



Full wwPDB X-ray Structure Validation Report ⓘ

Jun 18, 2026 – 12:12 PM EDT

PDB ID : 9EJD / pdb_00009ejd
Title : Crystal structure of HLA-B*07:02 with the 9-mer TP53 mutant peptide SPILTIITL
Authors : Tan, K.; Mallis, R.J.; Reinherz, E.L.
Deposited on : 2024-11-27
Resolution : 2.15 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

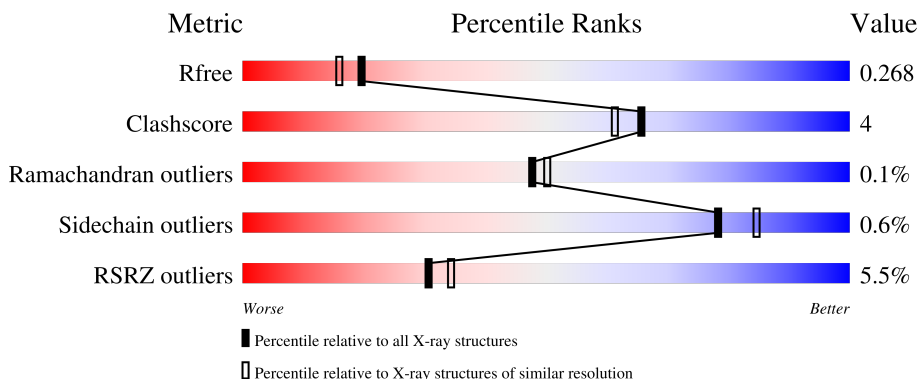
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.15 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	2057 (2.16-2.16)
Clashscore	190562	2159 (2.16-2.16)
Ramachandran outliers	187476	2134 (2.16-2.16)
Sidechain outliers	187428	2133 (2.16-2.16)
RSRZ outliers	180081	2059 (2.16-2.16)

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	277	 6% 87% 12%
1	D	277	 6% 91% 9%
2	B	100	 2% 85% 15%
2	E	100	 3% 94% 5%
3	C	9	 100%

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Mol	Chain	Length	Quality of chain
3	F	9	 <p>A horizontal bar chart representing the quality of chain. The bar is divided into three segments: a red segment on the left labeled '22%', a green segment in the middle labeled '89%', and a yellow segment on the right labeled '11%'.</p>

2 Entry composition [i](#)

There are 8 unique types of molecules in this entry. The entry contains 6640 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 HLA class I histocompatibility antigen, B alpha chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	276	Total	C	N	O	S	0	1	0
			2267	1408	414	438	7			
1	D	276	Total	C	N	O	S	0	2	0
			2275	1413	417	438	7			

There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	0	MET	-	initiating methionine	UNP P01889
D	0	MET	-	initiating methionine	UNP P01889

- Molecule 2 is a protein called Beta-2-microglobulin.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
2	B	100	Total	C	N	O	S	0	0	0
			837	533	141	159	4			
2	E	100	Total	C	N	O	S	0	0	0
			837	533	141	159	4			

There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
B	0	MET	-	initiating methionine	UNP P61769
E	0	MET	-	initiating methionine	UNP P61769

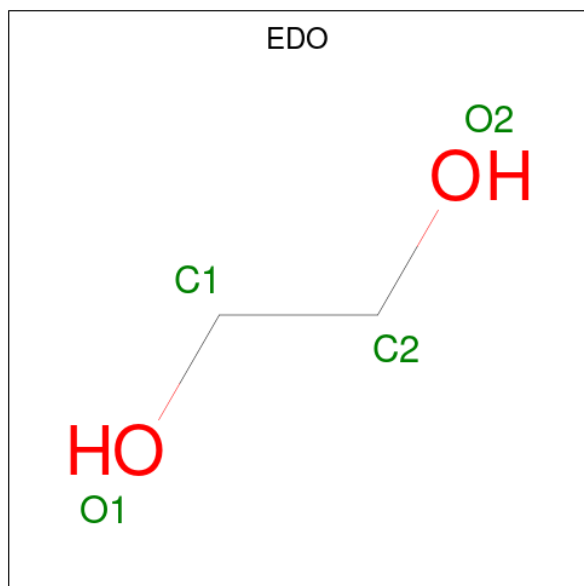
- Molecule 3 is a protein called Peptide from Cellular tumor antigen p53.

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
			Total	C	N	O			
3	C	9	Total	C	N	O	0	0	0
			68	46	9	13			
3	F	9	Total	C	N	O	0	0	0
			68	46	9	13			

There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
C	1	SER	ARG	variant	UNP P04637
F	1	SER	ARG	variant	UNP P04637

- Molecule 4 is 1,2-ETHANEDIOL (CCD ID: EDO) (formula: C₂H₆O₂).



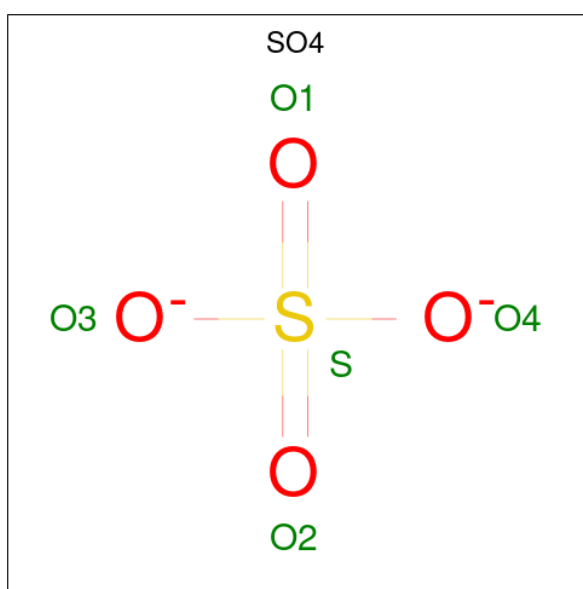
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	A	1	Total C O 4 2 2	0	0
4	A	1	Total C O 4 2 2	0	0
4	A	1	Total C O 4 2 2	0	0
4	A	1	Total C O 4 2 2	0	0
4	B	1	Total C O 4 2 2	0	0
4	B	1	Total C O 4 2 2	0	0
4	B	1	Total C O 4 2 2	0	0
4	D	1	Total C O 4 2 2	0	0
4	D	1	Total C O 4 2 2	0	0
4	D	1	Total C O 4 2 2	0	0

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Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	D	1	Total C O 4 2 2	0	0
4	D	1	Total C O 4 2 2	0	0
4	D	1	Total C O 4 2 2	0	0
4	E	1	Total C O 4 2 2	0	0

- Molecule 5 is SULFATE ION (CCD ID: SO4) (formula: O₄S).



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

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

- Molecule 6 is CHLORIDE ION (CCD ID: CL) (formula: Cl).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
6	A	1	Total Cl 1 1	0	0
6	B	2	Total Cl 2 2	0	0
6	D	6	Total Cl 6 6	0	0
6	E	2	Total Cl 2 2	0	0

- Molecule 7 is NICKEL (II) ION (CCD ID: NI) (formula: Ni).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
7	A	1	Total Ni 1 1	0	0
7	D	1	Total Ni 1 1	0	0

- Molecule 8 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
8	A	54	Total O 54 54	0	0
8	B	18	Total O 18 18	0	0
8	C	3	Total O 3 3	0	0

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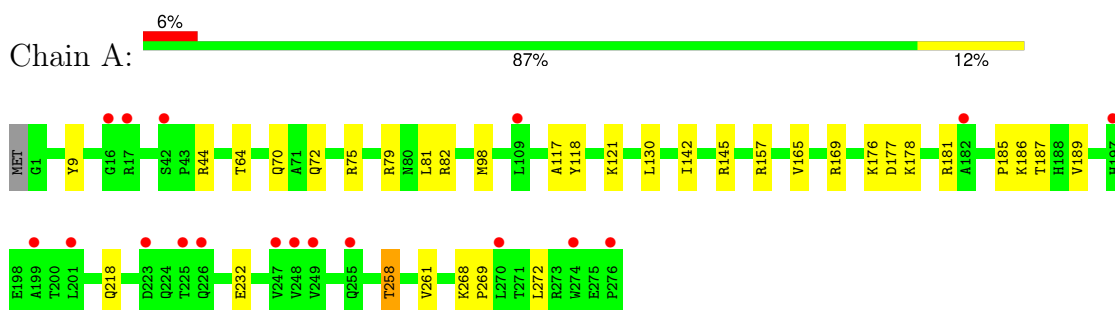
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Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
8	D	48	Total 48	O 48	0	0
8	E	26	Total 26	O 26	0	0
8	F	5	Total 5	O 5	0	0

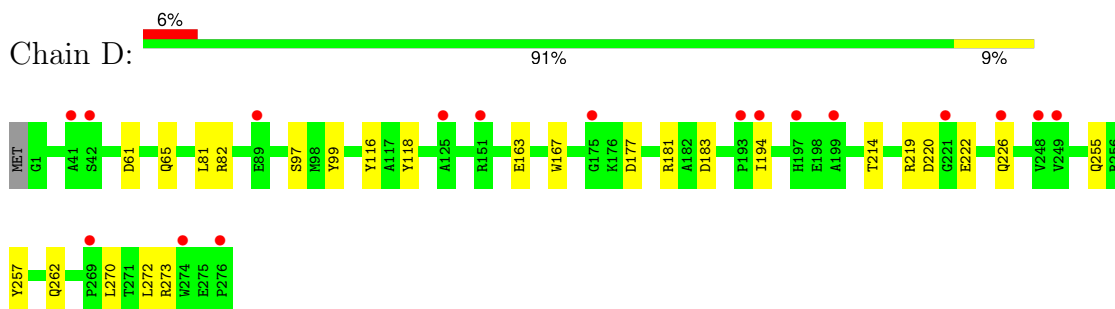
3 Residue-property plots [i](#)

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.

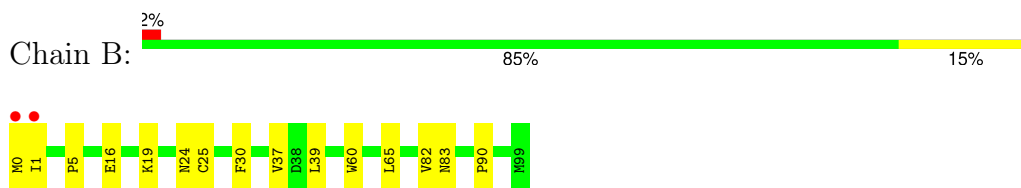
- Molecule 1: HLA class I histocompatibility antigen, B alpha chain



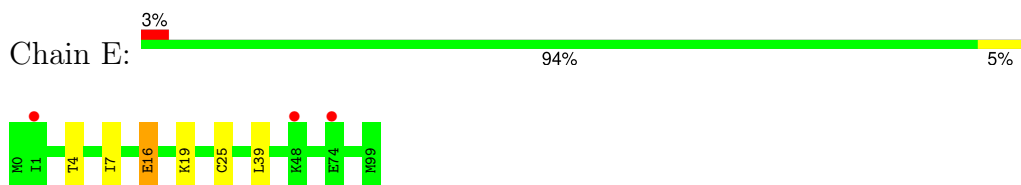
- Molecule 1: HLA class I histocompatibility antigen, B alpha chain



- Molecule 2: Beta-2-microglobulin



- Molecule 2: Beta-2-microglobulin




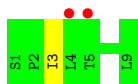
- Molecule 3: Peptide from Cellular tumor antigen p53

Chain C:  100%

There are no outlier residues recorded for this chain.

- Molecule 3: Peptide from Cellular tumor antigen p53

Chain F:  22% 89% 11%



4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 2	Depositor
Cell constants a, b, c, α , β , γ	175.43Å 64.55Å 83.97Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	44.20 – 2.15 44.20 – 2.15	Depositor EDS
% Data completeness (in resolution range)	95.8 (44.20-2.15) 95.9 (44.20-2.15)	Depositor EDS
R_{merge}	0.11	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.43 (at 2.16Å)	Xtrriage
Refinement program	PHENIX 1.21.2_5419	Depositor
R, R_{free}	0.233 , 0.267 0.233 , 0.268	Depositor DCC
R_{free} test set	2568 reflections (4.90%)	wwPDB-VP
Wilson B-factor (Å ²)	40.2	Xtrriage
Anisotropy	0.203	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.31 , 29.8	EDS
L-test for twinning ²	$\langle L \rangle = 0.45$, $\langle L^2 \rangle = 0.27$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
F_o, F_c correlation	0.94	EDS
Total number of atoms	6640	wwPDB-VP
Average B, all atoms (Å ²)	50.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The analyses of the Patterson function reveals a significant off-origin peak that is 32.50 % of the origin peak, indicating pseudo-translational symmetry. The chance of finding a peak of this or larger height randomly in a structure without pseudo-translational symmetry is equal to 9.3092e-04. The detected translational NCS is most likely also responsible for the elevated intensity ratio.*

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: EDO, NI, CL, 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	0.10	0/2333	0.26	0/3169
1	D	0.10	0/2344	0.28	0/3183
2	B	0.11	0/860	0.27	0/1162
2	E	0.09	0/860	0.27	0/1162
3	C	0.07	0/68	0.28	0/92
3	F	0.09	0/68	0.24	0/92
All	All	0.10	0/6533	0.27	0/8860

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 [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	2267	0	2114	23	0
1	D	2275	0	2127	15	0
2	B	837	0	802	11	0
2	E	837	0	803	4	0
3	C	68	0	83	0	0
3	F	68	0	83	1	0
4	A	16	0	24	1	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
4	B	12	0	17	0	0
4	D	24	0	36	3	0
4	E	4	0	6	1	0
5	A	15	0	0	0	0
5	B	15	0	0	0	0
5	D	15	0	0	0	0
5	E	20	0	0	0	0
6	A	1	0	0	0	0
6	B	2	0	0	0	0
6	D	6	0	0	0	0
6	E	2	0	0	0	0
7	A	1	0	0	0	0
7	D	1	0	0	0	0
8	A	54	0	0	0	0
8	B	18	0	0	0	0
8	C	3	0	0	0	0
8	D	48	0	0	0	0
8	E	26	0	0	0	0
8	F	5	0	0	0	0
All	All	6640	0	6095	48	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 (48) 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:145:ARG:HB3	1:D:226:GLN:HE22	1.63	0.64
1:A:72:GLN:HG3	1:A:75:ARG:HH21	1.62	0.64
1:D:82[A]:ARG:HH22	4:D:312:EDO:H12	1.64	0.62
2:B:16:GLU:HB3	2:B:19:LYS:HG3	1.80	0.62
1:D:219:ARG:HH21	1:D:222:GLU:HB2	1.66	0.60
1:A:268:LYS:HD2	1:A:269:PRO:HD2	1.84	0.59
1:A:189:VAL:HG23	1:A:272:LEU:HD12	1.84	0.58
1:A:142:ILE:HD11	4:D:301:EDO:H21	1.88	0.56
2:E:7:ILE:H	4:E:107:EDO:H11	1.70	0.56
1:A:130:LEU:HB2	1:A:157:ARG:HD3	1.89	0.55
1:A:186:LYS:HE3	1:A:186:LYS:HA	1.92	0.52
2:E:16:GLU:HG3	2:E:19:LYS:HD2	1.92	0.51
2:E:25:CYS:HB2	2:E:39:LEU:HD21	1.93	0.50
1:D:219:ARG:NH2	1:D:222:GLU:HB2	2.27	0.49

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:183:ASP:HB3	4:D:314:EDO:H12	1.96	0.48
1:D:163:GLU:HG2	1:D:167:TRP:CD1	2.49	0.47
1:A:72:GLN:HG3	1:A:75:ARG:NH2	2.30	0.47
1:A:98[B]:MET:HG2	2:B:60:TRP:CH2	2.50	0.46
1:A:218:GLN:HB2	1:A:258:THR:HG23	1.97	0.46
2:B:24:ASN:HB3	2:B:65:LEU:HD11	1.97	0.46
2:B:5:PRO:HB3	2:B:30:PHE:HB3	1.97	0.46
1:A:117:ALA:HB2	2:B:60:TRP:CE2	2.51	0.46
1:D:270:LEU:HD22	1:D:272:LEU:HD21	1.99	0.45
1:D:214:THR:HB	1:D:262:GLN:HB2	1.99	0.45
1:D:99:TYR:CZ	3:F:3:ILE:HG22	2.53	0.44
1:D:177:ASP:HA	1:D:181:ARG:HG2	1.99	0.44
1:A:177:ASP:HB2	1:A:178:LYS:HD2	2.00	0.43
1:D:219:ARG:HB2	1:D:257:TYR:CE2	2.53	0.43
1:D:255:GLN:HE22	1:D:273:ARG:HH11	1.66	0.43
1:A:232:GLU:HA	4:A:302:EDO:H11	1.99	0.43
1:A:268:LYS:HD3	1:A:268:LYS:HA	1.87	0.43
1:D:61:ASP:O	1:D:65:GLN:HG2	2.18	0.43
1:A:79:ARG:HG2	1:A:82:ARG:HH12	1.83	0.43
1:A:81:LEU:HD13	1:A:118:TYR:CD1	2.53	0.43
1:A:121:LYS:HG2	2:B:1:ILE:HG13	2.00	0.43
1:A:181:ARG:HE	1:A:181:ARG:HB2	1.63	0.43
1:D:97:SER:HB3	1:D:116:TYR:CD2	2.54	0.42
1:A:187:THR:HG21	1:A:261:VAL:HG21	2.00	0.42
2:B:0:MET:HB3	2:E:4:THR:CG2	2.49	0.42
1:A:9:TYR:CE2	1:A:70:GLN:HG2	2.54	0.42
2:B:0:MET:HE2	2:B:0:MET:HB2	1.93	0.42
2:B:37:VAL:HG22	2:B:82:VAL:HG22	2.02	0.42
1:A:185:PRO:C	1:A:186:LYS:HD2	2.45	0.42
2:B:83:ASN:ND2	2:B:90:PRO:HG3	2.36	0.41
1:A:44:ARG:HG3	1:A:64:THR:OG1	2.21	0.41
1:A:165:VAL:O	1:A:169:ARG:HG3	2.21	0.40
1:D:81:LEU:HD13	1:D:118:TYR:CD1	2.56	0.40
2:B:25:CYS:HB2	2:B:39:LEU:HD21	2.04	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	275/277 (99%)	267 (97%)	8 (3%)	0	100	100
1	D	276/277 (100%)	266 (96%)	9 (3%)	1 (0%)	30	26
2	B	98/100 (98%)	97 (99%)	1 (1%)	0	100	100
2	E	98/100 (98%)	97 (99%)	1 (1%)	0	100	100
3	C	7/9 (78%)	7 (100%)	0	0	100	100
3	F	7/9 (78%)	7 (100%)	0	0	100	100
All	All	761/772 (99%)	741 (97%)	19 (2%)	1 (0%)	48	50

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	D	220	ASP

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	235/235 (100%)	233 (99%)	2 (1%)	70	77
1	D	236/235 (100%)	235 (100%)	1 (0%)	84	89
2	B	95/95 (100%)	95 (100%)	0	100	100
2	E	95/95 (100%)	94 (99%)	1 (1%)	65	72
3	C	9/9 (100%)	9 (100%)	0	100	100
3	F	9/9 (100%)	9 (100%)	0	100	100

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles
All	All	679/678 (100%)	675 (99%)	4 (1%)	78 84

All (4) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	176	LYS
1	A	258	THR
1	D	194	ILE
2	E	16	GLU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (12) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	188	HIS
1	A	226	GLN
1	A	255	GLN
1	A	262	GLN
2	B	13	HIS
2	B	17	ASN
1	D	188	HIS
1	D	197	HIS
1	D	226	GLN
1	D	255	GLN
1	D	260	HIS
2	E	13	HIS

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

Of 40 ligands modelled in this entry, 13 are monoatomic - leaving 27 for Mogul analysis.

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	EDO	A	303	-	3,3,3	0.25	0	2,2,2	0.40	0
5	SO4	D	302	-	4,4,4	0.66	0	6,6,6	0.07	0
5	SO4	E	104	-	4,4,4	0.66	0	6,6,6	0.09	0
4	EDO	D	315	-	3,3,3	0.25	0	2,2,2	0.36	0
4	EDO	D	313	-	3,3,3	0.25	0	2,2,2	0.34	0
5	SO4	B	102	-	4,4,4	0.67	0	6,6,6	0.09	0
5	SO4	E	102	-	4,4,4	0.66	0	6,6,6	0.08	0
4	EDO	A	302	-	3,3,3	0.25	0	2,2,2	0.34	0
4	EDO	A	301	-	3,3,3	0.25	0	2,2,2	0.35	0
5	SO4	A	304	-	4,4,4	0.66	0	6,6,6	0.07	0
5	SO4	A	305	-	4,4,4	0.66	0	6,6,6	0.08	0
5	SO4	D	303	-	4,4,4	0.66	0	6,6,6	0.08	0
5	SO4	E	103	-	4,4,4	0.66	0	6,6,6	0.09	0
4	EDO	E	107	-	3,3,3	0.25	0	2,2,2	0.35	0
4	EDO	D	314	-	3,3,3	0.25	0	2,2,2	0.36	0
5	SO4	B	104	-	4,4,4	0.66	0	6,6,6	0.08	0
5	SO4	D	304	-	4,4,4	0.67	0	6,6,6	0.08	0
4	EDO	D	301	-	3,3,3	0.24	0	2,2,2	0.36	0
4	EDO	A	309	-	3,3,3	0.25	0	2,2,2	0.37	0
4	EDO	B	101	-	3,3,3	0.25	0	2,2,2	0.34	0
5	SO4	E	101	-	4,4,4	0.66	0	6,6,6	0.08	0
4	EDO	B	107	-	3,3,3	0.25	0	2,2,2	0.33	0
4	EDO	B	108	-	3,3,3	0.24	0	2,2,2	0.37	0
5	SO4	A	306	-	4,4,4	0.66	0	6,6,6	0.08	0
4	EDO	D	312	-	3,3,3	0.25	0	2,2,2	0.33	0
5	SO4	B	103	-	4,4,4	0.66	0	6,6,6	0.09	0
4	EDO	D	316	-	3,3,3	0.25	0	2,2,2	0.33	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
4	EDO	B	107	-	-	0/1/1/1	-
4	EDO	A	303	-	-	0/1/1/1	-
4	EDO	B	108	-	-	1/1/1/1	-
4	EDO	A	302	-	-	1/1/1/1	-
4	EDO	E	107	-	-	1/1/1/1	-
4	EDO	D	314	-	-	0/1/1/1	-
4	EDO	A	301	-	-	0/1/1/1	-
4	EDO	D	315	-	-	1/1/1/1	-
4	EDO	D	301	-	-	0/1/1/1	-
4	EDO	A	309	-	-	1/1/1/1	-
4	EDO	B	101	-	-	0/1/1/1	-
4	EDO	D	313	-	-	1/1/1/1	-
4	EDO	D	312	-	-	1/1/1/1	-
4	EDO	D	316	-	-	0/1/1/1	-

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (7) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
4	A	302	EDO	O1-C1-C2-O2
4	D	315	EDO	O1-C1-C2-O2
4	A	309	EDO	O1-C1-C2-O2
4	B	108	EDO	O1-C1-C2-O2
4	D	312	EDO	O1-C1-C2-O2
4	D	313	EDO	O1-C1-C2-O2
4	E	107	EDO	O1-C1-C2-O2

There are no ring outliers.

5 monomers are involved in 5 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	A	302	EDO	1	0
4	E	107	EDO	1	0
4	D	314	EDO	1	0
4	D	301	EDO	1	0
4	D	312	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	276/277 (99%)	0.64	18 (6%) 25 28	22, 48, 78, 112	1 (0%)
1	D	276/277 (99%)	0.74	17 (6%) 26 30	24, 49, 87, 131	2 (0%)
2	B	100/100 (100%)	0.29	2 (2%) 65 69	31, 43, 58, 64	0
2	E	100/100 (100%)	0.49	3 (3%) 52 56	33, 46, 65, 76	0
3	C	9/9 (100%)	0.88	0 100 100	39, 40, 43, 43	0
3	F	9/9 (100%)	0.98	2 (22%) 2 2	38, 45, 47, 50	0
All	All	770/772 (99%)	0.62	42 (5%) 30 34	22, 47, 79, 131	3 (0%)

All (42) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	226	GLN	4.8
1	D	276	PRO	4.0
1	A	276	PRO	3.0
1	D	199	ALA	3.0
1	A	274	TRP	2.9
1	D	226	GLN	2.8
2	B	1	ILE	2.8
1	D	194	ILE	2.7
1	D	248	VAL	2.6
1	D	249	VAL	2.6
1	A	223	ASP	2.5
1	A	199	ALA	2.5
1	A	42	SER	2.5
2	B	0	MET	2.5
1	D	42	SER	2.4
1	A	225	THR	2.4
2	E	74	GLU	2.4
1	D	197	HIS	2.4
1	A	109	LEU	2.4

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Mol	Chain	Res	Type	RSRZ
1	D	175	GLY	2.3
1	A	201	LEU	2.3
1	A	270	LEU	2.3
3	F	4	LEU	2.3
1	D	125	ALA	2.3
1	A	255	GLN	2.3
1	D	274	TRP	2.3
1	A	197	HIS	2.2
1	A	248	VAL	2.2
1	D	193	PRO	2.2
1	D	269	PRO	2.2
2	E	48	LYS	2.2
2	E	1	ILE	2.2
1	D	151	ARG	2.1
3	F	5	THR	2.1
1	A	17	ARG	2.1
1	A	249	VAL	2.1
1	D	89	GLU	2.1
1	D	221	GLY	2.1
1	A	182	ALA	2.1
1	D	41	ALA	2.1
1	A	247	VAL	2.0
1	A	16	GLY	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.

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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
5	SO4	E	102	5/5	0.64	0.16	60,66,72,74	5
5	SO4	A	306	5/5	0.71	0.12	58,62,67,68	5
4	EDO	B	108	4/4	0.75	0.17	43,47,48,52	0
5	SO4	A	305	5/5	0.78	0.15	51,51,53,61	5
4	EDO	A	309	4/4	0.80	0.15	65,68,69,71	0
4	EDO	D	315	4/4	0.82	0.19	52,53,54,55	0
4	EDO	D	314	4/4	0.83	0.14	60,61,63,63	0
4	EDO	D	312	4/4	0.84	0.13	58,59,59,60	0
4	EDO	D	316	4/4	0.85	0.22	46,49,49,53	0
4	EDO	A	302	4/4	0.85	0.17	45,49,54,56	0
6	CL	A	307	1/1	0.85	0.19	59,59,59,59	0
6	CL	D	305	1/1	0.85	0.15	68,68,68,68	0
5	SO4	D	304	5/5	0.86	0.12	58,58,62,63	5
4	EDO	A	301	4/4	0.86	0.13	42,43,47,49	0
5	SO4	B	103	5/5	0.86	0.10	64,64,65,66	5
5	SO4	B	104	5/5	0.86	0.12	50,50,54,54	5
6	CL	E	106	1/1	0.86	0.12	62,62,62,62	0
5	SO4	E	103	5/5	0.87	0.13	43,48,52,59	5
5	SO4	D	303	5/5	0.87	0.14	57,58,60,61	5
4	EDO	A	303	4/4	0.87	0.16	48,49,49,52	0
5	SO4	D	302	5/5	0.87	0.12	55,56,62,64	5
6	CL	D	307	1/1	0.88	0.10	73,73,73,73	0
6	CL	D	309	1/1	0.88	0.14	73,73,73,73	0
5	SO4	A	304	5/5	0.88	0.11	54,56,58,60	5
5	SO4	E	104	5/5	0.89	0.14	47,48,52,53	5
4	EDO	E	107	4/4	0.89	0.10	43,46,49,50	0
7	NI	D	311	1/1	0.89	0.09	66,66,66,66	1
4	EDO	D	313	4/4	0.90	0.10	49,50,52,55	0
4	EDO	D	301	4/4	0.90	0.12	53,53,54,54	0
4	EDO	B	107	4/4	0.91	0.17	41,42,42,46	0
6	CL	D	306	1/1	0.91	0.26	62,62,62,62	0
4	EDO	B	101	4/4	0.92	0.11	40,40,41,48	0
5	SO4	B	102	5/5	0.93	0.08	54,56,58,59	0
6	CL	D	308	1/1	0.94	0.08	57,57,57,57	0
5	SO4	E	101	5/5	0.94	0.07	46,46,54,57	0
6	CL	B	105	1/1	0.95	0.11	53,53,53,53	0
7	NI	A	308	1/1	0.95	0.06	67,67,67,67	1
6	CL	D	310	1/1	0.95	0.11	54,54,54,54	0
6	CL	B	106	1/1	0.96	0.18	49,49,49,49	0
6	CL	E	105	1/1	0.97	0.12	51,51,51,51	0

6.5 Other polymers [i](#)

There are no such residues in this entry.