
Total number of atoms	14371	wwPDB-VP
Average B, all atoms (Å ²)	69.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.39% 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: SO4, NAG

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	0.52	0/1649	0.68	0/2228
1	C	0.48	0/1649	0.64	0/2228
1	E	0.42	0/1599	0.64	0/2159
1	G	0.45	0/1649	0.70	2/2228 (0.1%)
2	B	0.53	1/2030 (0.0%)	0.70	1/2761 (0.0%)
2	D	0.50	0/2000	0.67	0/2719
2	F	0.45	0/1984	0.66	0/2698
2	H	0.45	0/1985	0.64	0/2699
All	All	0.48	1/14545 (0.0%)	0.67	3/19720 (0.0%)

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	104	CYS	CB-SG	-5.75	1.72	1.81

All (3) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	G	184	ASP	CB-CG-OD1	9.61	126.95	118.30
1	G	184	ASP	CB-CG-OD2	-5.18	113.64	118.30
2	B	190	LEU	CA-CB-CG	5.05	126.91	115.30

There are no chirality outliers.

There are no planarity outliers.

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	1616	0	1532	18	0
1	C	1616	0	1534	44	0
1	E	1569	0	1488	40	0
1	G	1616	0	1533	40	0
2	B	1974	0	1911	38	1
2	D	1945	0	1877	31	1
2	F	1929	0	1867	59	1
2	H	1930	0	1867	46	1
3	A	14	0	13	2	0
3	B	14	0	13	0	0
3	D	14	0	13	0	0
3	E	28	0	26	0	0
3	F	14	0	13	0	0
3	G	14	0	13	0	0
3	H	14	0	13	0	0
4	A	5	0	0	0	0
4	B	5	0	0	1	0
4	C	5	0	0	0	0
4	D	5	0	0	0	0
4	E	5	0	0	0	0
4	G	5	0	0	0	0
5	A	4	0	0	0	0
5	B	11	0	0	0	0
5	C	5	0	0	0	0
5	D	5	0	0	0	0
5	E	2	0	0	0	0
5	F	2	0	0	0	0
5	H	5	0	0	0	0
All	All	14371	0	13713	296	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 11.

The worst 5 of 296 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:G:13:VAL:HG11	1:G:19:VAL:HG22	1.42	0.99
2:D:236:TRP:HB2	2:D:242:LYS:HG3	1.45	0.96
1:G:12:PHE:HD1	1:G:127:GLN:HE22	1.14	0.92

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:156:PHE:HB2	1:C:160:ILE:HD13	1.53	0.88
1:G:135:PRO:HB2	1:G:214:THR:HG22	1.57	0.86

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)
2:F:58:TYR:O	2:H:37:ARG:NH2[1_655]	2.10	0.10
2:B:58:TYR:O	2:D:37:ARG:NH2[2_455]	2.16	0.04

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	202/205 (98%)	195 (96%)	7 (4%)	0	100	100
1	C	202/205 (98%)	185 (92%)	17 (8%)	0	100	100
1	E	194/205 (95%)	178 (92%)	16 (8%)	0	100	100
1	G	202/205 (98%)	187 (93%)	15 (7%)	0	100	100
2	B	246/249 (99%)	239 (97%)	7 (3%)	0	100	100
2	D	239/249 (96%)	228 (95%)	11 (5%)	0	100	100
2	F	236/249 (95%)	222 (94%)	14 (6%)	0	100	100
2	H	236/249 (95%)	227 (96%)	9 (4%)	0	100	100
All	All	1757/1816 (97%)	1661 (94%)	96 (6%)	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	
1	A	181/182 (100%)	174 (96%)	7 (4%)	27	52
1	C	181/182 (100%)	175 (97%)	6 (3%)	33	59
1	E	175/182 (96%)	164 (94%)	11 (6%)	15	30
1	G	181/182 (100%)	177 (98%)	4 (2%)	47	73
2	B	218/219 (100%)	211 (97%)	7 (3%)	34	60
2	D	216/219 (99%)	207 (96%)	9 (4%)	25	49
2	F	215/219 (98%)	205 (95%)	10 (5%)	22	44
2	H	215/219 (98%)	206 (96%)	9 (4%)	25	49
All	All	1582/1604 (99%)	1519 (96%)	63 (4%)	27	51

5 of 63 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
2	D	238	GLN
2	H	84	SER
1	E	138	TYR
2	H	3	GLU
2	H	180	HIS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 9 such sidechains are listed below:

Mol	Chain	Res	Type
1	G	79	ASN
1	G	127	GLN
2	D	17	ASN
2	D	193	GLN
2	F	83	ASN

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](#)

14 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
4	SO4	D	302	-	4,4,4	0.17	0	6,6,6	0.25	0
4	SO4	A	302	-	4,4,4	0.29	0	6,6,6	0.24	0
4	SO4	G	302	-	4,4,4	0.27	0	6,6,6	0.28	0
3	NAG	H	301	2	14,14,15	0.58	1 (7%)	17,19,21	0.77	1 (5%)
3	NAG	F	301	2	14,14,15	0.27	0	17,19,21	1.18	1 (5%)
4	SO4	C	301	-	4,4,4	0.34	0	6,6,6	0.25	0
3	NAG	G	301	1	14,14,15	0.48	0	17,19,21	0.50	0
3	NAG	D	301	2	14,14,15	0.68	1 (7%)	17,19,21	0.70	1 (5%)
4	SO4	B	302	-	4,4,4	0.16	0	6,6,6	0.24	0
3	NAG	A	301	1	14,14,15	0.67	0	17,19,21	0.55	0
3	NAG	E	302	1	14,14,15	0.66	1 (7%)	17,19,21	0.95	1 (5%)
3	NAG	B	301	2	14,14,15	0.43	0	17,19,21	0.81	1 (5%)
4	SO4	E	303	-	4,4,4	0.24	0	6,6,6	0.37	0
3	NAG	E	301	1	14,14,15	0.27	0	17,19,21	0.43	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	NAG	H	301	2	-	0/6/23/26	0/1/1/1
3	NAG	F	301	2	-	2/6/23/26	0/1/1/1
3	NAG	G	301	1	-	2/6/23/26	0/1/1/1
3	NAG	D	301	2	-	0/6/23/26	0/1/1/1
3	NAG	A	301	1	-	2/6/23/26	0/1/1/1
3	NAG	E	302	1	-	2/6/23/26	0/1/1/1
3	NAG	B	301	2	-	0/6/23/26	0/1/1/1
3	NAG	E	301	1	-	0/6/23/26	0/1/1/1

All (3) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	D	301	NAG	O5-C1	2.28	1.47	1.43
3	E	302	NAG	C1-C2	2.19	1.55	1.52
3	H	301	NAG	O5-C1	2.02	1.46	1.43

All (5) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	F	301	NAG	C1-O5-C5	4.11	117.76	112.19
3	E	302	NAG	C1-O5-C5	3.37	116.76	112.19
3	H	301	NAG	C1-O5-C5	2.56	115.66	112.19
3	D	301	NAG	C1-O5-C5	2.38	115.42	112.19
3	B	301	NAG	C1-O5-C5	2.14	115.09	112.19

There are no chirality outliers.

5 of 8 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	G	301	NAG	O5-C5-C6-O6
3	E	302	NAG	O5-C5-C6-O6
3	E	302	NAG	C4-C5-C6-O6
3	A	301	NAG	C4-C5-C6-O6
3	G	301	NAG	C4-C5-C6-O6

There are no ring outliers.

2 monomers are involved in 3 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	B	302	SO4	1	0
3	A	301	NAG	2	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	204/205 (99%)	0.12	3 (1%) 71 68	35, 57, 86, 105	0
1	C	204/205 (99%)	0.29	6 (2%) 54 50	38, 65, 102, 111	0
1	E	198/205 (96%)	0.44	11 (5%) 31 29	45, 71, 112, 130	0
1	G	204/205 (99%)	0.62	25 (12%) 9 9	43, 76, 110, 121	0
2	B	248/249 (99%)	0.03	5 (2%) 64 62	32, 55, 92, 113	0
2	D	243/249 (97%)	0.13	5 (2%) 63 60	36, 61, 91, 108	0
2	F	240/249 (96%)	0.56	20 (8%) 19 18	37, 79, 111, 122	0
2	H	240/249 (96%)	0.64	34 (14%) 7 7	39, 77, 117, 146	0
All	All	1781/1816 (98%)	0.35	109 (6%) 28 26	32, 64, 109, 146	0

The worst 5 of 109 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
2	H	174	VAL	4.1
2	D	154	ALA	4.0
2	H	209	VAL	4.0
2	B	111(A)	ALA	3.9
1	E	137	VAL	3.9

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
3	NAG	E	302	14/15	0.65	0.16	94,104,107,107	0
3	NAG	E	301	14/15	0.67	0.12	84,97,104,105	0
3	NAG	G	301	14/15	0.68	0.11	86,94,104,107	0
3	NAG	A	301	14/15	0.71	0.12	77,81,86,90	0
4	SO4	B	302	5/5	0.81	0.14	72,80,95,95	0
4	SO4	D	302	5/5	0.81	0.09	78,80,97,99	0
4	SO4	E	303	5/5	0.84	0.17	69,73,81,86	0
4	SO4	A	302	5/5	0.87	0.15	58,61,65,82	0
4	SO4	G	302	5/5	0.88	0.12	61,64,76,79	0
3	NAG	F	301	14/15	0.92	0.10	31,49,58,67	0
3	NAG	B	301	14/15	0.92	0.09	32,44,52,53	0
4	SO4	C	301	5/5	0.92	0.14	62,63,76,83	0
3	NAG	D	301	14/15	0.94	0.07	31,45,57,61	0
3	NAG	H	301	14/15	0.94	0.06	34,50,53,67	0

6.5 Other polymers [i](#)

There are no such residues in this entry.