



Full wwPDB X-ray Structure Validation Report ⓘ

Sep 10, 2017 – 06:17 AM EDT

PDB ID : 5KNL
Title : Crystal structure of *S. pombe* ubiquitin E1 (Uba1) in complex with Ubc15 and ubiquitin
Authors : Olsen, S.K.; Lv, Z.; Yuan, L.; Williams, K.
Deposited on : unknown
Resolution : 2.50 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

<http://wwpdb.org/validation/2016/XrayValidationReportHelp>

with specific help available everywhere you see the ⓘ symbol.

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 : rb-20029824
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) : rb-20029824

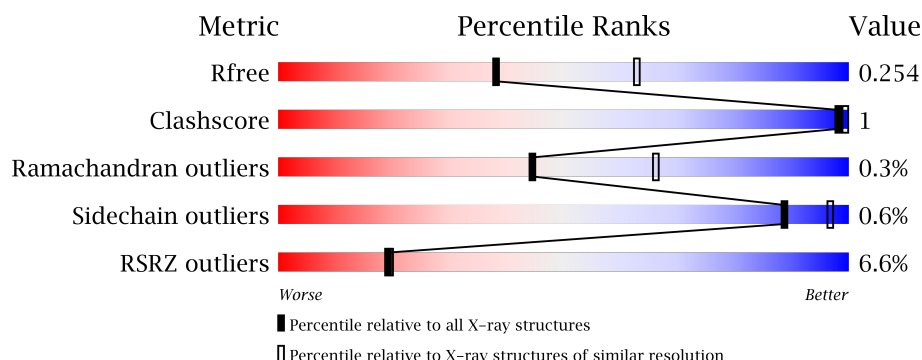
1 Overall quality at a glance

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}	100719	3846 (2.50-2.50)
Clashscore	112137	4554 (2.50-2.50)
Ramachandran outliers	110173	4463 (2.50-2.50)
Sidechain outliers	110143	4465 (2.50-2.50)
RSRZ outliers	101464	3876 (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 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 $\leq 5\%$. 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	1001	
1	D	1001	
2	B	96	
2	E	96	
3	C	175	

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Mol	Chain	Length	Quality of chain
3	F	175	<div><div></div><div>5%</div><div>89%</div><div>• • 7%</div></div>

2 Entry composition

There are 5 unique types of molecules in this entry. The entry contains 38561 atoms, of which 19138 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 Ubiquitin-activating enzyme E1 1.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
1	A	981	Total	C	H	N	O	S	0	0	0
			15342	4926	7637	1259	1481	39			
1	D	977	Total	C	H	N	O	S	0	0	0
			15280	4907	7607	1254	1473	39			

There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	12	SER	-	expression tag	UNP O94609
D	12	SER	-	expression tag	UNP O94609

- Molecule 2 is a protein called Ubiquitin.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
2	B	76	Total	C	H	N	O	S	0	0	0
			1236	375	623	119	118	1			
2	E	76	Total	C	H	N	O	S	0	0	0
			1236	375	623	119	118	1			

There are 56 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
B	-19	MET	-	initiating methionine	UNP A0A081CFF0
B	-18	GLY	-	expression tag	UNP A0A081CFF0
B	-17	SER	-	expression tag	UNP A0A081CFF0
B	-16	SER	-	expression tag	UNP A0A081CFF0
B	-15	HIS	-	expression tag	UNP A0A081CFF0
B	-14	HIS	-	expression tag	UNP A0A081CFF0
B	-13	HIS	-	expression tag	UNP A0A081CFF0
B	-12	HIS	-	expression tag	UNP A0A081CFF0
B	-11	HIS	-	expression tag	UNP A0A081CFF0
B	-10	HIS	-	expression tag	UNP A0A081CFF0

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Chain	Residue	Modelled	Actual	Comment	Reference
B	-9	SER	-	expression tag	UNP A0A081CFF0
B	-8	SER	-	expression tag	UNP A0A081CFF0
B	-7	GLY	-	expression tag	UNP A0A081CFF0
B	-6	LEU	-	expression tag	UNP A0A081CFF0
B	-5	VAL	-	expression tag	UNP A0A081CFF0
B	-4	PRO	-	expression tag	UNP A0A081CFF0
B	-3	ARG	-	expression tag	UNP A0A081CFF0
B	-2	GLY	-	expression tag	UNP A0A081CFF0
B	-1	SER	-	expression tag	UNP A0A081CFF0
B	0	HIS	-	expression tag	UNP A0A081CFF0
B	6	ARG	LYS	engineered mutation	UNP A0A081CFF0
B	11	ARG	LYS	engineered mutation	UNP A0A081CFF0
B	27	ARG	LYS	engineered mutation	UNP A0A081CFF0
B	29	ARG	LYS	engineered mutation	UNP A0A081CFF0
B	33	ARG	LYS	engineered mutation	UNP A0A081CFF0
B	48	ARG	LYS	engineered mutation	UNP A0A081CFF0
B	57	ALA	SER	engineered mutation	UNP A0A081CFF0
B	63	ARG	LYS	engineered mutation	UNP A0A081CFF0
E	-19	MET	-	initiating methionine	UNP A0A081CFF0
E	-18	GLY	-	expression tag	UNP A0A081CFF0
E	-17	SER	-	expression tag	UNP A0A081CFF0
E	-16	SER	-	expression tag	UNP A0A081CFF0
E	-15	HIS	-	expression tag	UNP A0A081CFF0
E	-14	HIS	-	expression tag	UNP A0A081CFF0
E	-13	HIS	-	expression tag	UNP A0A081CFF0
E	-12	HIS	-	expression tag	UNP A0A081CFF0
E	-11	HIS	-	expression tag	UNP A0A081CFF0
E	-10	HIS	-	expression tag	UNP A0A081CFF0
E	-9	SER	-	expression tag	UNP A0A081CFF0
E	-8	SER	-	expression tag	UNP A0A081CFF0
E	-7	GLY	-	expression tag	UNP A0A081CFF0
E	-6	LEU	-	expression tag	UNP A0A081CFF0
E	-5	VAL	-	expression tag	UNP A0A081CFF0
E	-4	PRO	-	expression tag	UNP A0A081CFF0
E	-3	ARG	-	expression tag	UNP A0A081CFF0
E	-2	GLY	-	expression tag	UNP A0A081CFF0
E	-1	SER	-	expression tag	UNP A0A081CFF0
E	0	HIS	-	expression tag	UNP A0A081CFF0
E	6	ARG	LYS	engineered mutation	UNP A0A081CFF0
E	11	ARG	LYS	engineered mutation	UNP A0A081CFF0
E	27	ARG	LYS	engineered mutation	UNP A0A081CFF0
E	29	ARG	LYS	engineered mutation	UNP A0A081CFF0

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Chain	Residue	Modelled	Actual	Comment	Reference
E	33	ARG	LYS	engineered mutation	UNP A0A081CFF0
E	48	ARG	LYS	engineered mutation	UNP A0A081CFF0
E	57	ALA	SER	engineered mutation	UNP A0A081CFF0
E	63	ARG	LYS	engineered mutation	UNP A0A081CFF0

- Molecule 3 is a protein called Ubiquitin-conjugating enzyme E2 15.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
3	C	171	Total	C	H	N	O	S	0	0	0
			2718	877	1346	230	258	7			
3	F	162	Total	C	H	N	O	S	0	1	0
			2610	840	1302	222	239	7			

There are 16 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
C	168	LEU	-	expression tag	UNP Q9Y818
C	169	GLU	-	expression tag	UNP Q9Y818
C	170	HIS	-	expression tag	UNP Q9Y818
C	171	HIS	-	expression tag	UNP Q9Y818
C	172	HIS	-	expression tag	UNP Q9Y818
C	173	HIS	-	expression tag	UNP Q9Y818
C	174	HIS	-	expression tag	UNP Q9Y818
C	175	HIS	-	expression tag	UNP Q9Y818
F	168	LEU	-	expression tag	UNP Q9Y818
F	169	GLU	-	expression tag	UNP Q9Y818
F	170	HIS	-	expression tag	UNP Q9Y818
F	171	HIS	-	expression tag	UNP Q9Y818
F	172	HIS	-	expression tag	UNP Q9Y818
F	173	HIS	-	expression tag	UNP Q9Y818
F	174	HIS	-	expression tag	UNP Q9Y818
F	175	HIS	-	expression tag	UNP Q9Y818

- 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	A	1	Total	O	S	0	0
			5	4	1		
4	A	1	Total	O	S	0	0
			5	4	1		
4	A	1	Total	O	S	0	0
			5	4	1		
4	B	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		
4	F	1	Total	O	S	0	0
			5	4	1		

- Molecule 5 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	32	Total	O	0	0
			32	32		
5	B	7	Total	O	0	0
			7	7		
5	C	6	Total	O	0	0
			6	6		

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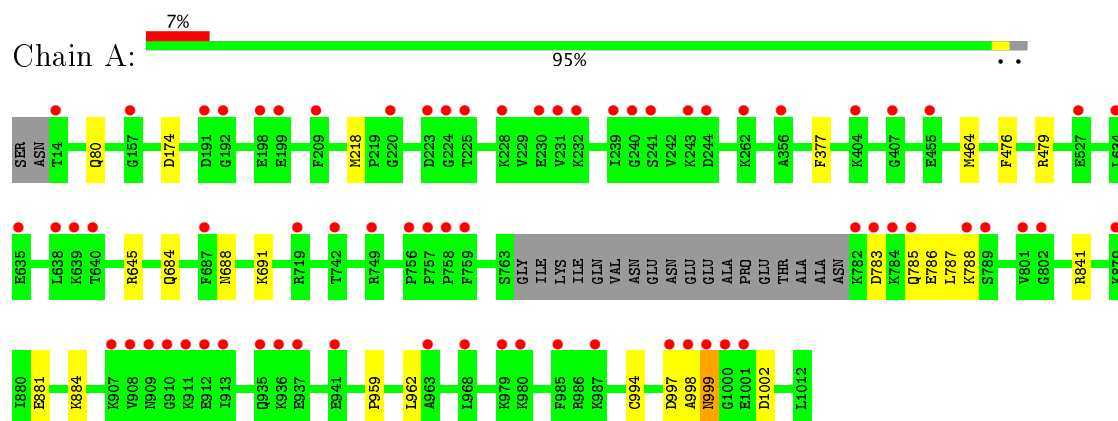
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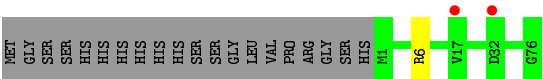
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	D	46	Total 46	O 46	0	0
5	E	2	Total 2	O 2	0	0
5	F	1	Total 1	O 1	0	0

3 Residue-property plots

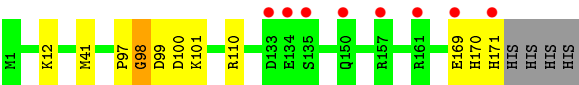
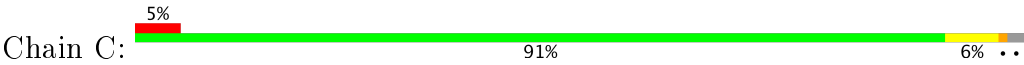
These plots are drawn for all protein, RNA and DNA chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron density. Residues are 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: Ubiquitin-activating enzyme E1 1

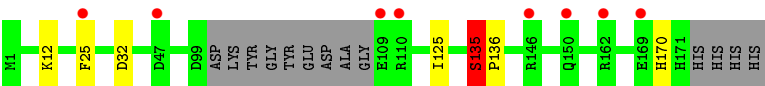
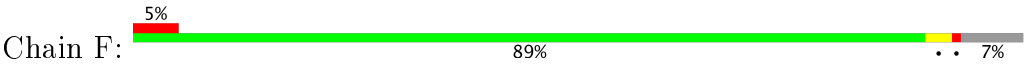




● Molecule 3: Ubiquitin-conjugating enzyme E2 15



● Molecule 3: Ubiquitin-conjugating enzyme E2 15



4 Data and refinement statistics

Property	Value	Source
Space group	P 1	Depositor
Cell constants a, b, c, α , β , γ	77.11Å 82.24Å 135.38Å 102.10° 95.78° 90.86°	Depositor
Resolution (Å)	28.31 – 2.50 28.41 – 2.50	Depositor EDS
% Data completeness (in resolution range)	96.9 (28.31-2.50) 91.0 (28.41-2.50)	Depositor EDS
R_{merge}	0.05	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	3.33 (at 2.51Å)	Xtriage
Refinement program	PHENIX 1.9_1692	Depositor
R, R_{free}	0.216 , 0.251 0.221 , 0.254	Depositor DCC
R_{free} test set	10828 reflections (10.00%)	DCC
Wilson B-factor (Å ²)	28.6	Xtriage
Anisotropy	0.251	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.33 , 35.4	EDS
L-test for twinning ²	$\langle L \rangle = 0.42$, $\langle L^2 \rangle = 0.24$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.90	EDS
Total number of atoms	38561	wwPDB-VP
Average B, all atoms (Å ²)	56.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.71% 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

5.1 Standard geometry

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

The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 5$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	# $ Z > 5$	RMSZ	# $ Z > 5$
1	A	0.22	0/7876	0.37	0/10660
1	D	0.23	0/7844	0.37	0/10618
2	B	0.22	0/618	0.43	0/831
2	E	0.22	0/618	0.40	0/831
3	C	0.23	0/1411	0.40	0/1915
3	F	0.24	0/1348	0.46	1/1829 (0.1%)
All	All	0.23	0/19715	0.39	1/26684 (0.0%)

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
3	F	0	1

There are no bond length outliers.

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed($^{\circ}$)	Ideal($^{\circ}$)
3	F	135	SER	C-N-CD	-5.85	107.73	120.60

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
3	F	135	SER	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	7705	7637	7634	10	0
1	D	7673	7607	7607	11	0
2	B	613	623	625	3	0
2	E	613	623	625	1	0
3	C	1372	1346	1341	5	0
3	F	1308	1302	1298	4	0
4	A	20	0	0	0	0
4	B	5	0	0	1	0
4	D	15	0	0	0	0
4	F	5	0	0	0	0
5	A	32	0	0	0	0
5	B	7	0	0	0	0
5	C	6	0	0	0	0
5	D	46	0	0	0	0
5	E	2	0	0	1	0
5	F	1	0	0	0	0
All	All	19423	19138	19130	31	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 1.

All (31) 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:D:684:GLN:O	1:D:688:ASN:ND2	2.32	0.61
2:B:33:ARG:NH1	4:B:101:SO4:O3	2.36	0.59
1:D:1009:CYS:SG	1:D:1011:LYS:NZ	2.68	0.57
1:D:13:ASN:OD1	1:D:14:THR:N	2.37	0.57
1:A:997:ASP:O	1:A:999:ASN:N	2.40	0.55
1:D:997:ASP:O	1:D:999:ASN:N	2.40	0.54
1:D:225:THR:O	1:D:227:ARG:NH1	2.41	0.54
1:A:684:GLN:O	1:A:688:ASN:ND2	2.41	0.51
3:F:135:SER:HB3	3:F:136:PRO:HA	1.94	0.49
1:D:994:CYS:SG	3:F:12:LYS:NZ	2.81	0.48
1:A:785:GLN:O	1:A:787:LEU:N	2.45	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:C:98:GLY:O	3:C:110:ARG:NH1	2.47	0.48
1:A:783:ASP:OD1	1:A:783:ASP:N	2.47	0.47
1:D:957:GLN:NE2	3:F:32:ASP:OD2	2.48	0.47
3:F:25:PHE:HZ	3:F:125:ILE:HG12	1.81	0.46
2:B:27:ARG:NH2	2:B:50:LEU:O	2.48	0.45
1:A:994:CYS:SG	3:C:12:LYS:NZ	2.81	0.45
1:D:881:GLU:O	1:D:884:LYS:NZ	2.50	0.44
2:E:6:ARG:NH1	5:E:101:HOH:O	2.46	0.44
3:C:169:GLU:O	3:C:171:HIS:N	2.50	0.44
1:A:645:ARG:HG3	1:A:788:LYS:CE	2.48	0.44
1:D:995:CYS:O	1:D:1003:VAL:N	2.47	0.43
1:A:476:PHE:O	1:A:479:ARG:NH1	2.49	0.42
2:B:74:ARG:HD3	2:B:75:GLY:N	2.34	0.41
3:C:100:ASP:HB3	3:C:101:LYS:HA	2.02	0.41
1:A:959:PRO:HA	1:A:962:LEU:HB2	2.02	0.41
3:C:97:PRO:HA	3:C:98:GLY:HA2	1.87	0.41
1:A:174:ASP:O	1:A:377:PHE:N	2.42	0.40
1:D:957:GLN:HB2	1:D:962:LEU:HD11	2.03	0.40
1:A:881:GLU:O	1:A:884:LYS:NZ	2.55	0.40
1:D:205:GLU:N	1:D:208:ASP:OD2	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	977/1001 (98%)	923 (94%)	52 (5%)	2 (0%)	51	73
1	D	973/1001 (97%)	923 (95%)	49 (5%)	1 (0%)	55	76
2	B	74/96 (77%)	71 (96%)	3 (4%)	0	100	100
2	E	74/96 (77%)	71 (96%)	3 (4%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
3	C	169/175 (97%)	160 (95%)	6 (4%)	3 (2%)	10	17
3	F	159/175 (91%)	152 (96%)	5 (3%)	2 (1%)	14	25
All	All	2426/2544 (95%)	2300 (95%)	118 (5%)	8 (0%)	44	66

All (8) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
3	F	170	HIS
1	A	786	GLU
1	A	998	ALA
3	C	170	HIS
1	D	998	ALA
3	F	135	SER
3	C	99	ASP
3	C	98	GLY

5.3.2 Protein sidechains ⓘ

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	860/877 (98%)	853 (99%)	7 (1%)	85	95
1	D	857/877 (98%)	853 (100%)	4 (0%)	91	97
2	B	67/84 (80%)	66 (98%)	1 (2%)	70	89
2	E	67/84 (80%)	67 (100%)	0	100	100
3	C	154/160 (96%)	153 (99%)	1 (1%)	89	97
3	F	149/160 (93%)	149 (100%)	0	100	100
All	All	2154/2242 (96%)	2141 (99%)	13 (1%)	89	97

All (13) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	80	GLN
1	A	218	MET

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Mol	Chain	Res	Type
1	A	464	MET
1	A	691	LYS
1	A	841	ARG
1	A	999	ASN
1	A	1002	ASP
2	B	74	ARG
3	C	41	MET
1	D	80	GLN
1	D	999	ASN
1	D	1002	ASP
1	D	1006	PRO

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. There are no such sidechains identified.

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 carbohydrates in this entry.

5.6 Ligand geometry [i](#)

9 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	A	1101	-	4,4,4	0.16	0	6,6,6	0.06	0
4	SO4	A	1102	-	4,4,4	0.15	0	6,6,6	0.05	0
4	SO4	A	1103	-	4,4,4	0.14	0	6,6,6	0.08	0
4	SO4	A	1104	-	4,4,4	0.15	0	6,6,6	0.07	0
4	SO4	B	101	-	4,4,4	0.15	0	6,6,6	0.06	0
4	SO4	D	1101	-	4,4,4	0.14	0	6,6,6	0.07	0
4	SO4	D	1102	-	4,4,4	0.15	0	6,6,6	0.06	0
4	SO4	D	1103	-	4,4,4	0.15	0	6,6,6	0.07	0
4	SO4	F	201	-	4,4,4	0.14	0	6,6,6	0.06	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	SO4	A	1101	-	-	0/0/0/0	0/0/0/0
4	SO4	A	1102	-	-	0/0/0/0	0/0/0/0
4	SO4	A	1103	-	-	0/0/0/0	0/0/0/0
4	SO4	A	1104	-	-	0/0/0/0	0/0/0/0
4	SO4	B	101	-	-	0/0/0/0	0/0/0/0
4	SO4	D	1101	-	-	0/0/0/0	0/0/0/0
4	SO4	D	1102	-	-	0/0/0/0	0/0/0/0
4	SO4	D	1103	-	-	0/0/0/0	0/0/0/0
4	SO4	F	201	-	-	0/0/0/0	0/0/0/0

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

1 monomer is involved in 1 short contact:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	B	101	SO4	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	981/1001 (98%)	0.36	70 (7%) 17 17	11, 44, 103, 165	0
1	D	977/1001 (97%)	0.41	74 (7%) 15 14	12, 43, 111, 179	0
2	B	76/96 (79%)	0.06	0 100 100	22, 45, 88, 108	0
2	E	76/96 (79%)	0.35	2 (2%) 56 59	21, 61, 104, 146	0
3	C	171/175 (97%)	0.28	8 (4%) 32 34	22, 49, 98, 140	0
3	F	162/175 (92%)	0.41	8 (4%) 30 32	30, 57, 102, 146	1 (0%)
All	All	2443/2544 (96%)	0.36	162 (6%) 19 19	11, 45, 104, 179	1 (0%)

All (162) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	D	199	GLU	8.3
1	D	998	ALA	7.7
1	A	1000	GLY	7.5
1	A	198	GLU	6.4
1	D	911	LYS	6.1
1	D	250	TYR	5.8
1	A	998	ALA	5.6
1	D	187	SER	5.6
1	D	201	ARG	5.3
1	D	228	LYS	5.3
1	D	909	ASN	5.1
1	D	235	TYR	5.0
1	D	198	GLU	4.7
1	A	911	LYS	4.7
1	D	638	LEU	4.7
1	A	908	VAL	4.6
1	A	999	ASN	4.5
1	A	199	GLU	4.5
1	D	910	GLY	4.5

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Mol	Chain	Res	Type	RSRZ
1	D	245	LEU	4.4
1	D	1000	GLY	4.4
1	A	1001	GLU	4.3
1	D	640	THR	4.3
1	A	638	LEU	4.2
1	D	999	ASN	4.2
1	A	782	LYS	4.2
1	D	936	LYS	4.2
1	D	232	LYS	4.1
1	D	251	ASN	4.1
1	D	244	ASP	4.0
1	A	209	PHE	4.0
1	A	907	LYS	4.0
1	D	639	LYS	3.9
1	A	783	ASP	3.9
1	A	909	ASN	3.9
1	A	784	LYS	3.8
1	A	230	GLU	3.7
1	D	802	GLY	3.7
1	D	762	LYS	3.7
1	D	745	ALA	3.7
1	A	232	LYS	3.6
1	D	1001	GLU	3.6
1	A	935	GLN	3.6
2	E	17	VAL	3.6
1	A	220	GLY	3.6
1	A	742	THR	3.5
1	D	741	GLU	3.5
3	F	109	GLU	3.5
1	A	407	GLY	3.5
1	A	244	ASP	3.4
1	D	239	ILE	3.4
1	D	935	GLN	3.4
1	A	243	LYS	3.4
1	A	14	THR	3.3
1	D	963	ALA	3.3
1	D	335	ASP	3.3
1	A	997	ASP	3.3
1	A	987	LYS	3.3
1	D	907	LYS	3.3
1	D	908	VAL	3.2
1	A	936	LYS	3.2

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Mol	Chain	Res	Type	RSRZ
1	D	696	SER	3.1
1	A	192	GLY	3.1
1	D	219	PRO	3.1
1	A	223	ASP	3.1
1	D	200	THR	3.1
1	D	185	ILE	3.1
1	A	228	LYS	3.1
3	C	150	GLN	3.1
2	E	32	ASP	3.1
1	A	749	ARG	3.1
1	A	404	LYS	3.1
1	D	242	VAL	3.1
1	A	758	PRO	3.0
1	A	191	ASP	2.9
1	A	963	ALA	2.9
1	A	719	ARG	2.9
1	D	912	GLU	2.9
1	A	635	GLU	2.9
1	A	789	SER	2.8
1	A	239	ILE	2.8
1	A	241	SER	2.8
3	C	171	HIS	2.8
1	D	697	THR	2.8
1	D	197	LEU	2.8
1	D	184	MET	2.8
1	A	980	LYS	2.7
1	D	247	SER	2.7
1	D	236	THR	2.7
3	C	135	SER	2.7
1	A	910	GLY	2.7
1	A	937	GLU	2.7
1	D	937	GLU	2.7
1	D	759	PHE	2.7
1	D	631	PRO	2.6
1	A	785	GLN	2.6
1	A	639	LYS	2.6
1	A	231	VAL	2.6
1	A	640	THR	2.6
1	D	243	LYS	2.6
3	F	25	PHE	2.6
1	A	240	GLY	2.6
1	D	241	SER	2.6

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Mol	Chain	Res	Type	RSRZ
1	A	912	GLU	2.5
1	D	755	ASN	2.5
1	A	968	LEU	2.5
3	C	161	ARG	2.5
1	D	209	PHE	2.5
1	A	157	GLY	2.5
1	A	527	GLU	2.4
1	D	224	GLY	2.4
1	D	248	ALA	2.4
1	A	788	LYS	2.4
1	D	997	ASP	2.4
1	A	634	LEU	2.4
1	A	224	GLY	2.4
1	A	757	PRO	2.4
1	A	802	GLY	2.3
1	D	246	GLY	2.3
1	D	698	GLY	2.3
1	D	748	GLU	2.3
1	A	913	ILE	2.3
3	F	47	ASP	2.3
1	D	195	THR	2.3
3	C	169	GLU	2.3
1	D	980	LYS	2.3
3	F	162	ARG	2.3
1	D	987	LYS	2.3
1	A	801	VAL	2.3
1	A	225	THR	2.3
3	C	134	GLU	2.3
1	D	661	LEU	2.2
1	D	738	LEU	2.2
1	D	906	MET	2.2
1	D	221	LEU	2.2
1	A	455	GLU	2.2
1	D	800	LEU	2.2
1	A	941	GLU	2.2
1	D	230	GLU	2.2
1	D	216	LYS	2.2
3	C	133	ASP	2.2
1	A	985	PHE	2.2
1	D	632	ASN	2.1
3	F	110	ARG	2.1
1	D	188	ILE	2.1

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Mol	Chain	Res	Type	RSRZ
1	A	687	PHE	2.1
3	F	169	GLU	2.1
1	A	879	LYS	2.1
1	D	763	SER	2.1
3	C	157	ARG	2.1
1	A	979	LYS	2.1
1	D	993	ILE	2.1
1	A	759	PHE	2.1
3	F	150	GLN	2.1
1	D	455	GLU	2.1
1	D	742	THR	2.1
1	D	214	GLU	2.1
3	F	146	ARG	2.1
1	A	262	LYS	2.0
1	A	756	PRO	2.0
1	A	356	ALA	2.0
1	D	183	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 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(\AA^2)	Q<0.9
4	SO4	A	1101	5/5	0.97	0.15	0.48	46,49,50,51	0
4	SO4	F	201	5/5	0.86	0.17	-0.51	129,129,130,131	0
4	SO4	D	1101	5/5	0.96	0.12	-0.67	55,56,60,61	0
4	SO4	B	101	5/5	0.90	0.17	-1.00	99,100,101,101	0

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Mol	Type	Chain	Res	Atoms	RSCC	RSR	LLDF	B-factors(\AA^2)	Q<0.9
4	SO4	A	1103	5/5	0.97	0.10	-1.75	49,51,51,53	0
4	SO4	A	1102	5/5	0.98	0.09	-1.77	38,43,44,48	0
4	SO4	A	1104	5/5	0.98	0.09	-2.11	34,36,39,47	0
4	SO4	D	1103	5/5	0.98	0.08	-2.58	37,39,44,44	0
4	SO4	D	1102	5/5	0.93	0.18	-	92,92,94,95	0

6.5 Other polymers [i](#)

There are no such residues in this entry.