



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 6, 2026 – 11:57 PM UTC

PDB ID : 1YKK / pdb_00001ykk
Title : Protocatechuate 3,4-Dioxygenase Y408C Mutant
Authors : Brown, C.K.; Ohlendorf, D.H.
Deposited on : 2005-01-18
Resolution : 2.06 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

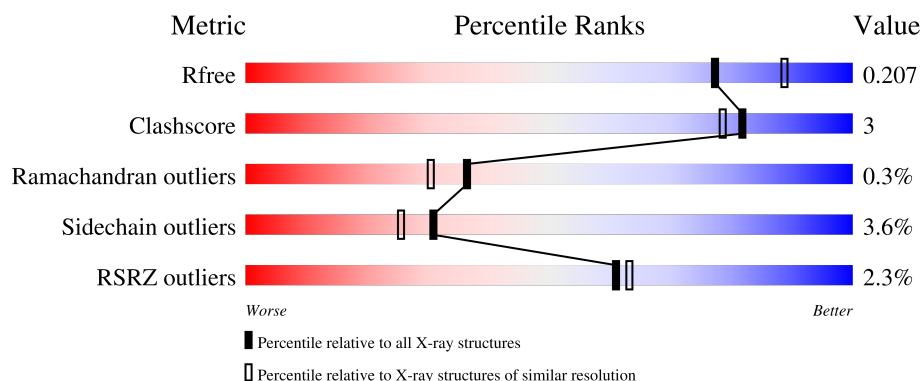
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.06 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	3774 (2.08-2.04)
Clashscore	190562	3883 (2.08-2.04)
Ramachandran outliers	187476	3860 (2.08-2.04)
Sidechain outliers	187428	3860 (2.08-2.04)
RSRZ outliers	180081	3775 (2.08-2.04)

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	200	4% 89% 9% .
1	C	200	4% 92% 6% .
1	E	200	3% 91% 8% .
1	G	200	2% 92% 6% .
1	I	200	2% 91% 7% .

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Mol	Chain	Length	Quality of chain
1	K	200	4% 90% 8%
2	B	238	2% 87% 11%
2	D	238	2% 90% 9%
2	F	238	% 87% 11%
2	H	238	% 87% 11%
2	J	238	% 90% 9%
2	L	238	2% 87% 11%

2 Entry composition

There are 4 unique types of molecules in this entry. The entry contains 21498 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 Protocatechuate 3,4-dioxygenase alpha chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	200	Total	C	N	O	S	0	0	0
			1571	993	276	299	3			
1	C	200	Total	C	N	O	S	0	0	0
			1571	993	276	299	3			
1	E	200	Total	C	N	O	S	0	0	0
			1571	993	276	299	3			
1	G	200	Total	C	N	O	S	0	0	0
			1571	993	276	299	3			
1	I	200	Total	C	N	O	S	0	0	0
			1571	993	276	299	3			
1	K	200	Total	C	N	O	S	0	0	0
			1571	993	276	299	3			

- Molecule 2 is a protein called Protocatechuate 3,4-dioxygenase beta chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	B	238	Total	C	N	O	S	20	1	0
			1879	1187	343	338	11			
2	D	238	Total	C	N	O	S	20	1	0
			1879	1187	343	338	11			
2	F	238	Total	C	N	O	S	20	1	0
			1879	1187	343	338	11			
2	H	238	Total	C	N	O	S	20	1	0
			1879	1187	343	338	11			
2	J	238	Total	C	N	O	S	20	1	0
			1879	1187	343	338	11			
2	L	238	Total	C	N	O	S	20	1	0
			1879	1187	343	338	11			

There are 12 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
B	408	CYS	TYR	engineered mutation	UNP P00437

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Chain	Residue	Modelled	Actual	Comment	Reference
B	429	CME	CYS	modified residue	UNP P00437
D	408	CYS	TYR	engineered mutation	UNP P00437
D	429	CME	CYS	modified residue	UNP P00437
F	408	CYS	TYR	engineered mutation	UNP P00437
F	429	CME	CYS	modified residue	UNP P00437
H	408	CYS	TYR	engineered mutation	UNP P00437
H	429	CME	CYS	modified residue	UNP P00437
J	408	CYS	TYR	engineered mutation	UNP P00437
J	429	CME	CYS	modified residue	UNP P00437
L	408	CYS	TYR	engineered mutation	UNP P00437
L	429	CME	CYS	modified residue	UNP P00437

- Molecule 3 is FE (III) ION (CCD ID: FE) (formula: Fe).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	B	1	Total Fe 1 1	0	0
3	D	1	Total Fe 1 1	0	0
3	F	1	Total Fe 1 1	0	0
3	H	1	Total Fe 1 1	0	0
3	J	1	Total Fe 1 1	0	0
3	L	1	Total Fe 1 1	0	0

- Molecule 4 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	A	42	Total O 42 42	0	0
4	B	90	Total O 90 90	0	0
4	C	43	Total O 43 43	0	0
4	D	90	Total O 90 90	0	0
4	E	43	Total O 43 43	0	0
4	F	89	Total O 89 89	0	0

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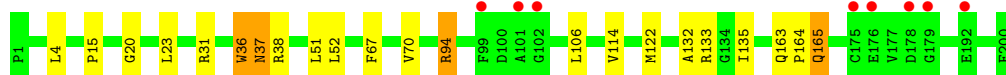
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Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	G	45	Total 45	O 45	0	0
4	H	87	Total 87	O 87	0	0
4	I	45	Total 45	O 45	0	0
4	J	86	Total 86	O 86	0	0
4	K	45	Total 45	O 45	0	0
4	L	87	Total 87	O 87	0	0

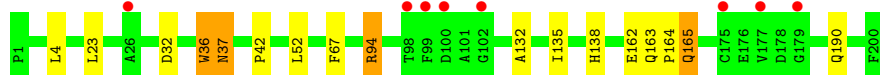
3 Residue-property plots [i](#)

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.

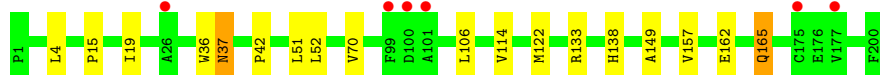
- Molecule 1: Protocatechuate 3,4-dioxygenase alpha chain



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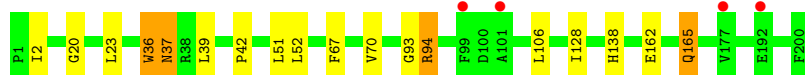
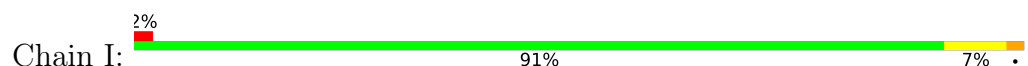
- Molecule 1: Protocatechuate 3,4-dioxygenase alpha chain



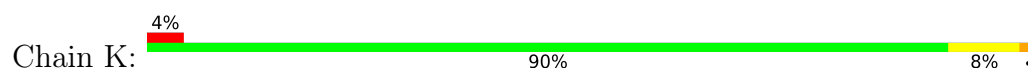
- Molecule 1: Protocatechuate 3,4-dioxygenase alpha chain



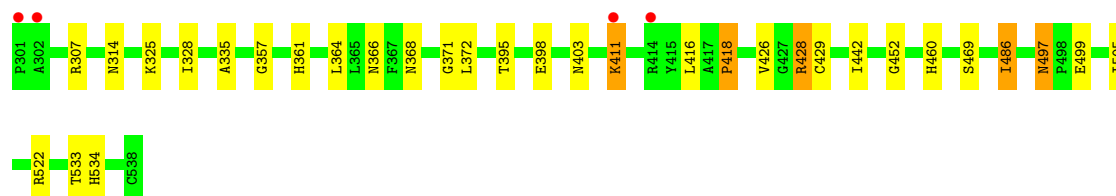
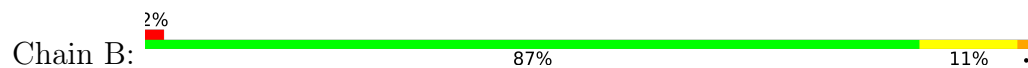
- Molecule 1: Protocatechuate 3,4-dioxygenase alpha chain



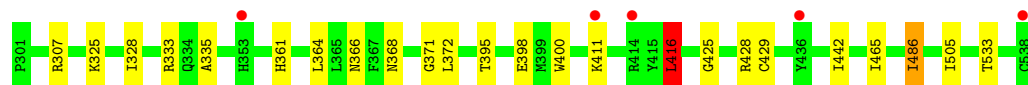
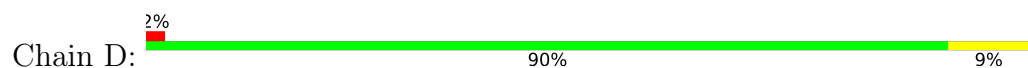
- Molecule 1: Protocatechuate 3,4-dioxygenase alpha chain



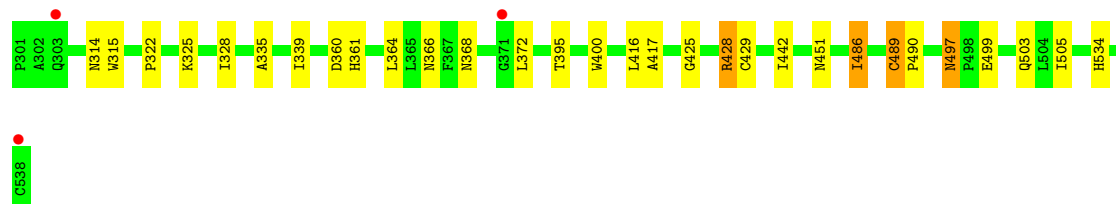
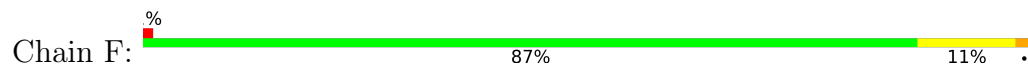
- Molecule 2: Protocatechuate 3,4-dioxygenase beta chain



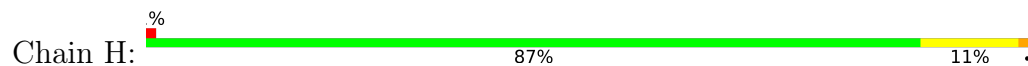
- Molecule 2: Protocatechuate 3,4-dioxygenase beta chain



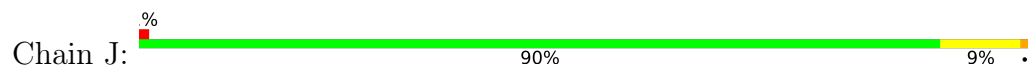
- Molecule 2: Protocatechuate 3,4-dioxygenase beta chain



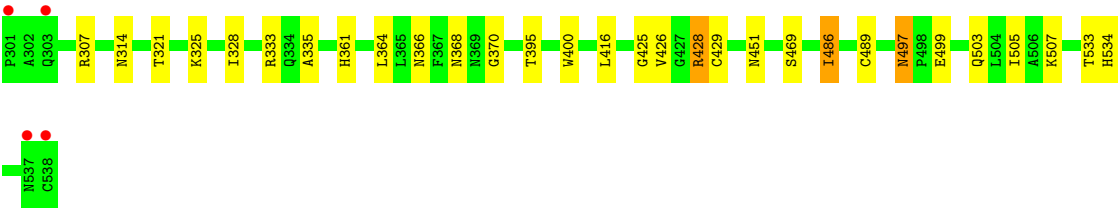
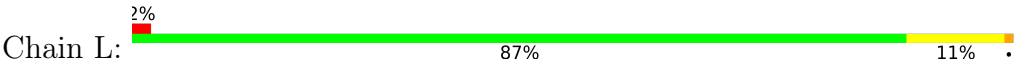
- Molecule 2: Protocatechuate 3,4-dioxygenase beta chain



- Molecule 2: Protocatechuate 3,4-dioxygenase beta chain



- Molecule 2: Protocatechuate 3,4-dioxygenase beta chain



4 Data and refinement statistics

Property	Value	Source
Space group	I 1 2 1	Depositor
Cell constants a, b, c, α , β , γ	194.87Å 126.96Å 132.76Å 90.00° 96.39° 90.00°	Depositor
Resolution (Å)	26.09 – 2.06 26.09 – 2.06	Depositor EDS
% Data completeness (in resolution range)	93.1 (26.09-2.06) 93.2 (26.09-2.06)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	3.49 (at 2.06Å)	Xtriage
Refinement program	CNS 1.1	Depositor
R, R_{free}	0.210 , 0.219 0.204 , 0.207	Depositor DCC
R_{free} test set	9213 reflections (5.01%)	wwPDB-VP
Wilson B-factor (Å ²)	31.5	Xtriage
Anisotropy	0.182	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.32 , 22.2	EDS
L-test for twinning ²	$\langle L \rangle = 0.43$, $\langle L^2 \rangle = 0.25$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.95	EDS
Total number of atoms	21498	wwPDB-VP
Average B, all atoms (Å ²)	35.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.87% 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: FE, CME

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	0.62	0/1611	0.98	3/2195 (0.1%)
1	C	0.61	0/1611	0.99	5/2195 (0.2%)
1	E	0.63	0/1611	1.00	4/2195 (0.2%)
1	G	0.63	0/1611	0.99	4/2195 (0.2%)
1	I	0.63	0/1611	0.98	5/2195 (0.2%)
1	K	0.62	0/1611	0.96	2/2195 (0.1%)
2	B	0.66	1/1923 (0.1%)	1.07	10/2616 (0.4%)
2	D	0.65	1/1923 (0.1%)	1.06	4/2616 (0.2%)
2	F	0.65	1/1923 (0.1%)	1.05	8/2616 (0.3%)
2	H	0.66	1/1923 (0.1%)	1.07	6/2616 (0.2%)
2	J	0.68	1/1923 (0.1%)	1.05	4/2616 (0.2%)
2	L	0.66	1/1923 (0.1%)	1.05	11/2616 (0.4%)
All	All	0.65	6/21204 (0.0%)	1.03	66/28866 (0.2%)

All (6) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	F	486	ILE	CA-CB	9.04	1.59	1.54
2	J	486	ILE	CA-CB	8.99	1.59	1.54
2	H	486	ILE	CA-CB	7.31	1.58	1.54
2	B	486	ILE	CA-CB	7.20	1.58	1.54
2	L	486	ILE	CA-CB	7.13	1.58	1.54
2	D	486	ILE	CA-CB	6.39	1.57	1.54

All (66) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	L	325	LYS	N-CA-C	7.52	120.42	111.33
2	B	325	LYS	N-CA-C	7.43	120.32	111.33
1	C	37	ASN	N-CA-C	7.40	122.00	113.19

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	H	366	ASN	N-CA-C	7.31	121.84	113.15
1	E	37	ASN	N-CA-C	7.26	121.98	113.20
2	F	325	LYS	N-CA-C	7.11	119.93	111.33
1	I	37	ASN	N-CA-C	6.83	121.47	113.20
2	H	452	GLY	N-CA-C	-6.51	104.09	112.10
1	K	37	ASN	N-CA-C	6.44	120.81	113.15
2	B	452	GLY	N-CA-C	-6.42	104.20	112.10
2	L	416	LEU	N-CA-C	6.39	120.54	112.87
1	E	138	HIS	N-CA-C	6.31	118.45	110.24
2	F	366	ASN	N-CA-C	6.26	120.60	113.15
1	I	23	LEU	N-CA-C	6.22	118.06	111.28
2	H	314	ASN	N-CA-C	-6.21	105.86	113.50
2	H	325	LYS	N-CA-C	6.18	118.81	111.33
2	B	366	ASN	N-CA-C	6.14	120.46	113.15
2	D	366	ASN	N-CA-C	6.07	120.41	113.19
2	J	416	LEU	N-CA-C	6.06	120.14	112.87
2	D	325	LYS	N-CA-C	6.04	121.33	111.37
2	D	416	LEU	N-CA-C	5.99	119.69	112.38
1	G	37	ASN	N-CA-C	5.96	120.55	113.16
2	B	469	SER	N-CA-C	5.86	117.13	108.86
2	B	460	HIS	N-CA-C	5.84	117.94	109.07
1	I	36	TRP	N-CA-C	5.81	116.08	108.07
1	A	23	LEU	N-CA-C	5.78	118.05	111.11
1	A	36	TRP	N-CA-C	5.73	119.25	108.65
2	D	371	GLY	N-CA-C	5.67	118.79	110.80
2	F	416	LEU	N-CA-C	5.64	119.64	112.87
2	L	314	ASN	N-CA-C	-5.62	106.59	113.50
2	F	314	ASN	N-CA-C	-5.60	106.80	113.97
1	A	37	ASN	N-CA-C	5.58	119.95	113.20
2	B	418	PRO	N-CA-C	5.51	119.67	111.41
2	L	469	SER	N-CA-C	5.48	116.58	108.86
2	L	451	ASN	N-CA-C	-5.45	99.19	110.80
2	J	314	ASN	N-CA-C	-5.43	106.82	113.50
2	B	314	ASN	N-CA-C	-5.40	106.74	113.38
2	L	366	ASN	N-CA-C	5.38	119.71	113.20
2	H	371	GLY	N-CA-C	5.37	118.43	110.42
2	F	322	PRO	N-CA-C	5.31	123.41	112.47
2	F	489	CYS	N-CA-C	5.30	116.33	109.65
1	I	162	GLU	N-CA-C	5.29	117.46	111.11
2	F	451	ASN	N-CA-C	-5.28	99.55	110.80
2	L	321	THR	CA-C-N	5.24	126.39	119.84
2	L	321	THR	C-N-CA	5.24	126.39	119.84

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	I	138	HIS	N-CA-C	5.23	117.04	110.24
2	L	489	CYS	N-CA-C	5.22	116.23	109.65
1	K	138	HIS	N-CA-C	5.21	117.44	110.35
1	C	23	LEU	N-CA-C	5.20	117.62	111.33
1	C	162	GLU	N-CA-C	5.18	117.33	111.11
2	F	417	ALA	N-CA-C	-5.18	103.12	109.65
1	C	138	HIS	N-CA-C	5.15	116.93	110.24
2	B	416	LEU	N-CA-C	5.14	119.04	112.87
2	J	460	HIS	N-CA-C	5.13	116.87	109.07
1	E	162	GLU	N-CA-C	5.12	117.26	111.11
2	H	416	LEU	N-CA-C	5.11	119.00	112.87
2	J	366	ASN	N-CA-C	5.07	119.34	113.20
2	B	357	GLY	N-CA-C	-5.07	105.82	112.82
1	E	149	ALA	N-CA-C	5.07	117.46	111.33
2	B	371	GLY	N-CA-C	5.03	117.92	110.42
1	G	163	GLN	CA-C-N	5.03	125.05	119.32
1	G	163	GLN	C-N-CA	5.03	125.05	119.32
1	G	81	ASP	N-CA-C	5.02	116.84	111.36
2	L	489	CYS	CA-C-N	5.01	124.50	119.19
2	L	489	CYS	C-N-CA	5.01	124.50	119.19
1	C	36	TRP	N-CA-C	5.01	117.92	108.65

There are no chirality outliers.

There are no planarity outliers.

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	1571	0	1499	13	0
1	C	1571	0	1499	9	0
1	E	1571	0	1499	7	0
1	G	1571	0	1499	10	0
1	I	1571	0	1499	12	0
1	K	1571	0	1499	10	0
2	B	1879	0	1823	14	0
2	D	1879	0	1823	10	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	F	1879	0	1823	10	0
2	H	1879	0	1823	10	0
2	J	1879	0	1823	9	0
2	L	1879	0	1823	12	0
3	B	1	0	0	0	0
3	D	1	0	0	0	0
3	F	1	0	0	0	0
3	H	1	0	0	0	0
3	J	1	0	0	0	0
3	L	1	0	0	0	0
4	A	42	0	0	0	0
4	B	90	0	0	1	0
4	C	43	0	0	0	0
4	D	90	0	0	0	0
4	E	43	0	0	0	0
4	F	89	0	0	0	0
4	G	45	0	0	0	0
4	H	87	0	0	0	0
4	I	45	0	0	0	0
4	J	86	0	0	0	0
4	K	45	0	0	0	0
4	L	87	0	0	0	0
All	All	21498	0	19932	102	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 3.

All (102) 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:I:165:GLN:H	1:I:165:GLN:HE21	1.17	0.91
1:G:51:LEU:HD12	1:G:106:LEU:HD23	1.78	0.65
2:F:497:ASN:HD22	2:F:499:GLU:H	1.46	0.63
2:L:497:ASN:HD22	2:L:499:GLU:H	1.47	0.61
1:A:36:TRP:CG	1:A:37:ASN:H	2.20	0.59
1:A:51:LEU:HD12	1:A:106:LEU:HD23	1.85	0.59
1:C:132:ALA:HB3	1:C:135:ILE:HD12	1.83	0.59
1:C:165:GLN:HE21	1:C:165:GLN:H	1.49	0.59
2:B:497:ASN:HD22	2:B:499:GLU:H	1.52	0.58
1:G:67:PHE:HZ	1:G:94:ARG:HD2	1.69	0.58
2:D:416:LEU:H	2:D:416:LEU:HD23	1.68	0.56

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:I:51:LEU:HD12	1:I:106:LEU:HD23	1.88	0.56
2:D:328:ILE:HD12	2:F:335:ALA:HB2	1.86	0.56
2:F:486:ILE:HD13	2:F:505:ILE:HD12	1.88	0.56
1:A:67:PHE:HZ	1:A:94:ARG:HD2	1.71	0.55
2:B:328:ILE:HD12	2:D:335:ALA:HB2	1.89	0.55
2:D:486:ILE:HD13	2:D:505:ILE:HD12	1.88	0.54
2:B:307:ARG:HG2	2:B:533:THR:HG22	1.90	0.53
2:D:307:ARG:HG2	2:D:533:THR:HG22	1.90	0.53
1:G:36:TRP:CG	1:G:37:ASN:H	2.27	0.52
1:C:165:GLN:H	1:C:165:GLN:NE2	2.06	0.52
2:B:335:ALA:HB2	2:F:328:ILE:HD12	1.91	0.52
1:I:94:ARG:NH2	2:J:398:GLU:OE2	2.40	0.52
2:B:418:PRO:HG2	2:H:374:ILE:HD13	1.90	0.52
1:K:6:PRO:HB2	2:L:503:GLN:HE22	1.75	0.52
1:E:165:GLN:NE2	1:E:165:GLN:H	2.08	0.52
1:G:70:VAL:HG21	1:G:106:LEU:HD21	1.92	0.52
1:G:165:GLN:NE2	1:G:165:GLN:H	2.08	0.51
2:L:361:HIS:H	2:L:361:HIS:CD2	2.29	0.50
2:H:497:ASN:HD22	2:H:499:GLU:H	1.59	0.50
2:L:486:ILE:HD13	2:L:505:ILE:HD12	1.92	0.50
2:B:486:ILE:HD13	2:B:505:ILE:HD12	1.94	0.50
2:H:335:ALA:HB2	2:L:328:ILE:HD12	1.93	0.50
2:H:486:ILE:HD13	2:H:505:ILE:HD12	1.93	0.50
1:K:165:GLN:NE2	1:K:165:GLN:H	2.10	0.50
1:K:36:TRP:CG	1:K:37:ASN:H	2.30	0.49
1:A:67:PHE:CZ	1:A:94:ARG:HD2	2.47	0.49
1:E:36:TRP:CG	1:E:37:ASN:H	2.31	0.49
1:A:70:VAL:HG21	1:A:106:LEU:HD21	1.94	0.48
1:C:36:TRP:CG	1:C:37:ASN:H	2.31	0.48
1:G:67:PHE:CZ	1:G:94:ARG:HD2	2.49	0.48
1:A:132:ALA:HB3	1:A:135:ILE:HD12	1.95	0.48
2:H:328:ILE:HD12	2:J:335:ALA:HB2	1.95	0.48
2:J:497:ASN:HD22	2:J:499:GLU:H	1.62	0.48
2:H:361:HIS:CD2	2:H:361:HIS:H	2.31	0.47
1:E:51:LEU:HD12	1:E:106:LEU:HD23	1.96	0.47
1:I:70:VAL:HG21	1:I:106:LEU:HD21	1.96	0.47
1:K:114:VAL:HG23	1:K:122:MET:HE3	1.95	0.47
1:I:36:TRP:CG	1:I:37:ASN:H	2.31	0.47
1:I:94:ARG:HH22	2:J:398:GLU:CD	2.22	0.47
2:B:361:HIS:H	2:B:361:HIS:CD2	2.32	0.47
2:F:315:TRP:HZ2	2:F:503:GLN:HE21	1.62	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:H:465:ILE:HG13	2:H:525:ILE:HG21	1.97	0.47
1:C:94:ARG:HH22	2:D:398:GLU:CD	2.23	0.47
2:J:328:ILE:HD12	2:L:335:ALA:HB2	1.97	0.46
2:L:307:ARG:HG2	2:L:533:THR:HG22	1.97	0.46
1:G:165:GLN:H	1:G:165:GLN:HE21	1.62	0.46
1:I:165:GLN:H	1:I:165:GLN:NE2	1.99	0.46
1:K:67:PHE:HZ	1:K:94:ARG:HD2	1.82	0.45
2:B:522:ARG:HB3	1:I:2:ILE:HD11	1.98	0.45
2:H:453:PRO:HB2	2:J:310:ILE:HG12	1.99	0.45
1:E:70:VAL:HG21	1:E:106:LEU:HD21	1.98	0.45
2:J:364:LEU:HD11	2:J:442:ILE:HG23	1.98	0.45
1:C:94:ARG:NH2	2:D:398:GLU:OE2	2.50	0.45
2:B:411:LYS:HD3	2:B:411:LYS:H	1.82	0.44
1:K:31:ARG:NH1	2:L:428:ARG:HG2	2.33	0.44
1:I:39:LEU:HD11	1:I:93:GLY:HA3	1.99	0.44
2:F:400:TRP:HA	2:F:425:GLY:O	2.18	0.44
1:I:67:PHE:HZ	1:I:94:ARG:HD2	1.82	0.44
1:A:15:PRO:HB3	1:A:133:ARG:HD2	2.00	0.43
1:A:114:VAL:HG23	1:A:122:MET:HE3	2.00	0.43
2:F:361:HIS:H	2:F:361:HIS:CD2	2.37	0.43
1:K:15:PRO:HB3	1:K:133:ARG:HD2	2.00	0.43
1:I:20:GLY:HA2	2:J:426:VAL:HG13	2.00	0.43
2:L:497:ASN:ND2	2:L:499:GLU:H	2.16	0.43
1:I:70:VAL:HG12	1:I:128:ILE:HG12	2.01	0.43
1:A:165:GLN:NE2	1:A:165:GLN:H	2.17	0.42
1:E:114:VAL:HG23	1:E:122:MET:HE3	2.01	0.42
2:F:489:CYS:HA	2:F:490:PRO:HD3	1.90	0.42
1:A:94:ARG:NH2	2:B:398:GLU:OE2	2.51	0.42
1:E:157:VAL:HG13	2:F:339:ILE:HG21	2.01	0.42
1:G:51:LEU:HB2	1:G:106:LEU:HB3	2.02	0.42
2:H:508:LEU:HD11	2:H:519:LEU:HD22	2.01	0.42
2:B:403:ASN:HB2	4:B:609:HOH:O	2.20	0.41
2:F:360:ASP:HB3	2:F:428:ARG:HG3	2.02	0.41
1:K:20:GLY:HA2	2:L:426:VAL:HG13	2.02	0.41
1:A:20:GLY:HA2	2:B:426:VAL:HG13	2.02	0.41
1:K:190:GLN:HG3	2:L:333:ARG:HG2	2.02	0.41
1:E:15:PRO:HB3	1:E:133:ARG:HD2	2.01	0.41
2:B:497:ASN:ND2	2:B:499:GLU:H	2.18	0.41
1:A:163:GLN:HA	1:A:164:PRO:HD2	1.93	0.41
2:D:361:HIS:CD2	2:D:361:HIS:H	2.38	0.41
2:L:400:TRP:HA	2:L:425:GLY:O	2.21	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:D:400:TRP:HA	2:D:425:GLY:O	2.21	0.41
2:J:484:PRO:O	2:J:488:MET:HE3	2.22	0.40
1:A:31:ARG:NH1	2:B:428:ARG:HG2	2.37	0.40
1:K:51:LEU:HD12	1:K:106:LEU:HD23	2.03	0.40
1:C:67:PHE:HZ	1:C:94:ARG:HD2	1.85	0.40
1:C:190:GLN:HG3	2:D:333:ARG:HG2	2.03	0.40
1:G:163:GLN:HA	1:G:164:PRO:HD3	1.93	0.40
1:C:163:GLN:HA	1:C:164:PRO:HD2	1.93	0.40
1:G:20:GLY:HA2	2:H:426:VAL:HG13	2.04	0.40

There are no symmetry-related clashes.

5.3 Torsion angles

5.3.1 Protein backbone

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	198/200 (99%)	192 (97%)	6 (3%)	0	100	100
1	C	198/200 (99%)	191 (96%)	7 (4%)	0	100	100
1	E	198/200 (99%)	193 (98%)	5 (2%)	0	100	100
1	G	198/200 (99%)	192 (97%)	6 (3%)	0	100	100
1	I	198/200 (99%)	192 (97%)	6 (3%)	0	100	100
1	K	198/200 (99%)	194 (98%)	4 (2%)	0	100	100
2	B	236/238 (99%)	228 (97%)	7 (3%)	1 (0%)	30	23
2	D	236/238 (99%)	230 (98%)	5 (2%)	1 (0%)	30	23
2	F	236/238 (99%)	226 (96%)	9 (4%)	1 (0%)	30	23
2	H	236/238 (99%)	227 (96%)	8 (3%)	1 (0%)	30	23
2	J	236/238 (99%)	228 (97%)	7 (3%)	1 (0%)	30	23
2	L	236/238 (99%)	227 (96%)	7 (3%)	2 (1%)	16	8
All	All	2604/2628 (99%)	2520 (97%)	77 (3%)	7 (0%)	36	30

All (7) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
2	B	368	ASN
2	D	368	ASN
2	F	368	ASN
2	H	368	ASN
2	L	368	ASN
2	J	368	ASN
2	L	370	GLY

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	162/163 (99%)	157 (97%)	5 (3%)	35	30
1	C	162/163 (99%)	156 (96%)	6 (4%)	30	24
1	E	162/163 (99%)	157 (97%)	5 (3%)	35	30
1	G	162/163 (99%)	156 (96%)	6 (4%)	30	24
1	I	162/163 (99%)	158 (98%)	4 (2%)	42	38
1	K	162/163 (99%)	157 (97%)	5 (3%)	35	30
2	B	200/201 (100%)	192 (96%)	8 (4%)	28	22
2	D	200/201 (100%)	192 (96%)	8 (4%)	28	22
2	F	200/201 (100%)	193 (96%)	7 (4%)	32	26
2	H	200/201 (100%)	189 (94%)	11 (6%)	19	12
2	J	200/201 (100%)	193 (96%)	7 (4%)	32	26
2	L	200/201 (100%)	194 (97%)	6 (3%)	36	32
All	All	2172/2184 (100%)	2094 (96%)	78 (4%)	31	25

All (78) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	4	LEU
1	A	38	ARG

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Mol	Chain	Res	Type
1	A	52	LEU
1	A	94	ARG
1	A	165	GLN
2	B	364	LEU
2	B	372	LEU
2	B	395	THR
2	B	411	LYS
2	B	428	ARG
2	B	442	ILE
2	B	497	ASN
2	B	534	HIS
1	C	4	LEU
1	C	32	ASP
1	C	42	PRO
1	C	52	LEU
1	C	94	ARG
1	C	165	GLN
2	D	364	LEU
2	D	372	LEU
2	D	395	THR
2	D	411	LYS
2	D	416	LEU
2	D	428	ARG
2	D	442	ILE
2	D	465	ILE
1	E	4	LEU
1	E	19	ILE
1	E	42	PRO
1	E	52	LEU
1	E	165	GLN
2	F	364	LEU
2	F	372	LEU
2	F	395	THR
2	F	428	ARG
2	F	442	ILE
2	F	497	ASN
2	F	534	HIS
1	G	4	LEU
1	G	19	ILE
1	G	42	PRO
1	G	52	LEU
1	G	94	ARG

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Mol	Chain	Res	Type
1	G	165	GLN
2	H	364	LEU
2	H	372	LEU
2	H	395	THR
2	H	414	ARG
2	H	428	ARG
2	H	442	ILE
2	H	465	ILE
2	H	470	ILE
2	H	497	ASN
2	H	499	GLU
2	H	534	HIS
1	I	42	PRO
1	I	52	LEU
1	I	94	ARG
1	I	165	GLN
2	J	364	LEU
2	J	372	LEU
2	J	395	THR
2	J	411	LYS
2	J	428	ARG
2	J	475	ILE
2	J	497	ASN
1	K	4	LEU
1	K	19	ILE
1	K	52	LEU
1	K	94	ARG
1	K	165	GLN
2	L	364	LEU
2	L	395	THR
2	L	428	ARG
2	L	497	ASN
2	L	507	LYS
2	L	534	HIS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (67) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	11	GLN
1	A	54	GLN
1	A	59	ASN
1	A	115	ASN

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Mol	Chain	Res	Type
1	A	163	GLN
1	A	165	GLN
2	B	305	ASN
2	B	314	ASN
2	B	350	ASN
2	B	361	HIS
2	B	412	ASN
2	B	497	ASN
2	B	530	GLN
1	C	11	GLN
1	C	59	ASN
1	C	163	GLN
1	C	165	GLN
2	D	314	ASN
2	D	334	GLN
2	D	361	HIS
2	D	412	ASN
2	D	497	ASN
1	E	11	GLN
1	E	37	ASN
1	E	90	ASN
1	E	127	ASN
1	E	152	ASN
1	E	163	GLN
1	E	165	GLN
2	F	305	ASN
2	F	314	ASN
2	F	334	GLN
2	F	361	HIS
2	F	412	ASN
2	F	497	ASN
2	F	503	GLN
2	F	530	GLN
1	G	127	ASN
1	G	163	GLN
1	G	165	GLN
2	H	305	ASN
2	H	314	ASN
2	H	361	HIS
2	H	412	ASN
2	H	497	ASN
2	H	512	ASN

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Mol	Chain	Res	Type
2	H	530	GLN
1	I	11	GLN
1	I	127	ASN
1	I	163	GLN
1	I	165	GLN
2	J	305	ASN
2	J	361	HIS
2	J	412	ASN
2	J	497	ASN
2	J	530	GLN
1	K	159	ASN
1	K	163	GLN
1	K	165	GLN
2	L	305	ASN
2	L	350	ASN
2	L	361	HIS
2	L	412	ASN
2	L	422	ASN
2	L	497	ASN
2	L	503	GLN
2	L	530	GLN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

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

6 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	$\# Z > 2$
2	CME	H	429	2	8,9,10	0.88	1 (12%)	6,9,11	1.10	1 (16%)
2	CME	L	429	2	8,9,10	1.03	1 (12%)	6,9,11	1.25	1 (16%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
2	CME	D	429	2	8,9,10	0.88	1 (12%)	6,9,11	1.11	1 (16%)
2	CME	B	429	2	8,9,10	0.87	1 (12%)	6,9,11	1.13	1 (16%)
2	CME	F	429	2	8,9,10	0.86	1 (12%)	6,9,11	1.19	1 (16%)
2	CME	J	429	2	8,9,10	0.88	1 (12%)	6,9,11	1.16	1 (16%)

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
2	CME	H	429	2	-	1/5/8/10	-
2	CME	L	429	2	-	2/5/8/10	-
2	CME	D	429	2	-	1/5/8/10	-
2	CME	B	429	2	-	1/5/8/10	-
2	CME	F	429	2	-	3/5/8/10	-
2	CME	J	429	2	-	3/5/8/10	-

All (6) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	D	429	CME	OH-CZ	-2.17	1.31	1.42
2	L	429	CME	OH-CZ	-2.16	1.31	1.42
2	H	429	CME	OH-CZ	-2.13	1.31	1.42
2	B	429	CME	OH-CZ	-2.11	1.31	1.42
2	J	429	CME	OH-CZ	-2.05	1.31	1.42
2	F	429	CME	OH-CZ	-2.01	1.31	1.42

All (6) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	F	429	CME	OH-CZ-CE	2.72	121.43	110.82
2	J	429	CME	OH-CZ-CE	2.68	121.26	110.82
2	L	429	CME	OH-CZ-CE	2.58	120.88	110.82
2	B	429	CME	OH-CZ-CE	2.55	120.79	110.82
2	H	429	CME	OH-CZ-CE	2.52	120.67	110.82
2	D	429	CME	OH-CZ-CE	2.51	120.60	110.82

There are no chirality outliers.

All (11) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	D	429	CME	CE-SD-SG-CB
2	J	429	CME	SD-CE-CZ-OH
2	L	429	CME	N-CA-CB-SG
2	F	429	CME	CE-SD-SG-CB
2	L	429	CME	CE-SD-SG-CB
2	B	429	CME	SD-CE-CZ-OH
2	F	429	CME	SD-CE-CZ-OH
2	H	429	CME	CZ-CE-SD-SG
2	J	429	CME	CE-SD-SG-CB
2	F	429	CME	CZ-CE-SD-SG
2	J	429	CME	CZ-CE-SD-SG

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](#)

Of 6 ligands modelled in this entry, 6 are monoatomic - leaving 0 for Mogul analysis.

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	200/200 (100%)	0.21	8 (4%) 42 43	20, 37, 59, 79	0
1	C	200/200 (100%)	0.26	8 (4%) 42 43	20, 37, 59, 77	0
1	E	200/200 (100%)	0.29	6 (3%) 52 53	22, 38, 60, 79	0
1	G	200/200 (100%)	0.24	5 (2%) 58 60	21, 38, 60, 80	0
1	I	200/200 (100%)	0.23	4 (2%) 65 67	22, 39, 61, 79	0
1	K	200/200 (100%)	0.40	8 (4%) 42 43	23, 40, 60, 80	0
2	B	234/238 (98%)	-0.05	4 (1%) 69 71	17, 29, 49, 78	1 (0%)
2	D	234/238 (98%)	-0.07	5 (2%) 63 66	17, 29, 48, 77	1 (0%)
2	F	234/238 (98%)	-0.06	3 (1%) 75 77	17, 29, 48, 75	1 (0%)
2	H	234/238 (98%)	-0.10	2 (0%) 81 83	17, 29, 49, 77	1 (0%)
2	J	234/238 (98%)	-0.06	2 (0%) 81 83	18, 31, 49, 76	1 (0%)
2	L	234/238 (98%)	-0.01	4 (1%) 69 71	18, 31, 49, 77	1 (0%)
All	All	2604/2628 (99%)	0.09	59 (2%) 61 63	17, 34, 58, 80	6 (0%)

All (59) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
2	B	301	PRO	4.7
1	C	99	PHE	4.3
1	C	179	GLY	4.1
2	H	538	CYS	3.9
2	F	538	CYS	3.4
1	A	99	PHE	3.4
2	J	538	CYS	3.4
1	K	99	PHE	3.3
1	C	177	VAL	3.2
1	G	99	PHE	3.1
2	D	414	ARG	3.0

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Mol	Chain	Res	Type	RSRZ
1	E	99	PHE	3.0
1	E	26	ALA	2.9
2	D	411	LYS	2.9
1	A	102	GLY	2.8
1	E	177	VAL	2.8
1	E	100	ASP	2.7
1	K	177	VAL	2.7
1	C	98	THR	2.6
1	E	101	ALA	2.6
1	K	26	ALA	2.6
2	D	538	CYS	2.5
1	A	178	ASP	2.5
2	B	414	ARG	2.5
1	K	42	PRO	2.5
2	J	537	ASN	2.5
2	B	302	ALA	2.5
2	L	301	PRO	2.5
1	I	99	PHE	2.5
2	L	303	GLN	2.4
1	A	176	GLU	2.4
2	D	436	TYR	2.3
1	C	26	ALA	2.3
1	A	179	GLY	2.3
2	D	353	HIS	2.3
1	K	179	GLY	2.3
1	C	175	CYS	2.3
2	F	303	GLN	2.2
1	G	175	CYS	2.2
1	I	192	GLU	2.2
2	F	371	GLY	2.2
1	C	100	ASP	2.2
1	C	102	GLY	2.2
2	B	411	LYS	2.2
1	I	177	VAL	2.1
1	I	101	ALA	2.1
1	G	176	GLU	2.1
1	K	117	ALA	2.1
1	A	175	CYS	2.1
2	L	538	CYS	2.1
1	K	181	THR	2.1
2	H	414	ARG	2.1
2	L	537	ASN	2.0

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Mol	Chain	Res	Type	RSRZ
1	K	180	LYS	2.0
1	A	192	GLU	2.0
1	A	101	ALA	2.0
1	G	182	ALA	2.0
1	E	175	CYS	2.0
1	G	179	GLY	2.0

6.2 Non-standard residues in protein, DNA, RNA chains [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
2	CME	L	429	10/11	0.83	0.15	33,39,57,59	0
2	CME	H	429	10/11	0.95	0.10	29,32,53,58	0
2	CME	J	429	10/11	0.96	0.09	31,33,55,59	0
2	CME	D	429	10/11	0.96	0.09	28,32,53,59	0
2	CME	F	429	10/11	0.97	0.09	30,33,56,60	0
2	CME	B	429	10/11	0.97	0.07	29,32,52,56	0

6.3 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

6.4 Ligands [i](#)

In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
3	FE	F	600	1/1	0.97	0.04	44,44,44,44	0
3	FE	H	600	1/1	0.97	0.05	44,44,44,44	0
3	FE	L	600	1/1	0.97	0.04	46,46,46,46	0
3	FE	D	600	1/1	0.98	0.04	38,38,38,38	0
3	FE	J	600	1/1	0.98	0.03	51,51,51,51	0
3	FE	B	600	1/1	0.98	0.04	41,41,41,41	0

6.5 Other polymers [i](#)

There are no such residues in this entry.