



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 14, 2026 – 08:36 PM UTC

PDB ID : 4WGF / pdb_00004wgf
Title : YcaC from Pseudomonas aeruginosa with hexane-2,5-diol and covalent acrylamide
Authors : Groftehauge, M.K.; Truan, D.; Vasil, A.; Denny, P.W.; Vasil, M.L.; Pohl, E.
Deposited on : 2014-09-18
Resolution : 2.34 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

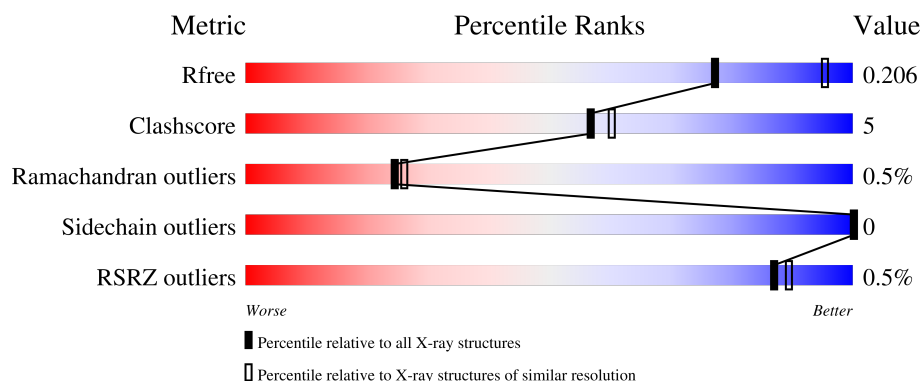
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.34 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.



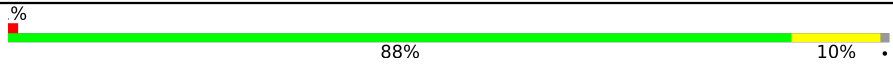
Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	180053	3031 (2.36-2.32)
Clashscore	190562	3127 (2.36-2.32)
Ramachandran outliers	187476	3095 (2.36-2.32)
Sidechain outliers	187428	3095 (2.36-2.32)
RSRZ outliers	180081	3033 (2.36-2.32)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments of the lower bar indicate the fraction of residues that contain outliers for ≥ 3 , 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions $\leq 5\%$. The upper red bar (where present) indicates the fraction of residues that have poor fit to the electron density. The numeric value is given above the bar.

Mol	Chain	Length	Quality of chain
1	A	205	91% 7% .
1	B	205	89% 9% .
1	C	205	88% 10% .
1	D	205	86% 12% .
1	E	205	% 89% 9% .

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Mol	Chain	Length	Quality of chain
1	F	205	
1	G	205	
1	H	205	

The following table lists non-polymeric compounds, carbohydrate monomers and non-standard residues in protein, DNA, RNA chains that are outliers for geometric or electron-density-fit criteria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
4	CL	B	303	-	-	X	-
4	CL	G	303	-	-	X	-

2 Entry composition

There are 6 unique types of molecules in this entry. The entry contains 13755 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.

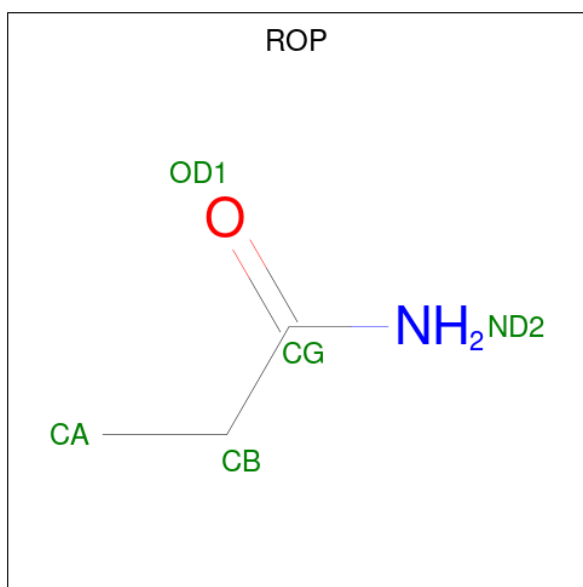
- Molecule 1 is a protein called Probable hydrolase.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
1	A	202	Total	C	N	O	S	Se	0	0	0
			1561	1006	261	289	2	3			
1	B	202	Total	C	N	O	S	Se	0	1	0
			1570	1011	262	292	2	3			
1	C	202	Total	C	N	O	S	Se	0	1	0
			1569	1010	263	291	2	3			
1	D	202	Total	C	N	O	S	Se	0	1	0
			1570	1011	262	292	2	3			
1	E	202	Total	C	N	O	S	Se	0	2	0
			1578	1015	264	294	2	3			
1	F	202	Total	C	N	O	S	Se	0	0	0
			1561	1006	261	289	2	3			
1	G	202	Total	C	N	O	S	Se	0	0	0
			1561	1006	261	289	2	3			
1	H	202	Total	C	N	O	S	Se	0	1	0
			1569	1010	263	291	2	3			

There are 8 discrepancies between the modelled and reference sequences:

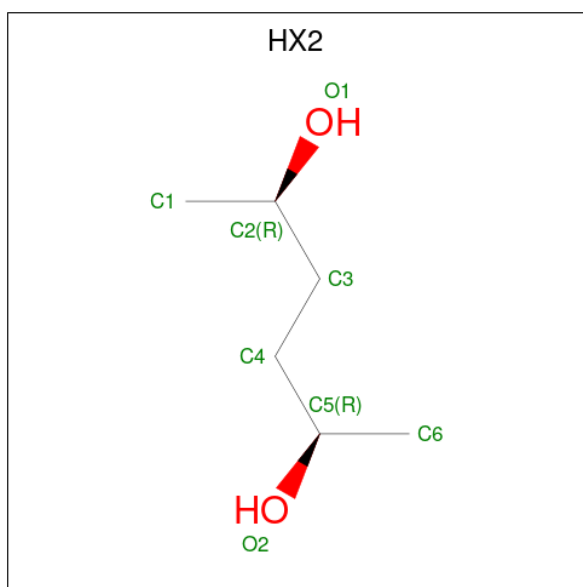
Chain	Residue	Modelled	Actual	Comment	Reference
A	1	MSE	-	initiating methionine	UNP Q9I4D6
B	1	MSE	-	initiating methionine	UNP Q9I4D6
C	1	MSE	-	initiating methionine	UNP Q9I4D6
D	1	MSE	-	initiating methionine	UNP Q9I4D6
E	1	MSE	-	initiating methionine	UNP Q9I4D6
F	1	MSE	-	initiating methionine	UNP Q9I4D6
G	1	MSE	-	initiating methionine	UNP Q9I4D6
H	1	MSE	-	initiating methionine	UNP Q9I4D6

- Molecule 2 is PROPIONAMIDE (CCD ID: ROP) (formula: C₃H₇NO).



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

- Molecule 3 is (2R,5R)-hexane-2,5-diol (CCD ID: HX2) (formula: C₆H₁₄O₂).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	A	1	Total	C	O	0	0
			8	6	2		
3	A	1	Total	C	O	0	0
			8	6	2		
3	B	1	Total	C	O	0	0
			8	6	2		
3	C	1	Total	C	O	0	0
			8	6	2		
3	D	1	Total	C	O	0	0
			8	6	2		
3	F	1	Total	C	O	0	0
			8	6	2		
3	G	1	Total	C	O	0	0
			8	6	2		
3	H	1	Total	C	O	0	0
			8	6	2		

- Molecule 4 is CHLORIDE ION (CCD ID: CL) (formula: Cl).

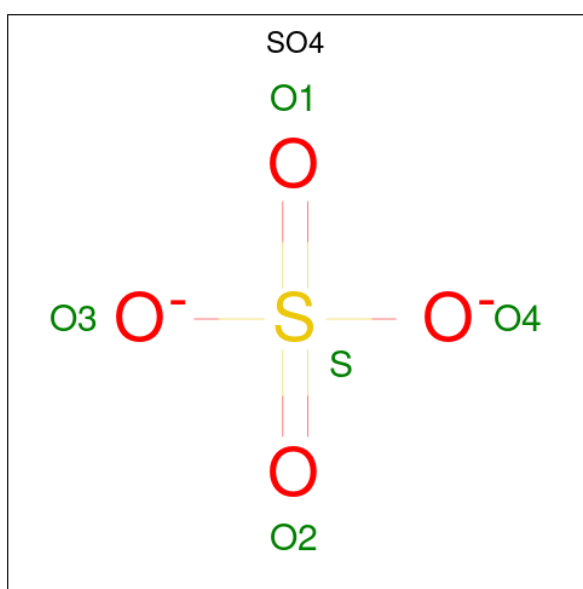
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	1	Total	Cl	0	0
			1	1		
4	B	1	Total	Cl	0	0
			1	1		
4	C	1	Total	Cl	0	0
			1	1		
4	D	1	Total	Cl	0	0
			1	1		

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Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	E	1	Total	Cl	0	0
			1	1		
4	F	1	Total	Cl	0	0
			1	1		
4	G	1	Total	Cl	0	0
			1	1		
4	H	1	Total	Cl	0	0
			1	1		

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



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

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Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
5	G	1	Total	O	S	0	0
			5	4	1		
5	H	1	Total	O	S	0	0
			5	4	1		

- Molecule 6 is water.

Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
6	A	131	Total	O		0	0
			131	131			
6	B	130	Total	O		0	0
			130	130			
6	C	122	Total	O		0	0
			122	122			
6	D	128	Total	O		0	0
			128	128			
6	E	121	Total	O		0	0
			121	121			
6	F	141	Total	O		0	0
			141	141			
6	G	162	Total	O		0	0
			162	162			
6	H	124	Total	O		0	0
			124	124			

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: Probable hydrolase

Chain A: 



- Molecule 1: Probable hydrolase

Chain B: 



- Molecule 1: Probable hydrolase

Chain C: 



- Molecule 1: Probable hydrolase

Chain D: 

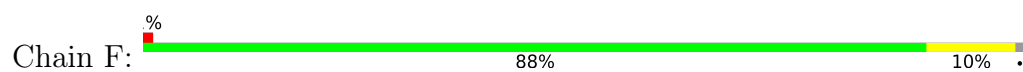


- Molecule 1: Probable hydrolase

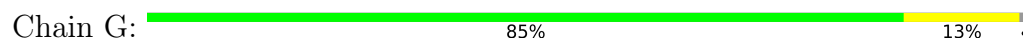
Chain E: 



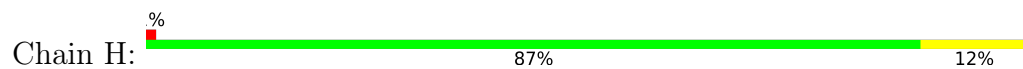
- Molecule 1: Probable hydrolase



- Molecule 1: Probable hydrolase



- Molecule 1: Probable hydrolase



4 Data and refinement statistics

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, α , β , γ	158.36Å 74.48Å 141.06Å 90.00° 92.29° 90.00°	Depositor
Resolution (Å)	31.72 – 2.34 31.72 – 2.34	Depositor EDS
% Data completeness (in resolution range)	86.8 (31.72-2.34) 82.6 (31.72-2.34)	Depositor EDS
R_{merge}	0.16	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	3.56 (at 2.34Å)	Xtriage
Refinement program	PHENIX dev_1745	Depositor
R, R_{free}	0.172 , 0.204 0.175 , 0.206	Depositor DCC
R_{free} test set	3058 reflections (4.40%)	wwPDB-VP
Wilson B-factor (Å ²)	10.0	Xtriage
Anisotropy	0.356	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.34 , 30.3	EDS
L-test for twinning ²	$\langle L \rangle = 0.48$, $\langle L^2 \rangle = 0.31$	Xtriage
Estimated twinning fraction	0.022 for -h,-k,l	Xtriage
F_o, F_c correlation	0.93	EDS
Total number of atoms	13755	wwPDB-VP
Average B, all atoms (Å ²)	14.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 6.25% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

²Theoretical values of $\langle |L| \rangle$, $\langle L^2 \rangle$ for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

5 Model quality [i](#)

5.1 Standard geometry [i](#)

Bond lengths and bond angles in the following residue types are not validated in this section: ROP, CL, SO4, HX2

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	0.29	0/1598	0.74	1/2173 (0.0%)
1	B	0.28	0/1607	0.76	2/2185 (0.1%)
1	C	0.29	0/1606	0.75	1/2184 (0.0%)
1	D	0.28	0/1607	0.75	0/2185
1	E	0.28	0/1615	0.74	1/2196 (0.0%)
1	F	0.28	0/1598	0.75	1/2173 (0.0%)
1	G	0.28	0/1598	0.75	1/2173 (0.0%)
1	H	0.29	0/1606	0.75	0/2184
All	All	0.28	0/12835	0.75	7/17453 (0.0%)

There are no bond length outliers.

All (7) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	191	LEU	CA-C-N	5.45	125.79	119.47
1	B	191	LEU	C-N-CA	5.45	125.79	119.47
1	E	112	GLY	N-CA-C	5.38	117.85	110.69
1	A	112	GLY	N-CA-C	5.28	117.72	110.69
1	C	112	GLY	N-CA-C	5.13	117.51	110.69
1	G	112	GLY	N-CA-C	5.11	117.48	110.69
1	F	112	GLY	N-CA-C	5.03	117.38	110.69

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	1561	0	1521	10	0
1	B	1570	0	1526	13	0
1	C	1569	0	1526	13	0
1	D	1570	0	1526	19	0
1	E	1578	0	1531	12	0
1	F	1561	0	1521	12	0
1	G	1561	0	1521	20	0
1	H	1569	0	1526	17	0
2	A	5	0	5	0	0
2	B	5	0	5	0	0
2	C	5	0	5	0	0
2	D	5	0	5	1	0
2	E	5	0	5	0	0
2	F	5	0	5	0	0
2	G	5	0	5	0	0
2	H	5	0	5	0	0
3	A	16	0	28	7	0
3	B	8	0	13	1	0
3	C	8	0	14	5	0
3	D	8	0	14	2	0
3	F	8	0	14	0	0
3	G	8	0	14	3	0
3	H	8	0	14	2	0
4	A	1	0	0	1	0
4	B	1	0	0	3	0
4	C	1	0	0	1	0
4	D	1	0	0	1	0
4	E	1	0	0	1	0
4	F	1	0	0	1	0
4	G	1	0	0	3	0
4	H	1	0	0	1	0
5	A	5	0	0	0	0
5	B	5	0	0	0	0
5	C	5	0	0	0	0
5	D	5	0	0	0	0
5	E	5	0	0	0	0
5	F	10	0	0	0	0
5	G	5	0	0	0	0
5	H	5	0	0	0	0
6	A	131	0	0	3	1
6	B	130	0	0	1	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
6	C	122	0	0	1	0
6	D	128	0	0	3	0
6	E	121	0	0	2	0
6	F	141	0	0	1	0
6	G	162	0	0	4	1
6	H	124	0	0	5	0
All	All	13755	0	12349	116	1

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 5.

All (116) 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:95:ASP:OD1	6:A:401:HOH:O	1.87	0.92
1:G:52:LEU:O	6:G:532:HOH:O	1.89	0.89
1:B:149:ASP:OD1	6:B:470:HOH:O	1.99	0.80
1:C:34:ASP:OD2	6:C:500:HOH:O	2.03	0.77
1:H:132:ASP:OD2	6:H:401:HOH:O	2.03	0.75
1:C:37:LYS:HG3	3:G:302:HX2:H2	1.68	0.75
1:H:85:PRO:O	6:H:498:HOH:O	2.04	0.74
1:H:61:GLU:O	6:H:500:HOH:O	2.07	0.72
1:D:68:LEU:O	1:D:73:LYS:NZ	2.24	0.71
1:H:64:PRO:O	6:H:495:HOH:O	2.12	0.66
3:C:302:HX2:H4A	1:G:69:VAL:HG11	1.78	0.65
1:A:25:LEU:HD13	3:A:305:HX2:H5	1.78	0.64
1:A:30:ASP:OD2	6:A:459:HOH:O	2.14	0.64
1:F:30:ASP:OD2	6:F:423:HOH:O	2.15	0.64
3:A:302:HX2:H5	1:E:69:VAL:HG11	1.79	0.63
1:D:81:TYR:O	6:D:401:HOH:O	2.16	0.62
1:H:106:LYS:HE2	1:H:131:PHE:HA	1.83	0.61
1:B:35[B]:GLU:HG2	1:H:34:ASP:HB2	1.84	0.58
1:D:106:LYS:NZ	6:D:402:HOH:O	2.35	0.58
1:H:147:VAL:O	6:H:443:HOH:O	2.18	0.56
1:B:37:LYS:HG3	3:H:302:HX2:H3A	1.87	0.55
1:E:106:LYS:NZ	6:E:401:HOH:O	2.40	0.55
1:G:123:THR:HG23	1:G:133:VAL:HG11	1.88	0.55
1:B:123:THR:HG23	1:B:133:VAL:HG11	1.89	0.54
1:G:106:LYS:NZ	6:G:442:HOH:O	2.40	0.54
1:C:123:THR:HG23	1:C:133:VAL:HG11	1.90	0.54
1:F:123:THR:HG23	1:F:133:VAL:HG11	1.89	0.54

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:C:302:HX2:H6	3:C:302:HX2:H1	1.91	0.53
1:D:35[B]:GLU:HG2	1:F:34:ASP:HB2	1.92	0.52
1:D:149:ASP:OD2	6:D:473:HOH:O	2.19	0.52
1:G:127:LEU:HD11	1:G:160:ALA:HB2	1.91	0.51
1:A:5:TYR:CE1	1:A:7:ARG:HB3	2.45	0.51
1:F:127:LEU:HD11	1:F:160:ALA:HB2	1.92	0.51
1:D:5:TYR:CE1	1:D:7:ARG:HB3	2.46	0.51
1:D:123:THR:HG23	1:D:133:VAL:HG11	1.92	0.51
1:A:37:LYS:HG3	3:A:305:HX2:H3A	1.94	0.50
1:B:5:TYR:CE1	1:B:7:ARG:HB3	2.47	0.50
1:G:85:PRO:HD2	4:G:303:CL:CL	2.49	0.50
1:B:85:PRO:HD2	4:B:303:CL:CL	2.49	0.49
1:A:123:THR:HG23	1:A:133:VAL:HG11	1.94	0.49
1:C:196:ASN:HD21	3:C:302:HX2:H1A	1.77	0.49
1:B:87:ASN:ND2	4:B:303:CL:CL	2.78	0.48
1:B:37:LYS:HA	3:H:302:HX2:H2	1.93	0.48
3:A:302:HX2:H6B	1:E:37:LYS:HG3	1.94	0.48
1:B:127:LEU:HD11	1:B:160:ALA:HB2	1.95	0.48
1:E:5:TYR:CE1	1:E:7:ARG:HB3	2.49	0.48
1:C:5:TYR:CE1	1:C:7:ARG:HB3	2.49	0.48
1:D:12:ASP:OD2	1:D:106:LYS:HE3	2.14	0.48
1:F:5:TYR:CE1	1:F:7:ARG:HB3	2.49	0.48
1:E:123:THR:HG23	1:E:133:VAL:HG11	1.97	0.47
1:C:48:ARG:CZ	1:C:75:MSE:HE3	2.44	0.47
1:F:85:PRO:HD2	4:F:303:CL:CL	2.51	0.47
1:D:85:PRO:HD2	4:D:303:CL:CL	2.51	0.47
1:G:6:LYS:NZ	6:G:404:HOH:O	2.47	0.46
1:H:5:TYR:CE1	1:H:7:ARG:HB3	2.50	0.46
1:H:20:HIS:CE1	1:H:112:GLY:HA2	2.51	0.46
3:A:302:HX2:H1	3:A:302:HX2:H6	1.97	0.46
1:C:69:VAL:HG11	3:G:302:HX2:H3A	1.97	0.46
1:C:85:PRO:HD2	4:C:303:CL:CL	2.53	0.46
3:C:302:HX2:H3	1:G:37:LYS:HG3	1.98	0.46
1:E:85:PRO:HD2	4:E:302:CL:CL	2.53	0.45
1:D:29:ARG:HB2	1:D:143:PHE:O	2.16	0.45
1:D:89:ASN:HD22	1:D:90:ALA:N	2.14	0.45
1:B:20:HIS:CE1	1:B:112:GLY:HA2	2.52	0.45
1:D:89:ASN:ND2	1:D:91:TRP:H	2.15	0.45
1:A:85:PRO:HD2	4:A:303:CL:CL	2.53	0.45
1:D:192:PRO:HB3	3:D:302:HX2:H2	1.99	0.45
1:C:20:HIS:CE1	1:C:112:GLY:HA2	2.52	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:G:20:HIS:CE1	1:G:112:GLY:HA2	2.51	0.45
1:F:29:ARG:HB2	1:F:143:PHE:O	2.16	0.44
1:D:20:HIS:CE1	1:D:112:GLY:HA2	2.53	0.44
1:C:59:SER:HB2	1:C:84:ARG:NH2	2.32	0.44
1:F:113:VAL:HA	1:F:114:VAL:HA	1.74	0.44
1:H:127:LEU:HD11	1:H:160:ALA:HB2	1.99	0.44
1:G:5:TYR:CE1	1:G:7:ARG:HB3	2.52	0.44
1:D:89:ASN:HD22	1:D:89:ASN:C	2.25	0.44
1:G:10:LYS:HG2	6:G:523:HOH:O	2.17	0.44
1:H:123:THR:HG23	1:H:133:VAL:HG11	2.00	0.43
1:A:20:HIS:CE1	1:A:112:GLY:HA2	2.53	0.43
3:A:305:HX2:H3	6:A:524:HOH:O	2.18	0.43
3:B:302:HX2:H3A	1:H:25:LEU:HD13	2.01	0.43
1:G:87:ASN:HB2	4:G:303:CL:CL	2.55	0.43
1:H:85:PRO:HD2	4:H:303:CL:CL	2.56	0.43
1:E:113:VAL:HA	1:E:114:VAL:HA	1.73	0.43
3:C:302:HX2:H5	1:G:37:LYS:HG3	1.99	0.43
1:H:106:LYS:HA	1:H:106:LYS:HD2	1.73	0.43
1:D:114:VAL:H	2:D:301:ROP:HCA1	1.84	0.43
1:H:48:ARG:CZ	1:H:75:MSE:HE3	2.49	0.43
1:E:98:LYS:HD2	6:E:472:HOH:O	2.18	0.42
1:G:87:ASN:ND2	4:G:303:CL:CL	2.75	0.42
1:H:29:ARG:HB2	1:H:143:PHE:O	2.19	0.42
1:C:30:ASP:HB2	1:C:148:ARG:NH2	2.35	0.42
1:A:113:VAL:HA	1:A:114:VAL:HA	1.74	0.42
1:E:29:ARG:HB2	1:E:143:PHE:O	2.20	0.42
1:H:113:VAL:HA	1:H:114:VAL:HA	1.73	0.42
1:D:113:VAL:HA	1:D:114:VAL:HA	1.72	0.42
1:B:87:ASN:HB2	4:B:303:CL:CL	2.57	0.42
1:F:59:SER:HB2	1:F:84:ARG:NH2	2.35	0.42
1:D:67:PRO:HG3	1:F:203:THR:HG21	2.02	0.41
1:B:59:SER:HB2	1:B:84:ARG:NH2	2.36	0.41
1:F:120:ALA:O	1:F:124:LEU:HG	2.20	0.41
1:C:117:VAL:HG13	1:C:121:PHE:CE2	2.56	0.41
1:G:113:VAL:HA	1:G:114:VAL:HA	1.76	0.41
3:A:302:HX2:H4A	1:E:37:LYS:HG3	2.03	0.41
1:C:29:ARG:HB2	1:C:143:PHE:O	2.20	0.41
1:G:68:LEU:O	1:G:73:LYS:NZ	2.53	0.41
1:D:199:GLN:CD	1:F:70:PRO:HD3	2.45	0.41
1:E:127:LEU:HD11	1:E:160:ALA:HB2	2.03	0.41
1:G:29:ARG:HB2	1:G:143:PHE:O	2.21	0.40

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:29:ARG:HB2	1:A:143:PHE:O	2.20	0.40
1:B:120:ALA:O	1:B:124:LEU:HG	2.22	0.40
1:G:30:ASP:HB2	1:G:148:ARG:NH2	2.36	0.40
3:D:302:HX2:H3A	3:D:302:HX2:H6	1.82	0.40
1:E:188:GLY:O	1:E:195:ALA:HB2	2.21	0.40
1:G:192:PRO:HB3	3:G:302:HX2:H5	2.03	0.40
1:G:59:SER:HB2	1:G:84:ARG:NH2	2.36	0.40

All (1) symmetry-related close contacts are listed below. The label for Atom-2 includes the symmetry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
6:A:402:HOH:O	6:G:422:HOH:O[3_455]	2.08	0.12

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	200/205 (98%)	196 (98%)	3 (2%)	1 (0%)	24	26
1	B	201/205 (98%)	197 (98%)	3 (2%)	1 (0%)	24	26
1	C	201/205 (98%)	196 (98%)	4 (2%)	1 (0%)	24	26
1	D	201/205 (98%)	196 (98%)	4 (2%)	1 (0%)	24	26
1	E	202/205 (98%)	197 (98%)	4 (2%)	1 (0%)	24	26
1	F	200/205 (98%)	195 (98%)	4 (2%)	1 (0%)	24	26
1	G	200/205 (98%)	194 (97%)	5 (2%)	1 (0%)	24	26
1	H	201/205 (98%)	196 (98%)	4 (2%)	1 (0%)	24	26
All	All	1606/1640 (98%)	1567 (98%)	31 (2%)	8 (0%)	24	26

All (8) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	86	GLY
1	G	86	GLY
1	D	86	GLY
1	A	86	GLY
1	H	86	GLY
1	C	86	GLY
1	E	86	GLY
1	F	86	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	163/162 (101%)	163 (100%)	0	100	100
1	B	164/162 (101%)	164 (100%)	0	100	100
1	C	164/162 (101%)	164 (100%)	0	100	100
1	D	164/162 (101%)	164 (100%)	0	100	100
1	E	165/162 (102%)	165 (100%)	0	100	100
1	F	163/162 (101%)	163 (100%)	0	100	100
1	G	163/162 (101%)	163 (100%)	0	100	100
1	H	164/162 (101%)	164 (100%)	0	100	100
All	All	1310/1296 (101%)	1310 (100%)	0	100	100

There are no protein residues with a non-rotameric sidechain to report.

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (6) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	11	ASN
1	B	11	ASN
1	B	78	GLN
1	D	11	ASN
1	D	89	ASN
1	E	11	ASN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

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

There are no non-standard protein/DNA/RNA residues in this entry.

5.5 Carbohydrates ⓘ

There are no oligosaccharides in this entry.

5.6 Ligand geometry ⓘ

Of 33 ligands modelled in this entry, 8 are monoatomic - leaving 25 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	$\# Z > 2$
3	HX2	A	302	-	7,7,7	0.32	0	8,8,8	1.24	2 (25%)
5	SO4	D	304	-	4,4,4	0.24	0	6,6,6	0.07	0
2	ROP	F	301	1	4,4,4	1.52	1 (25%)	4,4,4	1.22	0
2	ROP	D	301	1	4,4,4	1.52	1 (25%)	4,4,4	1.23	0
3	HX2	C	302	-	7,7,7	0.30	0	8,8,8	0.97	1 (12%)
3	HX2	D	302	-	7,7,7	0.29	0	8,8,8	0.89	0
3	HX2	A	305	-	7,7,7	0.32	0	8,8,8	1.40	2 (25%)
2	ROP	G	301	1	4,4,4	1.52	1 (25%)	4,4,4	1.20	0
5	SO4	H	304	-	4,4,4	0.24	0	6,6,6	0.07	0
5	SO4	B	304	-	4,4,4	0.23	0	6,6,6	0.08	0
2	ROP	A	301	1	4,4,4	1.52	1 (25%)	4,4,4	1.24	0
5	SO4	C	304	-	4,4,4	0.24	0	6,6,6	0.06	0
2	ROP	C	301	1	4,4,4	1.52	1 (25%)	4,4,4	1.22	0
3	HX2	G	302	-	7,7,7	0.30	0	8,8,8	0.63	0
2	ROP	B	301	1	4,4,4	1.52	1 (25%)	4,4,4	1.23	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
2	ROP	E	301	1	4,4,4	1.51	1 (25%)	4,4,4	1.24	0
5	SO4	F	304	-	4,4,4	0.24	0	6,6,6	0.07	0
3	HX2	H	302	-	7,7,7	0.30	0	8,8,8	0.62	0
3	HX2	B	302	-	7,7,7	0.24	0	8,8,8	0.74	0
5	SO4	F	305	-	4,4,4	0.23	0	6,6,6	0.08	0
5	SO4	A	304	-	4,4,4	0.24	0	6,6,6	0.07	0
3	HX2	F	302	-	7,7,7	0.29	0	8,8,8	0.96	0
5	SO4	E	303	-	4,4,4	0.24	0	6,6,6	0.07	0
5	SO4	G	304	-	4,4,4	0.23	0	6,6,6	0.07	0
2	ROP	H	301	1	4,4,4	1.52	1 (25%)	4,4,4	1.23	0

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
3	HX2	F	302	-	-	2/5/5/5	-
3	HX2	A	302	-	-	4/5/5/5	-
2	ROP	G	301	1	-	1/2/2/2	-
3	HX2	G	302	-	-	4/5/5/5	-
2	ROP	F	301	1	-	1/2/2/2	-
2	ROP	B	301	1	-	1/2/2/2	-
2	ROP	D	301	1	-	1/2/2/2	-
2	ROP	A	301	1	-	1/2/2/2	-
2	ROP	E	301	1	-	1/2/2/2	-
3	HX2	H	302	-	-	5/5/5/5	-
3	HX2	B	302	-	-	3/5/5/5	-
2	ROP	H	301	1	-	1/2/2/2	-
3	HX2	C	302	-	-	4/5/5/5	-
3	HX2	D	302	-	-	2/5/5/5	-
2	ROP	C	301	1	-	1/2/2/2	-
3	HX2	A	305	-	-	2/5/5/5	-

All (8) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	C	301	ROP	CG-ND2	2.95	1.42	1.32
2	F	301	ROP	CG-ND2	2.95	1.42	1.32
2	H	301	ROP	CG-ND2	2.95	1.42	1.32

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	301	ROP	CG-ND2	2.95	1.42	1.32
2	B	301	ROP	CG-ND2	2.95	1.42	1.32
2	G	301	ROP	CG-ND2	2.94	1.42	1.32
2	D	301	ROP	CG-ND2	2.94	1.42	1.32
2	E	301	ROP	CG-ND2	2.94	1.42	1.32

All (5) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	A	305	HX2	C4-C3-C2	-2.80	109.23	113.10
3	A	305	HX2	C3-C4-C5	-2.65	109.44	113.10
3	A	302	HX2	C4-C3-C2	-2.48	109.67	113.10
3	A	302	HX2	C3-C4-C5	-2.38	109.81	113.10
3	C	302	HX2	C4-C3-C2	-2.03	110.30	113.10

There are no chirality outliers.

All (34) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	301	ROP	CA-CB-CG-OD1
2	B	301	ROP	CA-CB-CG-OD1
2	C	301	ROP	CA-CB-CG-OD1
2	D	301	ROP	CA-CB-CG-OD1
2	E	301	ROP	CA-CB-CG-OD1
2	F	301	ROP	CA-CB-CG-OD1
2	G	301	ROP	CA-CB-CG-OD1
2	H	301	ROP	CA-CB-CG-OD1
3	A	302	HX2	C1-C2-C3-C4
3	A	302	HX2	O1-C2-C3-C4
3	B	302	HX2	C1-C2-C3-C4
3	D	302	HX2	C3-C4-C5-C6
3	F	302	HX2	C1-C2-C3-C4
3	G	302	HX2	C1-C2-C3-C4
3	G	302	HX2	C3-C4-C5-O2
3	G	302	HX2	C3-C4-C5-C6
3	H	302	HX2	C1-C2-C3-C4
3	H	302	HX2	C3-C4-C5-C6
3	A	302	HX2	C3-C4-C5-C6
3	A	305	HX2	C3-C4-C5-C6
3	B	302	HX2	O1-C2-C3-C4
3	C	302	HX2	C1-C2-C3-C4
3	C	302	HX2	O1-C2-C3-C4

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Mol	Chain	Res	Type	Atoms
3	C	302	HX2	C3-C4-C5-C6
3	F	302	HX2	C3-C4-C5-C6
3	G	302	HX2	O1-C2-C3-C4
3	H	302	HX2	O1-C2-C3-C4
3	H	302	HX2	C3-C4-C5-O2
3	A	302	HX2	C3-C4-C5-O2
3	A	305	HX2	C3-C4-C5-O2
3	B	302	HX2	C3-C4-C5-O2
3	C	302	HX2	C3-C4-C5-O2
3	D	302	HX2	C1-C2-C3-C4
3	H	302	HX2	C2-C3-C4-C5

There are no ring outliers.

8 monomers are involved in 21 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	A	302	HX2	4	0
2	D	301	ROP	1	0
3	C	302	HX2	5	0
3	D	302	HX2	2	0
3	A	305	HX2	3	0
3	G	302	HX2	3	0
3	H	302	HX2	2	0
3	B	302	HX2	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 ⓘ

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	199/205 (97%)	-0.32	0	100 100	7, 12, 24, 35	0
1	B	199/205 (97%)	-0.33	0	100 100	5, 12, 25, 39	1 (0%)
1	C	199/205 (97%)	-0.29	0	100 100	8, 12, 24, 37	1 (0%)
1	D	199/205 (97%)	-0.33	1 (0%)	87 89	5, 12, 22, 37	1 (0%)
1	E	199/205 (97%)	-0.29	2 (1%)	79 82	7, 13, 26, 41	2 (1%)
1	F	199/205 (97%)	-0.31	2 (1%)	79 82	7, 12, 24, 39	0
1	G	199/205 (97%)	-0.34	1 (0%)	87 89	7, 11, 23, 37	0
1	H	199/205 (97%)	-0.25	2 (1%)	79 82	8, 12, 26, 40	1 (0%)
All	All	1592/1640 (97%)	-0.31	8 (0%)	87 89	5, 12, 24, 41	6 (0%)

All (8) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	F	2	SER	2.7
1	E	78	GLN	2.6
1	H	12	ASP	2.6
1	F	181	GLU	2.6
1	D	2	SER	2.3
1	H	106	LYS	2.3
1	G	78	GLN	2.2
1	E	2	SER	2.0

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

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.

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
3	HX2	B	302	8/8	0.66	0.27	37,38,40,40	0
2	ROP	H	301	5/5	0.70	0.28	60,61,62,64	0
3	HX2	A	302	8/8	0.71	0.23	42,46,47,48	0
2	ROP	D	301	5/5	0.71	0.20	46,46,47,49	0
5	SO4	D	304	5/5	0.71	0.18	71,72,73,73	0
2	ROP	C	301	5/5	0.72	0.22	55,56,58,60	0
5	SO4	F	304	5/5	0.72	0.17	87,88,88,89	0
2	ROP	E	301	5/5	0.73	0.31	67,68,72,73	0
2	ROP	A	301	5/5	0.73	0.23	55,55,57,59	0
3	HX2	F	302	8/8	0.74	0.20	34,36,38,39	0
5	SO4	G	304	5/5	0.74	0.17	63,65,66,66	0
5	SO4	F	305	5/5	0.75	0.24	100,101,101,102	0
5	SO4	E	303	5/5	0.76	0.18	75,75,76,78	0
3	HX2	C	302	8/8	0.76	0.18	27,30,31,32	0
5	SO4	B	304	5/5	0.77	0.18	69,72,72,73	0
2	ROP	F	301	5/5	0.79	0.20	51,51,53,55	0
5	SO4	A	304	5/5	0.79	0.16	79,80,80,81	0
5	SO4	H	304	5/5	0.79	0.18	65,65,66,68	0
3	HX2	G	302	8/8	0.80	0.15	23,28,29,31	0
5	SO4	C	304	5/5	0.80	0.15	62,63,65,65	0
3	HX2	D	302	8/8	0.82	0.17	26,32,38,40	0
2	ROP	G	301	5/5	0.82	0.15	36,39,39,42	0
3	HX2	H	302	8/8	0.83	0.15	20,28,30,31	0
2	ROP	B	301	5/5	0.83	0.17	42,44,47,47	0
3	HX2	A	305	8/8	0.84	0.18	33,35,36,37	0
4	CL	B	303	1/1	0.90	0.10	36,36,36,36	0
4	CL	G	303	1/1	0.94	0.05	31,31,31,31	0
4	CL	F	303	1/1	0.94	0.06	24,24,24,24	0
4	CL	E	302	1/1	0.96	0.05	18,18,18,18	0
4	CL	C	303	1/1	0.96	0.05	24,24,24,24	0
4	CL	D	303	1/1	0.96	0.04	18,18,18,18	0
4	CL	A	303	1/1	0.97	0.05	23,23,23,23	0

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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
4	CL	H	303	1/1	0.99	0.03	23,23,23,23	0

6.5 Other polymers [i](#)

There are no such residues in this entry.