



wwPDB X-ray Structure Validation Summary Report ⓘ

Mar 4, 2026 – 10:48 PM UTC

PDB ID : 5MV4 / pdb_00005mv4
Title : ACC1 Fab fragment in complex with citrullinated CII616-639 epitope of collagen type II (ptm23)
Authors : Dobritsch, D.; Holmdahl, R.; Ge, C.
Deposited on : 2017-01-15
Resolution : 2.90 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	:	4-5-2 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

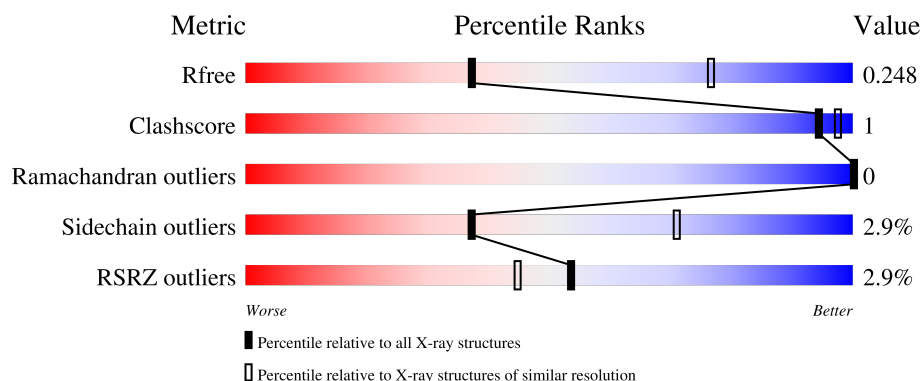
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.90 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	2481 (2.90-2.90)
Clashscore	190562	2690 (2.90-2.90)
Ramachandran outliers	187476	2623 (2.90-2.90)
Sidechain outliers	187428	2625 (2.90-2.90)
RSRZ outliers	180081	2481 (2.90-2.90)

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	218	96% .
1	C	218	94% 6%
1	F	218	92% 6% .
1	I	218	94% 5%
1	L	218	9% 94% 6% .

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Mol	Chain	Length	Quality of chain
1	O	218	% 94% 5% .
1	R	218	% 93% 6% .
1	U	218	11% 90% 6% .
2	B	218	93% 7%
2	D	218	95% 5%
2	G	218	% 96% .
2	J	218	94% 6%
2	M	218	6% 94% 5%
2	P	218	2% 94% 6%
2	S	218	94% 6%
2	V	218	14% 93% 6%
3	E	46	22% . 74%
3	H	46	24% . 72%
3	K	46	24% . 72%
3	N	46	22% . 74%
3	Q	46	2% 22% . 74%
3	T	46	22% . 74%
3	W	46	22% . 74%
3	X	46	22% . 74%

2 Entry composition [i](#)

There are 5 unique types of molecules in this entry. The entry contains 27296 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 ACC1 antibody Fab fragment, heavy chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	218	Total	C	N	O	S	0	0	0
			1640	1034	273	325	8			
1	C	218	Total	C	N	O	S	0	0	0
			1640	1034	273	325	8			
1	F	213	Total	C	N	O	S	0	0	0
			1612	1019	268	317	8			
1	I	218	Total	C	N	O	S	0	0	0
			1640	1034	273	325	8			
1	L	216	Total	C	N	O	S	0	0	0
			1632	1030	271	323	8			
1	O	216	Total	C	N	O	S	0	0	0
			1629	1028	271	322	8			
1	R	215	Total	C	N	O	S	0	0	0
			1625	1026	270	321	8			
1	U	212	Total	C	N	O	S	0	0	0
			1608	1017	267	317	7			

- Molecule 2 is a protein called ACC1 antibody Fab fragment, light chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	B	217	Total	C	N	O	S	0	0	0
			1660	1035	281	338	6			
2	D	217	Total	C	N	O	S	0	0	0
			1660	1035	281	338	6			
2	G	218	Total	C	N	O	S	0	0	0
			1666	1038	282	339	7			
2	J	218	Total	C	N	O	S	0	0	0
			1666	1038	282	339	7			
2	M	217	Total	C	N	O	S	0	0	0
			1660	1035	281	338	6			
2	P	218	Total	C	N	O	S	0	0	0
			1666	1038	282	339	7			

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Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	S	218	Total	C	N	O	S	0	0	0
			1666	1038	282	339	7			
2	V	218	Total	C	N	O	S	0	0	0
			1666	1038	282	339	7			

- Molecule 3 is a protein called synthetic peptide containing the citrullinated collagen type II epitope CII616-639, Collagen alpha-1(II) chain, synthetic peptide containing the citrullinated collagen type II epitope CII616-639.

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
3	X	12	Total	C	N	O	0	0	0
			82	48	15	19			
3	E	12	Total	C	N	O	0	0	0
			82	48	15	19			
3	H	13	Total	C	N	O	0	0	0
			87	51	16	20			
3	K	13	Total	C	N	O	0	0	0
			87	51	16	20			
3	N	12	Total	C	N	O	0	0	0
			82	48	15	19			
3	Q	12	Total	C	N	O	0	0	0
			82	48	15	19			
3	T	12	Total	C	N	O	0	0	0
			82	48	15	19			
3	W	12	Total	C	N	O	0	0	0
			82	48	15	19			

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



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
4	X	1	Total	O	S	0	0
			5	4	1		
4	E	1	Total	O	S	0	0
			5	4	1		
4	H	1	Total	O	S	0	0
			5	4	1		
4	I	1	Total	O	S	0	0
			5	4	1		
4	L	1	Total	O	S	0	0
			5	4	1		
4	Q	1	Total	O	S	0	0
			5	4	1		
4	T	1	Total	O	S	0	0
			5	4	1		
4	W	1	Total	O	S	0	0
			5	4	1		

- Molecule 5 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	23	Total	O	0	0
			23	23		
5	B	34	Total	O	0	0
			34	34		
5	C	15	Total	O	0	0
			15	15		
5	D	35	Total	O	0	0
			35	35		

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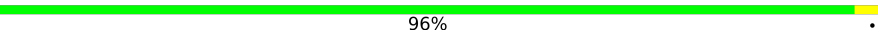
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Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	F	18	Total 18	O 18	0	0
5	G	22	Total 22	O 22	0	0
5	H	3	Total 3	O 3	0	0
5	I	21	Total 21	O 21	0	0
5	J	15	Total 15	O 15	0	0
5	K	4	Total 4	O 4	0	0
5	L	13	Total 13	O 13	0	0
5	M	4	Total 4	O 4	0	0
5	O	11	Total 11	O 11	0	0
5	P	8	Total 8	O 8	0	0
5	Q	1	Total 1	O 1	0	0
5	R	8	Total 8	O 8	0	0
5	S	10	Total 10	O 10	0	0
5	U	3	Total 3	O 3	0	0
5	V	6	Total 6	O 6	0	0

3 Residue-property plots [i](#)

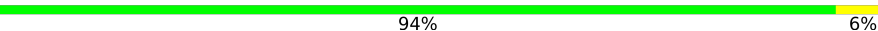
These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron density. 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: ACC1 antibody Fab fragment, heavy chain

Chain A:  96%



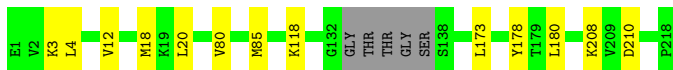
- Molecule 1: ACC1 antibody Fab fragment, heavy chain

Chain C:  94% 6%

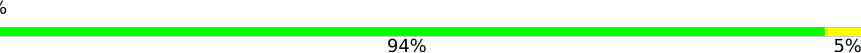


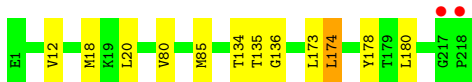
- Molecule 1: ACC1 antibody Fab fragment, heavy chain

Chain F:  92% 6%

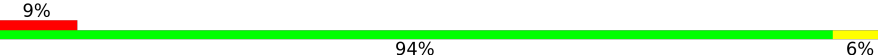


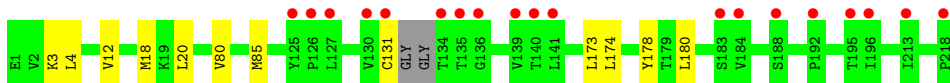
- Molecule 1: ACC1 antibody Fab fragment, heavy chain

Chain I:  94% 5%

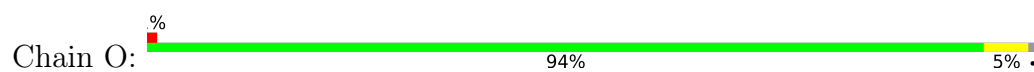


- Molecule 1: ACC1 antibody Fab fragment, heavy chain

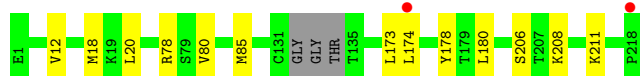
Chain L:  94% 6%



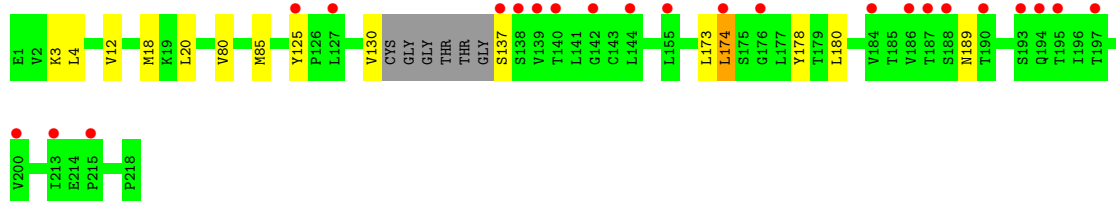
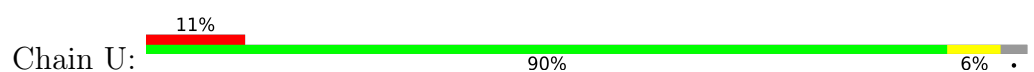
- Molecule 1: ACC1 antibody Fab fragment, heavy chain



- Molecule 1: ACC1 antibody Fab fragment, heavy chain



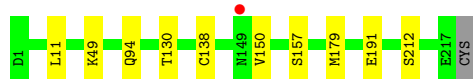
- Molecule 1: ACC1 antibody Fab fragment, heavy chain



- Molecule 2: ACC1 antibody Fab fragment, light chain



- Molecule 2: ACC1 antibody Fab fragment, light chain

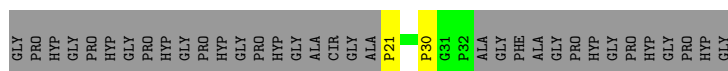


- Molecule 2: ACC1 antibody Fab fragment, light chain



- Molecule 2: ACC1 antibody Fab fragment, light chain



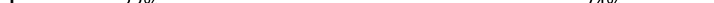


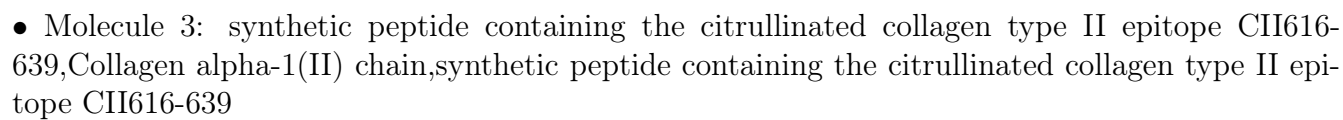
- [illegible]

- [illegible]

- [illegible]

- [illegible]

- Chain T:  22% . 74%



GLY	PRO	HYP	GLY	PRO	HYP	GLY	PRO	HYP	GLY	PRO	HYP	GLY	PRO	HYP	GLY	PRO	HYP	GLY	PRO	HYP
P21	G31	P32	ALA	GLY	PHE	ALA	GLY	PRO	HYP	GLY	PRO	HYP	GLY	PRO	HYP	GLY	PRO	HYP	GLY	PRO

4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	119.24Å 91.60Å 182.36Å 90.00° 91.52° 90.00°	Depositor
Resolution (Å)	32.80 – 2.90 32.80 – 2.90	Depositor EDS
% Data completeness (in resolution range)	96.8 (32.80-2.90) 96.8 (32.80-2.90)	Depositor EDS
R_{merge}	0.18	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.37 (at 2.90Å)	Xtriage
Refinement program	REFMAC 5.8.0155	Depositor
R, R_{free}	0.232 , 0.247 0.235 , 0.248	Depositor DCC
R_{free} test set	4191 reflections (4.79%)	wwPDB-VP
Wilson B-factor (Å ²)	38.7	Xtriage
Anisotropy	0.627	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.30 , 36.3	EDS
L-test for twinning ²	$\langle L \rangle = 0.46$, $\langle L^2 \rangle = 0.28$	Xtriage
Estimated twinning fraction	0.036 for h,-k,-l	Xtriage
F_o, F_c correlation	0.92	EDS
Total number of atoms	27296	wwPDB-VP
Average B, all atoms (Å ²)	52.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The analyses of the Patterson function reveals a significant off-origin peak that is 42.04 % 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 2.1622e-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: HYP, 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	0.67	0/1681	0.80	0/2295
1	C	0.71	1/1681 (0.1%)	0.82	1/2295 (0.0%)
1	F	0.68	0/1652	0.81	0/2254
1	I	0.72	1/1681 (0.1%)	0.84	3/2295 (0.1%)
1	L	0.70	0/1672	0.82	0/2282
1	O	0.68	0/1669	0.80	0/2277
1	R	0.64	0/1665	0.82	0/2272
1	U	0.60	0/1648	0.79	0/2249
2	B	0.68	0/1697	0.81	0/2302
2	D	0.66	0/1697	0.80	0/2302
2	G	0.65	0/1703	0.80	0/2310
2	J	0.69	0/1703	0.81	0/2310
2	M	0.70	0/1697	0.80	0/2302
2	P	0.66	0/1703	0.80	0/2310
2	S	0.63	0/1703	0.79	0/2310
2	V	0.62	0/1703	0.80	0/2310
3	E	0.96	0/66	1.13	0/86
3	H	1.05	0/71	1.08	0/93
3	K	1.06	0/71	1.09	0/93
3	N	1.05	0/66	1.08	0/86
3	Q	0.99	0/66	1.07	0/86
3	T	0.92	0/66	1.00	0/86
3	W	0.93	0/66	1.04	0/86
3	X	0.98	0/66	1.19	0/86
All	All	0.68	2/27493 (0.0%)	0.81	4/37377 (0.0%)

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	C	136	GLY	N-CA	7.24	1.50	1.44
1	I	136	GLY	C-O	-5.16	1.19	1.24

All (4) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	I	135	THR	CA-C-O	-6.09	114.05	120.63
1	C	135	THR	N-CA-C	-5.61	98.59	108.23
1	I	135	THR	N-CA-C	5.34	117.80	111.33
1	I	134	THR	N-CA-C	5.10	118.43	110.32

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	1640	0	1601	4	0
1	C	1640	0	1601	11	0
1	F	1612	0	1574	6	0
1	I	1640	0	1600	4	0
1	L	1632	0	1594	4	0
1	O	1629	0	1589	6	0
1	R	1625	0	1586	9	0
1	U	1608	0	1572	14	0
2	B	1660	0	1593	3	0
2	D	1660	0	1593	2	0
2	G	1666	0	1597	1	0
2	J	1666	0	1597	6	0
2	M	1660	0	1593	7	0
2	P	1666	0	1597	4	0
2	S	1666	0	1597	8	0
2	V	1666	0	1598	6	0
3	E	82	0	73	0	0
3	H	87	0	77	0	0
3	K	87	0	77	0	0
3	N	82	0	72	0	0
3	Q	82	0	72	0	0
3	T	82	0	72	0	0
3	W	82	0	72	0	0
3	X	82	0	72	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
4	E	5	0	0	0	0
4	H	5	0	0	0	0
4	I	5	0	0	0	0
4	L	5	0	0	0	0
4	Q	5	0	0	0	0
4	T	5	0	0	0	0
4	W	5	0	0	0	0
4	X	5	0	0	0	0
5	A	23	0	0	0	0
5	B	34	0	0	0	0
5	C	15	0	0	0	0
5	D	35	0	0	0	0
5	F	18	0	0	0	0
5	G	22	0	0	0	0
5	H	3	0	0	0	0
5	I	21	0	0	0	0
5	J	15	0	0	0	0
5	K	4	0	0	0	0
5	L	13	0	0	0	0
5	M	4	0	0	0	0
5	O	11	0	0	0	0
5	P	8	0	0	0	0
5	Q	1	0	0	0	0
5	R	8	0	0	0	0
5	S	10	0	0	0	0
5	U	3	0	0	0	0
5	V	6	0	0	0	0
All	All	27296	0	26069	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 1.

The worst 5 of 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)
1:C:3:LYS:HG3	2:M:206:THR:HB	1.67	0.76
1:I:174:LEU:HD13	2:J:164:LEU:HD11	1.67	0.76
2:J:206:THR:HG23	1:R:208:LYS:HB2	1.74	0.70
1:U:130:VAL:C	2:V:218:CYS:SG	2.78	0.66
2:P:194:ASN:OD1	2:P:215:ARG:HG2	1.95	0.66

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	216/218 (99%)	210 (97%)	6 (3%)	0	100	100
1	C	216/218 (99%)	210 (97%)	6 (3%)	0	100	100
1	F	209/218 (96%)	205 (98%)	4 (2%)	0	100	100
1	I	216/218 (99%)	211 (98%)	5 (2%)	0	100	100
1	L	212/218 (97%)	207 (98%)	5 (2%)	0	100	100
1	O	212/218 (97%)	207 (98%)	5 (2%)	0	100	100
1	R	211/218 (97%)	207 (98%)	4 (2%)	0	100	100
1	U	208/218 (95%)	203 (98%)	5 (2%)	0	100	100
2	B	215/218 (99%)	210 (98%)	5 (2%)	0	100	100
2	D	215/218 (99%)	211 (98%)	4 (2%)	0	100	100
2	G	216/218 (99%)	212 (98%)	4 (2%)	0	100	100
2	J	216/218 (99%)	212 (98%)	4 (2%)	0	100	100
2	M	215/218 (99%)	211 (98%)	4 (2%)	0	100	100
2	P	216/218 (99%)	212 (98%)	4 (2%)	0	100	100
2	S	216/218 (99%)	212 (98%)	4 (2%)	0	100	100
2	V	216/218 (99%)	211 (98%)	5 (2%)	0	100	100
3	E	9/46 (20%)	8 (89%)	1 (11%)	0	100	100
3	H	10/46 (22%)	9 (90%)	1 (10%)	0	100	100
3	K	10/46 (22%)	9 (90%)	1 (10%)	0	100	100
3	N	9/46 (20%)	8 (89%)	1 (11%)	0	100	100
3	Q	9/46 (20%)	8 (89%)	1 (11%)	0	100	100
3	T	9/46 (20%)	8 (89%)	1 (11%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
3	W	9/46 (20%)	8 (89%)	1 (11%)	0	100	100
3	X	9/46 (20%)	8 (89%)	1 (11%)	0	100	100
All	All	3499/3856 (91%)	3417 (98%)	82 (2%)	0	100	100

There are no Ramachandran outliers to report.

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	185/185 (100%)	182 (98%)	3 (2%)	55	83
1	C	185/185 (100%)	183 (99%)	2 (1%)	65	88
1	F	182/185 (98%)	180 (99%)	2 (1%)	65	88
1	I	185/185 (100%)	182 (98%)	3 (2%)	55	83
1	L	185/185 (100%)	181 (98%)	4 (2%)	45	77
1	O	184/185 (100%)	181 (98%)	3 (2%)	55	83
1	R	184/185 (100%)	181 (98%)	3 (2%)	55	83
1	U	182/185 (98%)	179 (98%)	3 (2%)	55	83
2	B	187/188 (100%)	176 (94%)	11 (6%)	18	48
2	D	187/188 (100%)	180 (96%)	7 (4%)	30	64
2	G	188/188 (100%)	181 (96%)	7 (4%)	30	64
2	J	188/188 (100%)	180 (96%)	8 (4%)	26	60
2	M	187/188 (100%)	180 (96%)	7 (4%)	30	64
2	P	188/188 (100%)	181 (96%)	7 (4%)	30	64
2	S	188/188 (100%)	180 (96%)	8 (4%)	26	60
2	V	188/188 (100%)	179 (95%)	9 (5%)	23	55
3	E	6/15 (40%)	6 (100%)	0	100	100
3	H	6/15 (40%)	6 (100%)	0	100	100
3	K	6/15 (40%)	6 (100%)	0	100	100

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
3	N	6/15 (40%)	6 (100%)	0	100	100
3	Q	6/15 (40%)	6 (100%)	0	100	100
3	T	6/15 (40%)	6 (100%)	0	100	100
3	W	6/15 (40%)	6 (100%)	0	100	100
3	X	6/15 (40%)	6 (100%)	0	100	100
All	All	3021/3104 (97%)	2934 (97%)	87 (3%)	37	71

5 of 87 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
2	P	11	LEU
2	S	138	CYS
2	P	94	GLN
1	R	174	LEU
1	U	80	VAL

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 25 such sidechains are listed below:

Mol	Chain	Res	Type
2	J	141	ASN
2	M	161	ASN
2	V	194	ASN
2	J	194	ASN
2	M	194	ASN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

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

16 non-standard protein/DNA/RNA residues are modelled in this entry.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the

expected value. A bond length (or angle) with $|Z| > 2$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\# Z > 2$	Counts	RMSZ	$\# Z > 2$
3	HYP	T	30	3	7,8,9	0.93	1 (14%)	5,10,12	2.33	2 (40%)
3	HYP	Q	21	3	7,8,9	0.69	0	5,10,12	2.99	1 (20%)
3	HYP	T	21	3	7,8,9	0.72	0	5,10,12	2.84	2 (40%)
3	HYP	H	21	3	7,8,9	0.60	0	5,10,12	2.98	1 (20%)
3	HYP	W	30	3	7,8,9	0.94	1 (14%)	5,10,12	2.23	2 (40%)
3	HYP	X	30	3	7,8,9	1.15	1 (14%)	5,10,12	2.17	2 (40%)
3	HYP	W	21	3	7,8,9	0.77	0	5,10,12	3.17	2 (40%)
3	HYP	K	30	3	7,8,9	1.14	1 (14%)	5,10,12	2.08	2 (40%)
3	HYP	E	21	3	7,8,9	0.64	0	5,10,12	2.86	3 (60%)
3	HYP	K	21	3	7,8,9	0.58	0	5,10,12	2.93	3 (60%)
3	HYP	N	30	3	7,8,9	0.76	0	5,10,12	2.24	2 (40%)
3	HYP	Q	30	3	7,8,9	0.89	0	5,10,12	2.22	2 (40%)
3	HYP	X	21	3	7,8,9	0.77	0	5,10,12	2.90	2 (40%)
3	HYP	N	21	3	7,8,9	0.56	0	5,10,12	3.00	1 (20%)
3	HYP	E	30	3	7,8,9	1.08	0	5,10,12	1.74	2 (40%)
3	HYP	H	30	3	7,8,9	0.96	1 (14%)	5,10,12	2.19	2 (40%)

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	HYP	T	30	3	-	0/0/11/13	0/1/1/1
3	HYP	Q	21	3	-	0/0/11/13	0/1/1/1
3	HYP	T	21	3	-	0/0/11/13	0/1/1/1
3	HYP	H	21	3	-	0/0/11/13	0/1/1/1
3	HYP	W	30	3	-	0/0/11/13	0/1/1/1
3	HYP	X	30	3	-	0/0/11/13	0/1/1/1
3	HYP	W	21	3	-	0/0/11/13	0/1/1/1
3	HYP	K	30	3	-	0/0/11/13	0/1/1/1
3	HYP	E	21	3	-	0/0/11/13	0/1/1/1
3	HYP	K	21	3	-	0/0/11/13	0/1/1/1
3	HYP	N	30	3	-	0/0/11/13	0/1/1/1
3	HYP	Q	30	3	-	0/0/11/13	0/1/1/1
3	HYP	X	21	3	-	0/0/11/13	0/1/1/1

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
3	HYP	N	21	3	-	0/0/11/13	0/1/1/1
3	HYP	E	30	3	-	0/0/11/13	0/1/1/1
3	HYP	H	30	3	-	0/0/11/13	0/1/1/1

All (5) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	K	30	HYP	CA-N	-2.37	1.44	1.48
3	W	30	HYP	CA-N	-2.23	1.44	1.48
3	X	30	HYP	CA-N	-2.22	1.44	1.48
3	H	30	HYP	CA-N	-2.12	1.45	1.48
3	T	30	HYP	CA-N	-2.03	1.45	1.48

The worst 5 of 31 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	W	21	HYP	CB-CG-CD	6.52	110.42	103.16
3	Q	21	HYP	CB-CG-CD	6.39	110.27	103.16
3	N	21	HYP	CB-CG-CD	6.33	110.21	103.16
3	H	21	HYP	CB-CG-CD	6.15	110.00	103.16
3	T	21	HYP	CB-CG-CD	5.78	109.60	103.16

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

No monomer is involved in short contacts.

5.5 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

8 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	W	101	-	4,4,4	0.44	0	6,6,6	0.21	0
4	SO4	H	101	-	4,4,4	0.45	0	6,6,6	0.27	0
4	SO4	L	301	-	4,4,4	0.48	0	6,6,6	0.18	0
4	SO4	I	301	-	4,4,4	0.48	0	6,6,6	0.18	0
4	SO4	E	101	-	4,4,4	0.44	0	6,6,6	0.12	0
4	SO4	Q	101	-	4,4,4	0.43	0	6,6,6	0.21	0
4	SO4	X	101	-	4,4,4	0.42	0	6,6,6	0.35	0
4	SO4	T	101	-	4,4,4	0.48	0	6,6,6	0.26	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.

No monomer is involved in short contacts.

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 ⓘ

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	218/218 (100%)	-0.01	1 (0%) 87 83	24, 42, 69, 79	0
1	C	218/218 (100%)	-0.04	1 (0%) 87 83	30, 43, 67, 80	0
1	F	213/218 (97%)	-0.03	0 100 100	27, 45, 67, 93	0
1	I	218/218 (100%)	-0.09	2 (0%) 81 75	27, 40, 59, 79	0
1	L	216/218 (99%)	0.52	19 (8%) 15 13	27, 49, 97, 116	0
1	O	216/218 (99%)	0.21	2 (0%) 81 75	28, 47, 85, 108	0
1	R	215/218 (98%)	0.14	2 (0%) 81 75	34, 49, 73, 95	0
1	U	212/218 (97%)	0.87	23 (10%) 11 9	41, 76, 110, 127	0
2	B	217/218 (99%)	-0.13	0 100 100	22, 39, 52, 57	0
2	D	217/218 (99%)	-0.11	1 (0%) 87 83	24, 38, 51, 59	0
2	G	218/218 (100%)	0.16	3 (1%) 73 65	25, 50, 86, 101	0
2	J	218/218 (100%)	0.02	0 100 100	28, 42, 58, 73	0
2	M	217/218 (99%)	0.58	13 (5%) 27 21	27, 59, 106, 113	0
2	P	218/218 (100%)	0.47	5 (2%) 61 52	29, 63, 110, 119	0
2	S	218/218 (100%)	0.23	0 100 100	32, 56, 87, 97	0
2	V	218/218 (100%)	0.88	30 (13%) 6 5	32, 74, 120, 144	0
3	E	10/46 (21%)	0.39	0 100 100	39, 45, 56, 58	0
3	H	11/46 (23%)	0.56	0 100 100	48, 52, 55, 55	0
3	K	11/46 (23%)	0.65	0 100 100	43, 49, 56, 62	0
3	N	10/46 (21%)	0.35	0 100 100	48, 54, 68, 75	0
3	Q	10/46 (21%)	1.27	1 (10%) 12 10	73, 78, 96, 106	0
3	T	10/46 (21%)	0.44	0 100 100	55, 58, 66, 69	0
3	W	10/46 (21%)	0.80	0 100 100	66, 70, 80, 80	0
3	X	10/46 (21%)	0.64	0 100 100	37, 42, 52, 61	0

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Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å ²)	Q<0.9
All	All	3549/3856 (92%)	0.24	103 (2%) 53 45	22, 47, 98, 144	0

The worst 5 of 103 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	U	139	VAL	4.5
1	L	141	LEU	4.2
1	L	131	CYS	4.1
2	V	218	CYS	4.0
1	L	130	VAL	3.7

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

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	HYP	X	21	8/9	0.52	0.21	48,49,50,50	0
3	HYP	Q	21	8/9	0.61	0.23	83,85,92,92	0
3	HYP	N	21	8/9	0.65	0.18	57,61,65,65	0
3	HYP	E	21	8/9	0.67	0.15	50,52,52,53	0
3	HYP	W	21	8/9	0.69	0.20	77,78,78,79	0
3	HYP	T	21	8/9	0.72	0.19	65,67,67,67	0
3	HYP	K	21	8/9	0.76	0.16	50,52,59,61	0
3	HYP	H	21	8/9	0.80	0.15	50,52,56,58	0
3	HYP	W	30	8/9	0.83	0.15	70,72,72,72	0
3	HYP	N	30	8/9	0.89	0.11	58,61,62,63	0
3	HYP	T	30	8/9	0.91	0.11	59,61,61,61	0
3	HYP	Q	30	8/9	0.91	0.17	85,89,92,93	0
3	HYP	X	30	8/9	0.91	0.12	42,44,47,48	0
3	HYP	E	30	8/9	0.93	0.10	45,46,48,49	0
3	HYP	H	30	8/9	0.94	0.10	52,53,53,53	0
3	HYP	K	30	8/9	0.94	0.09	51,52,60,61	0

6.3 Carbohydrates ⓘ

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
4	SO4	W	101	5/5	0.85	0.11	83,84,88,89	0
4	SO4	T	101	5/5	0.86	0.15	64,68,69,70	0
4	SO4	Q	101	5/5	0.89	0.12	65,65,68,69	0
4	SO4	L	301	5/5	0.92	0.12	62,65,69,70	0
4	SO4	H	101	5/5	0.93	0.13	43,43,46,49	0
4	SO4	E	101	5/5	0.94	0.09	61,63,65,65	0
4	SO4	I	301	5/5	0.95	0.10	47,49,50,53	0
4	SO4	X	101	5/5	0.97	0.09	40,41,41,42	0

6.5 Other polymers [i](#)

There are no such residues in this entry.