



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 20, 2026 – 01:32 PM UTC

PDB ID : 3HEA / pdb_00003hea
Title : The L29P/L124I mutation of Pseudomonas fluorescens esterase
Authors : Kazlauskas, R.J.; Schrag, J.D.; Cheeseman, J.D.; Morley, K.L.
Deposited on : 2009-05-08
Resolution : 1.90 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

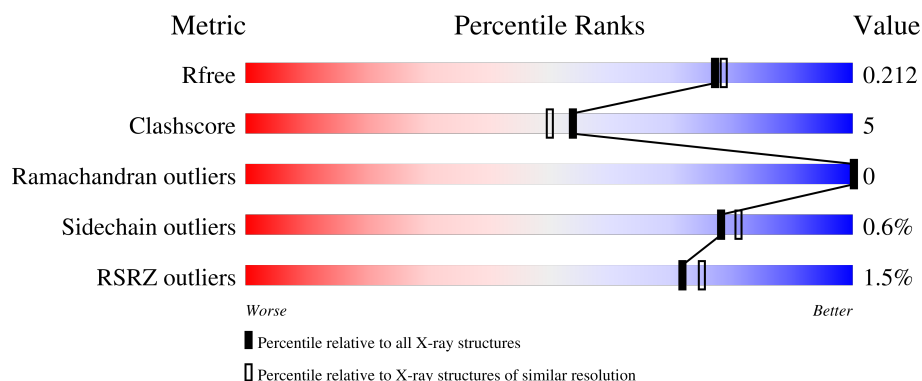
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.90 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	7789 (1.90-1.90)
Clashscore	190562	8410 (1.90-1.90)
Ramachandran outliers	187476	8333 (1.90-1.90)
Sidechain outliers	187428	8333 (1.90-1.90)
RSRZ outliers	180081	7790 (1.90-1.90)

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	271	% 89% 11%
1	B	271	% 89% 11%
1	C	271	2% 92% 8%
1	D	271	2% 89% 11%
1	E	271	% 94% 6%

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Mol	Chain	Length	Quality of chain
1	F	271	

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	EEE	B	300	-	X	-	-
4	EEE	C	300	-	X	-	-
4	EEE	E	300	-	X	-	-
4	EEE	F	300	-	X	-	-

2 Entry composition

There are 5 unique types of molecules in this entry. The entry contains 14195 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 Arylesterase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	271	Total	C	N	O	S	0	6	0
			2153	1385	361	402	5			
1	B	271	Total	C	N	O	S	0	7	0
			2155	1390	359	401	5			
1	C	271	Total	C	N	O	S	0	4	0
			2143	1376	360	402	5			
1	D	271	Total	C	N	O	S	0	6	0
			2147	1386	357	399	5			
1	E	271	Total	C	N	O	S	0	6	0
			2148	1384	357	402	5			
1	F	271	Total	C	N	O	S	0	5	0
			2142	1378	357	402	5			

There are 12 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	29	PRO	LEU	engineered mutation	UNP P22862
A	124	ILE	LEU	engineered mutation	UNP P22862
B	29	PRO	LEU	engineered mutation	UNP P22862
B	124	ILE	LEU	engineered mutation	UNP P22862
C	29	PRO	LEU	engineered mutation	UNP P22862
C	124	ILE	LEU	engineered mutation	UNP P22862
D	29	PRO	LEU	engineered mutation	UNP P22862
D	124	ILE	LEU	engineered mutation	UNP P22862
E	29	PRO	LEU	engineered mutation	UNP P22862
E	124	ILE	LEU	engineered mutation	UNP P22862
F	29	PRO	LEU	engineered mutation	UNP P22862
F	124	ILE	LEU	engineered mutation	UNP P22862

- Molecule 2 is GLYCEROL (CCD ID: GOL) (formula: C₃H₈O₃).



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

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Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
2	E	1	Total	C	O	0	0
			6	3	3		
2	E	1	Total	C	O	0	0
			6	3	3		
2	E	1	Total	C	O	0	0
			6	3	3		
2	E	1	Total	C	O	0	0
			6	3	3		
2	E	1	Total	C	O	0	0
			6	3	3		
2	F	1	Total	C	O	0	0
			6	3	3		
2	F	1	Total	C	O	0	0
			6	3	3		
2	F	1	Total	C	O	0	0
			6	3	3		
2	F	1	Total	C	O	0	0
			6	3	3		

- Molecule 3 is SULFATE ION (CCD ID: SO4) (formula: O₄S).



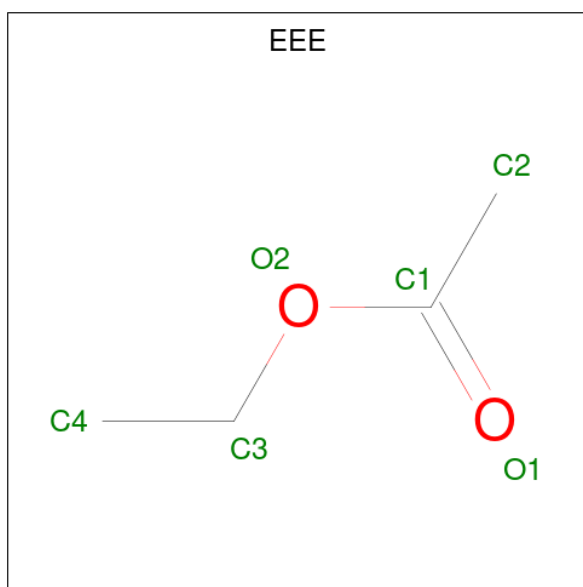
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	A	1	Total	O	S	0	0
			5	4	1		

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

- Molecule 4 is ETHYL ACETATE (CCD ID: EEE) (formula: C₄H₈O₂).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
4	A	1	Total	C	O	0	0
			6	4	2		
4	B	1	Total	C	O	0	0
			6	4	2		
4	C	1	Total	C	O	0	0
			6	4	2		
4	D	1	Total	C	O	0	0
			6	4	2		
4	E	1	Total	C	O	0	0
			6	4	2		
4	F	1	Total	C	O	0	0
			6	4	2		

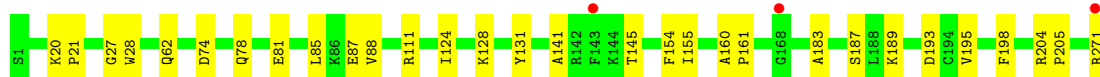
- Molecule 5 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	163	Total	O	0	0
			163	163		
5	B	198	Total	O	0	0
			198	198		
5	C	175	Total	O	0	0
			175	175		
5	D	178	Total	O	0	0
			178	178		
5	E	172	Total	O	0	0
			172	172		
5	F	171	Total	O	0	0
			171	171		

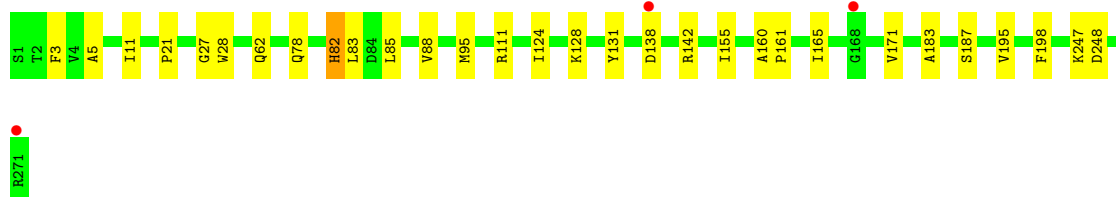
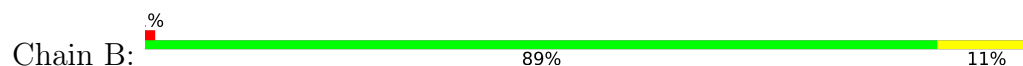
3 Residue-property plots

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.

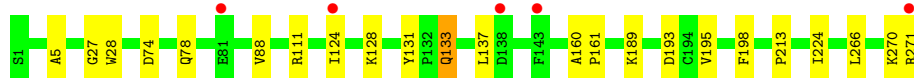
• Molecule 1: Arylesterase



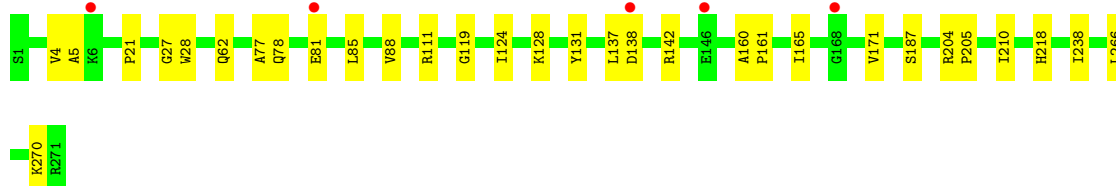
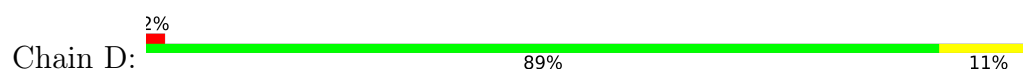
• Molecule 1: Arylesterase



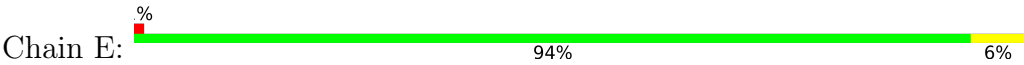
• Molecule 1: Arylesterase



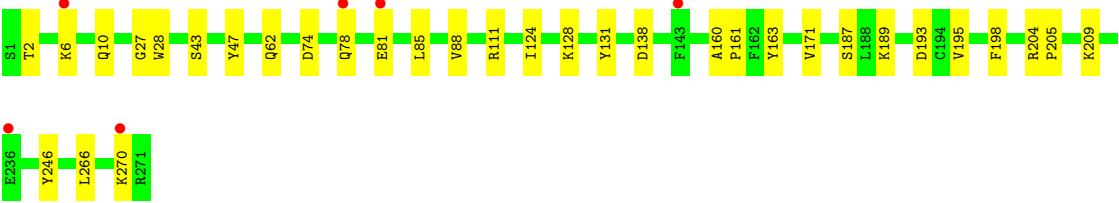
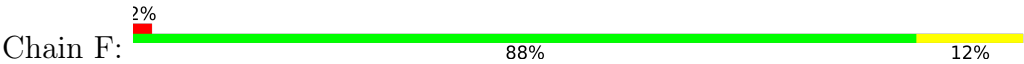
• Molecule 1: Arylesterase



• Molecule 1: Arylesterase



● Molecule 1: Arylesterase



4 Data and refinement statistics

Property	Value	Source
Space group	P 32	Depositor
Cell constants a, b, c, α , β , γ	145.59Å 145.59Å 128.20Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	48.10 – 1.90 48.10 – 1.90	Depositor EDS
% Data completeness (in resolution range)	96.4 (48.10-1.90) 96.4 (48.10-1.90)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	0.06	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.56 (at 1.90Å)	Xtriage
Refinement program	REFMAC 5.4.0069	Depositor
R, R_{free}	0.190 , 0.212 0.191 , 0.212	Depositor DCC
R_{free} test set	11625 reflections (4.85%)	wwPDB-VP
Wilson B-factor (Å ²)	22.5	Xtriage
Anisotropy	0.413	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.38 , 32.9	EDS
L-test for twinning ²	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.33$	Xtriage
Estimated twinning fraction	0.048 for -h,-k,l 0.000 for h,-h-k,-l 0.000 for -k,-h,-l	Xtriage
F_o, F_c correlation	0.96	EDS
Total number of atoms	14195	wwPDB-VP
Average B, all atoms (Å ²)	23.0	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 22.31 % 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 5.8491e-03. 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: GOL, SO4, EEE

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	0.40	0/2219	0.68	0/3006
1	B	0.42	0/2229	0.68	0/3023
1	C	0.41	0/2206	0.68	0/2987
1	D	0.40	0/2217	0.70	0/3007
1	E	0.41	0/2219	0.69	0/3009
1	F	0.41	0/2209	0.68	0/2996
All	All	0.41	0/13299	0.69	0/18028

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts [i](#)

In the following table, the Non-H and H(model) columns list the number of non-hydrogen atoms and hydrogen atoms in the chain respectively. The H(added) column lists the number of hydrogen atoms added and optimized by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, whereas Symm-Clashes lists symmetry-related clashes.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	2153	0	2128	20	0
1	B	2155	0	2132	21	0
1	C	2143	0	2107	19	0
1	D	2147	0	2130	22	0
1	E	2148	0	2115	20	0
1	F	2142	0	2110	26	0
2	A	18	0	24	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	B	24	0	32	0	0
2	C	24	0	32	2	0
2	D	18	0	24	1	0
2	E	30	0	40	0	0
2	F	30	0	40	1	0
3	A	20	0	0	0	0
3	B	10	0	0	0	0
3	C	15	0	0	0	0
3	D	10	0	0	0	0
3	E	10	0	0	0	0
3	F	5	0	0	0	0
4	A	6	0	8	2	0
4	B	6	0	8	2	0
4	C	6	0	8	2	0
4	D	6	0	8	2	0
4	E	6	0	8	2	0
4	F	6	0	8	2	0
5	A	163	0	0	0	0
5	B	198	0	0	0	0
5	C	175	0	0	0	0
5	D	178	0	0	0	0
5	E	172	0	0	0	0
5	F	171	0	0	0	0
All	All	14195	0	12962	128	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 5.

All (128) 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:E:165:ILE:HD11	1:E:171[B]:VAL:CG2	1.57	1.32
1:E:165:ILE:CD1	1:E:171[B]:VAL:HG22	1.58	1.30
1:E:165:ILE:HD11	1:E:171[B]:VAL:HG22	1.02	0.99
1:A:20:LYS:HE2	1:A:87[B]:GLU:OE1	1.63	0.98
1:F:2[B]:THR:CG2	1:F:10:GLN:HG3	1.97	0.95
1:C:133:GLN:H	1:C:133:GLN:HE21	0.92	0.90
1:E:6:LYS:H	1:E:78:GLN:HE22	1.18	0.90
1:F:6:LYS:H	1:F:78:GLN:HE22	1.15	0.87
1:F:2[B]:THR:HG21	1:F:10:GLN:HG3	1.55	0.87
1:E:165:ILE:HD11	1:E:171[B]:VAL:HG21	1.57	0.85

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:E:165:ILE:HD12	1:E:171[B]:VAL:HG22	1.56	0.85
1:C:133:GLN:H	1:C:133:GLN:NE2	1.76	0.81
1:C:133:GLN:HE21	1:C:133:GLN:N	1.77	0.78
1:D:77:ALA:O	1:D:81:GLU:HG2	1.82	0.78
1:B:165[B]:ILE:HD11	1:B:171:VAL:HB	1.69	0.75
1:F:6:LYS:HG3	1:F:78:GLN:NE2	2.03	0.73
1:D:85:LEU:HB3	1:D:88[B]:VAL:CG2	2.19	0.72
1:F:2[B]:THR:HG23	1:F:10:GLN:HG3	1.70	0.72
1:A:20:LYS:CE	1:A:87[B]:GLU:OE1	2.40	0.69
1:B:88[A]:VAL:HG12	1:B:111:ARG:O	1.92	0.69
1:D:4:VAL:O	1:D:78:GLN:NE2	2.25	0.69
1:F:28:TRP:O	4:F:300:EEE:H22	1.93	0.68
1:C:189:LYS:HE3	1:C:193:ASP:OD2	1.94	0.68
1:A:88[A]:VAL:HG12	1:A:111:ARG:O	1.94	0.68
1:A:28:TRP:O	4:A:300:EEE:H22	1.94	0.67
1:C:28:TRP:O	4:C:300:EEE:H22	1.94	0.66
1:A:85:LEU:HB3	1:A:88[B]:VAL:CG2	2.26	0.66
1:D:88[A]:VAL:HG12	1:D:111:ARG:O	1.97	0.64
1:F:27:GLY:HA3	4:F:300:EEE:H23	1.79	0.64
1:E:165:ILE:CD1	1:E:171[B]:VAL:CG2	2.38	0.63
1:E:165:ILE:HD11	1:E:171[A]:VAL:HB	1.81	0.62
1:D:27:GLY:HA3	4:D:300:EEE:H23	1.80	0.62
1:E:27:GLY:HA3	4:E:300:EEE:H23	1.80	0.61
1:B:27:GLY:HA3	4:B:300:EEE:H23	1.83	0.61
1:E:28:TRP:O	4:E:300:EEE:H22	2.00	0.61
1:A:189:LYS:HE3	1:A:193:ASP:OD2	2.01	0.60
1:B:28:TRP:O	4:B:300:EEE:H22	2.00	0.60
1:C:266:LEU:HD11	1:C:270:LYS:HE2	1.82	0.60
1:C:124:ILE:HG23	1:C:131:TYR:CE2	2.37	0.59
1:F:6:LYS:H	1:F:78:GLN:NE2	1.94	0.59
1:B:85:LEU:HB3	1:B:88[B]:VAL:CG2	2.32	0.59
1:C:137:LEU:HB3	2:C:273:GOL:H12	1.85	0.59
1:E:124:ILE:HD11	1:E:128:LYS:CG	2.33	0.59
1:C:5:ALA:HA	1:C:78:GLN:HE22	1.68	0.58
1:D:28:TRP:O	4:D:300:EEE:H22	2.03	0.58
1:E:6:LYS:N	1:E:78:GLN:HE22	1.97	0.58
1:F:62:GLN:HB3	1:F:187:SER:HB2	1.85	0.58
1:A:27:GLY:HA3	4:A:300:EEE:H23	1.83	0.58
1:C:27:GLY:HA3	4:C:300:EEE:H23	1.85	0.57
1:B:124:ILE:HD11	1:B:128:LYS:CG	2.34	0.57
1:A:141:ALA:O	1:A:145[A]:THR:HG23	2.05	0.56

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:74:ASP:O	1:A:78:GLN:HG3	2.05	0.56
1:D:266:LEU:HD11	1:D:270:LYS:HE2	1.86	0.56
1:F:124:ILE:HD11	1:F:128:LYS:CG	2.36	0.56
1:B:124:ILE:HG23	1:B:131:TYR:CE2	2.42	0.55
1:D:21:PRO:HG2	1:D:88[B]:VAL:HG22	1.88	0.54
1:D:124:ILE:HD11	1:D:128:LYS:CG	2.38	0.53
1:F:88[B]:VAL:HG12	1:F:111:ARG:O	2.09	0.53
1:B:3:PHE:CZ	1:B:11[B]:ILE:HD12	2.44	0.52
1:E:124:ILE:HD11	1:E:128:LYS:HG2	1.91	0.52
1:B:62:GLN:HB3	1:B:187:SER:HB2	1.92	0.52
1:B:5:ALA:HA	1:B:78:GLN:OE1	2.10	0.52
1:C:5:ALA:HA	1:C:78:GLN:NE2	2.24	0.52
1:B:124:ILE:HD11	1:B:128:LYS:HG3	1.92	0.51
1:B:138:ASP:O	1:B:142:ARG:HG3	2.10	0.51
1:D:124:ILE:HD11	1:D:128:LYS:HG3	1.92	0.51
1:F:124:ILE:HG23	1:F:131:TYR:CE2	2.45	0.51
1:D:138:ASP:OD2	1:D:142:ARG:NH2	2.43	0.51
1:C:88:VAL:HG12	1:C:111:ARG:O	2.10	0.51
1:E:124:ILE:HG23	1:E:131:TYR:CE2	2.46	0.51
1:A:155:ILE:HD13	1:A:183:ALA:HB1	1.94	0.50
1:F:189:LYS:HE3	1:F:193:ASP:OD2	2.11	0.50
1:F:160:ALA:HB3	1:F:161:PRO:CD	2.42	0.50
1:D:119:GLY:HA2	1:D:218:HIS:CE1	2.47	0.50
1:E:124:ILE:HD11	1:E:128:LYS:HG3	1.95	0.49
1:A:124:ILE:HG23	1:A:131:TYR:CE2	2.46	0.49
1:E:195:VAL:HA	1:E:198:PHE:CZ	2.47	0.49
1:B:21:PRO:HG2	1:B:88[B]:VAL:HG22	1.94	0.48
1:D:85:LEU:HB3	1:D:88[B]:VAL:HG21	1.94	0.48
1:B:160:ALA:HB3	1:B:161:PRO:CD	2.43	0.48
1:B:124:ILE:HD11	1:B:128:LYS:HG2	1.96	0.48
1:F:124:ILE:HD11	1:F:128:LYS:HG2	1.95	0.48
1:B:160:ALA:HB3	1:B:161:PRO:HD3	1.96	0.48
1:C:160:ALA:HB3	1:C:161:PRO:HD3	1.97	0.47
1:E:160:ALA:HB3	1:E:161:PRO:HD3	1.97	0.47
1:D:124:ILE:HG23	1:D:131:TYR:CE2	2.49	0.47
1:F:85:LEU:HB3	1:F:88[A]:VAL:HG22	1.96	0.47
1:D:204:ARG:N	1:D:205:PRO:CD	2.77	0.47
1:A:21:PRO:HG2	1:A:88[B]:VAL:HG22	1.95	0.47
1:C:124:ILE:HD11	1:C:128:LYS:CG	2.45	0.46
1:C:213:PRO:HG2	1:C:271[B]:ARG:HH21	1.79	0.46
1:C:74:ASP:O	1:C:78:GLN:HG3	2.15	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:154:PHE:C	1:A:154:PHE:CD2	2.95	0.45
1:C:224:ILE:O	2:C:275:GOL:H32	2.16	0.45
1:F:266:LEU:HD11	1:F:270:LYS:HE2	1.99	0.45
1:A:124:ILE:HD11	1:A:128:LYS:CG	2.47	0.45
1:F:124:ILE:HD11	1:F:128:LYS:HG3	1.98	0.45
1:B:247:LYS:NZ	1:B:248:ASP:OD2	2.50	0.45
1:A:124:ILE:HD11	1:A:128:LYS:HG2	1.99	0.44
1:C:160:ALA:HB3	1:C:161:PRO:CD	2.47	0.44
1:E:88:VAL:HG12	1:E:111:ARG:O	2.17	0.44
1:D:137:LEU:HB3	2:D:272:GOL:H12	1.99	0.44
1:A:195:VAL:HA	1:A:198:PHE:CZ	2.52	0.44
1:B:155:ILE:HD13	1:B:183:ALA:HB1	2.00	0.43
1:A:85:LEU:HB3	1:A:88[B]:VAL:HG21	2.00	0.43
1:D:62:GLN:HB3	1:D:187:SER:HB2	2.01	0.43
1:D:160:ALA:HB3	1:D:161:PRO:CD	2.49	0.42
1:D:165[A]:ILE:HD11	1:D:171:VAL:HB	2.01	0.42
1:D:5:ALA:HA	1:D:78:GLN:OE1	2.20	0.42
1:A:204:ARG:N	1:A:205:PRO:CD	2.83	0.42
1:E:160:ALA:HB3	1:E:161:PRO:CD	2.49	0.42
1:B:195:VAL:HA	1:B:198:PHE:CZ	2.55	0.42
1:F:160:ALA:HB3	1:F:161:PRO:HD3	2.01	0.42
1:B:28:TRP:HB2	1:B:95:MET:SD	2.61	0.41
1:A:160:ALA:HB3	1:A:161:PRO:HD3	2.01	0.41
1:F:195:VAL:HA	1:F:198:PHE:CZ	2.56	0.41
1:F:204:ARG:N	1:F:205:PRO:CD	2.84	0.41
1:D:124:ILE:HD11	1:D:128:LYS:HG2	2.03	0.41
1:F:85:LEU:HB3	1:F:88[A]:VAL:CG2	2.50	0.41
1:C:195:VAL:HA	1:C:198:PHE:CZ	2.55	0.41
1:E:163:TYR:HB3	1:E:171[B]:VAL:HG11	2.03	0.41
1:F:246:TYR:HA	2:F:275:GOL:H2	2.03	0.41
1:F:43:SER:HA	1:F:47:TYR:O	2.21	0.40
1:F:163:TYR:HB3	1:F:171:VAL:HG21	2.02	0.40
1:D:210[B]:ILE:HD13	1:D:238:ILE:HD13	2.04	0.40
1:F:74:ASP:O	1:F:78:GLN:HG3	2.21	0.40
1:A:62:GLN:HB3	1:A:187:SER:HB2	2.03	0.40
1:B:82[A]:HIS:CD2	1:B:83:LEU:HG	2.57	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	274/271 (101%)	266 (97%)	8 (3%)	0	100	100
1	B	276/271 (102%)	268 (97%)	8 (3%)	0	100	100
1	C	272/271 (100%)	264 (97%)	8 (3%)	0	100	100
1	D	275/271 (102%)	266 (97%)	9 (3%)	0	100	100
1	E	275/271 (102%)	265 (96%)	10 (4%)	0	100	100
1	F	274/271 (101%)	266 (97%)	8 (3%)	0	100	100
All	All	1646/1626 (101%)	1595 (97%)	51 (3%)	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	226/220 (103%)	223 (99%)	3 (1%)	61	61
1	B	227/220 (103%)	225 (99%)	2 (1%)	70	73
1	C	224/220 (102%)	223 (100%)	1 (0%)	84	87
1	D	226/220 (103%)	226 (100%)	0	100	100
1	E	226/220 (103%)	225 (100%)	1 (0%)	84	87
1	F	225/220 (102%)	222 (99%)	3 (1%)	61	61
All	All	1354/1320 (103%)	1344 (99%)	10 (1%)	78	78

All (10) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	81	GLU
1	A	271[A]	ARG
1	A	271[B]	ARG
1	B	82[A]	HIS
1	B	82[B]	HIS
1	C	133	GLN
1	E	88	VAL
1	F	81	GLU
1	F	138	ASP
1	F	209	LYS

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

Mol	Chain	Res	Type
1	A	38	GLN
1	A	159	ASN
1	A	262	ASN
1	B	159	ASN
1	C	38	GLN
1	C	133	GLN
1	D	38	GLN
1	E	38	GLN
1	E	78	GLN
1	E	159	ASN
1	F	38	GLN
1	F	78	GLN

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

44 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	EEE	E	300	1	5,5,5	3.14	2 (40%)	5,5,5	2.41	2 (40%)
2	GOL	F	276	-	5,5,5	0.37	0	5,5,5	0.32	0
2	GOL	C	272	-	5,5,5	0.37	0	5,5,5	0.33	0
2	GOL	F	275	-	5,5,5	0.39	0	5,5,5	0.39	0
2	GOL	B	273	-	5,5,5	0.37	0	5,5,5	0.19	0
3	SO4	D	275	-	4,4,4	0.23	0	6,6,6	0.10	0
2	GOL	F	272	-	5,5,5	0.38	0	5,5,5	0.36	0
2	GOL	F	274	-	5,5,5	0.40	0	5,5,5	0.33	0
2	GOL	C	274	-	5,5,5	0.36	0	5,5,5	0.36	0
2	GOL	B	274	-	5,5,5	0.37	0	5,5,5	0.38	0
3	SO4	B	276	-	4,4,4	0.24	0	6,6,6	0.11	0
4	EEE	A	300	1	5,5,5	3.13	2 (40%)	5,5,5	2.37	2 (40%)
2	GOL	E	273	-	5,5,5	0.36	0	5,5,5	0.30	0
2	GOL	A	272	-	5,5,5	0.31	0	5,5,5	0.36	0
2	GOL	E	275	-	5,5,5	0.35	0	5,5,5	0.38	0
2	GOL	C	273	-	5,5,5	0.32	0	5,5,5	0.44	0
2	GOL	E	276	-	5,5,5	0.38	0	5,5,5	0.29	0
3	SO4	C	277	-	4,4,4	0.23	0	6,6,6	0.08	0
2	GOL	E	272	-	5,5,5	0.42	0	5,5,5	0.35	0
3	SO4	E	278	-	4,4,4	0.24	0	6,6,6	0.11	0
3	SO4	B	277	-	4,4,4	0.28	0	6,6,6	0.13	0
2	GOL	D	273	-	5,5,5	0.46	0	5,5,5	0.21	0
3	SO4	E	277	-	4,4,4	0.25	0	6,6,6	0.07	0
3	SO4	A	276	-	4,4,4	0.25	0	6,6,6	0.05	0
2	GOL	A	273	-	5,5,5	0.32	0	5,5,5	0.39	0
3	SO4	A	277	-	4,4,4	0.24	0	6,6,6	0.13	0
3	SO4	A	275	-	4,4,4	0.23	0	6,6,6	0.10	0
3	SO4	C	278	-	4,4,4	0.24	0	6,6,6	0.09	0
4	EEE	B	300	1	5,5,5	3.11	2 (40%)	5,5,5	2.44	2 (40%)
2	GOL	B	275	-	5,5,5	0.38	0	5,5,5	0.19	0
3	SO4	A	278	-	4,4,4	0.26	0	6,6,6	0.19	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
2	GOL	A	274	-	5,5,5	0.34	0	5,5,5	0.37	0
3	SO4	D	276	-	4,4,4	0.27	0	6,6,6	0.12	0
4	EEE	F	300	1	5,5,5	3.10	2 (40%)	5,5,5	2.48	2 (40%)
4	EEE	D	300	1	5,5,5	3.06	2 (40%)	5,5,5	2.46	2 (40%)
2	GOL	B	272	-	5,5,5	0.37	0	5,5,5	0.41	0
3	SO4	F	277	-	4,4,4	0.24	0	6,6,6	0.09	0
2	GOL	F	273	-	5,5,5	0.38	0	5,5,5	0.35	0
3	SO4	C	276	-	4,4,4	0.24	0	6,6,6	0.14	0
2	GOL	D	272	-	5,5,5	0.35	0	5,5,5	0.35	0
2	GOL	D	274	-	5,5,5	0.34	0	5,5,5	0.26	0
2	GOL	E	274	-	5,5,5	0.38	0	5,5,5	0.29	0
4	EEE	C	300	1	5,5,5	3.09	2 (40%)	5,5,5	2.34	2 (40%)
2	GOL	C	275	-	5,5,5	0.38	0	5,5,5	0.40	0

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

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
4	EEE	E	300	1	-	2/3/3/3	-
2	GOL	F	276	-	-	4/4/4/4	-
2	GOL	C	272	-	-	0/4/4/4	-
2	GOL	F	275	-	-	4/4/4/4	-
2	GOL	B	273	-	-	0/4/4/4	-
2	GOL	F	272	-	-	0/4/4/4	-
2	GOL	F	274	-	-	0/4/4/4	-
2	GOL	C	274	-	-	1/4/4/4	-
2	GOL	B	274	-	-	1/4/4/4	-
4	EEE	A	300	1	-	1/3/3/3	-
2	GOL	E	273	-	-	1/4/4/4	-
2	GOL	A	272	-	-	0/4/4/4	-
2	GOL	E	275	-	-	0/4/4/4	-
2	GOL	C	273	-	-	2/4/4/4	-
2	GOL	E	276	-	-	4/4/4/4	-
2	GOL	E	272	-	-	0/4/4/4	-
2	GOL	D	273	-	-	0/4/4/4	-
2	GOL	A	273	-	-	0/4/4/4	-
4	EEE	B	300	1	-	2/3/3/3	-
2	GOL	B	275	-	-	2/4/4/4	-

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	GOL	A	274	-	-	0/4/4/4	-
4	EEE	F	300	1	-	2/3/3/3	-
4	EEE	D	300	1	-	1/3/3/3	-
2	GOL	B	272	-	-	0/4/4/4	-
2	GOL	F	273	-	-	2/4/4/4	-
2	GOL	D	272	-	-	1/4/4/4	-
2	GOL	D	274	-	-	2/4/4/4	-
2	GOL	E	274	-	-	1/4/4/4	-
4	EEE	C	300	1	-	2/3/3/3	-
2	GOL	C	275	-	-	2/4/4/4	-

All (12) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	E	300	EEE	O1-C1	6.48	1.44	1.21
4	A	300	EEE	O1-C1	6.46	1.44	1.21
4	F	300	EEE	O1-C1	6.43	1.44	1.21
4	B	300	EEE	O1-C1	6.40	1.44	1.21
4	C	300	EEE	O1-C1	6.35	1.43	1.21
4	D	300	EEE	O1-C1	6.33	1.43	1.21
4	D	300	EEE	O2-C1	2.17	1.43	1.33
4	B	300	EEE	O2-C1	2.16	1.43	1.33
4	E	300	EEE	O2-C1	2.15	1.43	1.33
4	C	300	EEE	O2-C1	2.14	1.43	1.33
4	F	300	EEE	O2-C1	2.12	1.43	1.33
4	A	300	EEE	O2-C1	2.06	1.43	1.33

All (12) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	D	300	EEE	O1-C1-C2	-4.41	109.17	124.77
4	B	300	EEE	O1-C1-C2	-4.31	109.51	124.77
4	F	300	EEE	O1-C1-C2	-4.20	109.91	124.77
4	E	300	EEE	O1-C1-C2	-4.20	109.91	124.77
4	C	300	EEE	O1-C1-C2	-4.18	109.98	124.77
4	A	300	EEE	O1-C1-C2	-4.16	110.05	124.77
4	F	300	EEE	O2-C1-O1	-3.24	105.33	121.59
4	E	300	EEE	O2-C1-O1	-3.14	105.83	121.59
4	B	300	EEE	O2-C1-O1	-3.08	106.14	121.59
4	A	300	EEE	O2-C1-O1	-3.00	106.53	121.59
4	D	300	EEE	O2-C1-O1	-2.96	106.73	121.59

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	C	300	EEE	O2-C1-O1	-2.91	106.97	121.59

There are no chirality outliers.

All (37) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	B	275	GOL	C1-C2-C3-O3
2	C	273	GOL	O1-C1-C2-C3
2	C	275	GOL	C1-C2-C3-O3
2	C	275	GOL	O2-C2-C3-O3
2	E	276	GOL	O1-C1-C2-C3
2	E	276	GOL	C1-C2-C3-O3
2	E	276	GOL	O2-C2-C3-O3
2	F	275	GOL	O1-C1-C2-O2
2	F	275	GOL	O1-C1-C2-C3
2	F	276	GOL	C1-C2-C3-O3
2	F	276	GOL	O1-C1-C2-O2
4	D	300	EEE	C2-C1-O2-C3
2	D	274	GOL	C1-C2-C3-O3
2	F	273	GOL	O1-C1-C2-C3
2	F	276	GOL	O1-C1-C2-C3
2	C	273	GOL	O1-C1-C2-O2
2	E	276	GOL	O1-C1-C2-O2
2	F	273	GOL	O1-C1-C2-O2
2	F	276	GOL	O2-C2-C3-O3
4	A	300	EEE	C2-C1-O2-C3
4	F	300	EEE	C2-C1-O2-C3
4	E	300	EEE	C2-C1-O2-C3
4	B	300	EEE	C2-C1-O2-C3
4	C	300	EEE	C2-C1-O2-C3
2	B	275	GOL	O2-C2-C3-O3
2	E	273	GOL	O1-C1-C2-O2
2	E	274	GOL	C1-C2-C3-O3
2	D	272	GOL	O1-C1-C2-O2
4	C	300	EEE	O1-C1-O2-C3
2	F	275	GOL	C1-C2-C3-O3
4	B	300	EEE	O1-C1-O2-C3
2	D	274	GOL	O2-C2-C3-O3
2	F	275	GOL	O2-C2-C3-O3
4	E	300	EEE	O1-C1-O2-C3
2	B	274	GOL	C1-C2-C3-O3
2	C	274	GOL	C1-C2-C3-O3

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Mol	Chain	Res	Type	Atoms
4	F	300	EEE	O1-C1-O2-C3

There are no ring outliers.

10 monomers are involved in 16 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	E	300	EEE	2	0
2	F	275	GOL	1	0
4	A	300	EEE	2	0
2	C	273	GOL	1	0
4	B	300	EEE	2	0
4	F	300	EEE	2	0
4	D	300	EEE	2	0
2	D	272	GOL	1	0
4	C	300	EEE	2	0
2	C	275	GOL	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	271/271 (100%)	-0.01	3 (1%) 78 80	12, 22, 30, 34	6 (2%)
1	B	271/271 (100%)	-0.12	3 (1%) 78 80	12, 21, 29, 36	7 (2%)
1	C	271/271 (100%)	-0.11	5 (1%) 67 71	15, 22, 29, 34	4 (1%)
1	D	271/271 (100%)	-0.11	5 (1%) 67 71	12, 22, 30, 37	6 (2%)
1	E	271/271 (100%)	-0.04	3 (1%) 78 80	13, 22, 30, 38	6 (2%)
1	F	271/271 (100%)	-0.03	6 (2%) 62 66	15, 22, 30, 37	5 (1%)
All	All	1626/1626 (100%)	-0.07	25 (1%) 72 75	12, 22, 30, 38	34 (2%)

All (25) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	E	168	GLY	4.8
1	B	168	GLY	4.1
1	A	143	PHE	3.4
1	A	271[A]	ARG	3.4
1	C	271[A]	ARG	3.4
1	B	138	ASP	3.3
1	F	143	PHE	3.1
1	A	168	GLY	3.1
1	D	138	ASP	3.0
1	D	146	GLU	2.9
1	C	138	ASP	2.7
1	D	168	GLY	2.4
1	F	81	GLU	2.4
1	B	271	ARG	2.3
1	C	81	GLU	2.3
1	F	236	GLU	2.3
1	F	270	LYS	2.3
1	E	143	PHE	2.3
1	F	6	LYS	2.3

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Mol	Chain	Res	Type	RSRZ
1	C	143	PHE	2.2
1	D	81	GLU	2.1
1	F	78	GLN	2.1
1	C	124	ILE	2.0
1	D	6	LYS	2.0
1	E	271	ARG	2.0

6.2 Non-standard residues in protein, DNA, RNA chains [i](#)

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

6.3 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

6.4 Ligands [i](#)

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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
3	SO4	F	277	5/5	0.66	0.18	99,99,99,99	0
3	SO4	E	278	5/5	0.75	0.18	84,84,85,85	0
4	EEE	A	300	6/6	0.80	0.16	21,23,25,26	0
4	EEE	D	300	6/6	0.80	0.15	21,22,24,25	0
4	EEE	F	300	6/6	0.81	0.15	21,23,25,26	0
3	SO4	C	278	5/5	0.82	0.19	90,90,90,90	0
4	EEE	C	300	6/6	0.82	0.15	20,23,25,26	0
3	SO4	A	278	5/5	0.83	0.17	60,61,61,61	0
3	SO4	A	277	5/5	0.83	0.14	67,67,67,67	0
3	SO4	A	276	5/5	0.84	0.14	77,77,77,77	0
3	SO4	D	276	5/5	0.84	0.14	63,63,64,64	0
3	SO4	C	277	5/5	0.85	0.14	81,81,82,82	0
3	SO4	D	275	5/5	0.85	0.15	85,85,85,85	0
4	EEE	B	300	6/6	0.85	0.15	20,23,24,25	0
3	SO4	E	277	5/5	0.87	0.13	73,73,73,73	0
2	GOL	F	275	6/6	0.87	0.17	41,42,42,43	0
2	GOL	F	276	6/6	0.87	0.20	53,54,54,54	0

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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
4	EEE	E	300	6/6	0.87	0.14	20,22,25,25	0
2	GOL	F	274	6/6	0.87	0.14	32,33,34,34	0
3	SO4	B	277	5/5	0.88	0.13	61,61,62,62	0
2	GOL	C	274	6/6	0.89	0.15	32,32,32,33	0
2	GOL	F	273	6/6	0.90	0.12	34,37,38,40	0
2	GOL	B	274	6/6	0.90	0.12	31,32,32,33	0
3	SO4	C	276	5/5	0.90	0.10	57,57,57,57	0
2	GOL	A	274	6/6	0.90	0.12	35,35,36,36	0
2	GOL	D	274	6/6	0.91	0.12	32,34,34,34	0
3	SO4	A	275	5/5	0.91	0.13	62,63,63,63	0
2	GOL	E	276	6/6	0.91	0.14	49,50,50,51	0
2	GOL	C	273	6/6	0.91	0.12	33,35,36,38	0
2	GOL	B	272	6/6	0.91	0.11	31,34,35,37	0
3	SO4	B	276	5/5	0.91	0.12	68,68,68,68	0
2	GOL	C	275	6/6	0.91	0.13	46,47,47,48	0
2	GOL	E	274	6/6	0.92	0.10	34,34,35,35	0
2	GOL	B	275	6/6	0.92	0.12	36,39,40,41	0
2	GOL	E	272	6/6	0.93	0.09	21,21,21,22	0
2	GOL	E	273	6/6	0.93	0.10	29,32,33,35	0
2	GOL	D	272	6/6	0.94	0.10	27,31,32,34	0
2	GOL	A	273	6/6	0.94	0.09	26,29,31,34	0
2	GOL	A	272	6/6	0.96	0.07	20,21,21,21	0
2	GOL	D	273	6/6	0.97	0.06	20,20,20,21	0
2	GOL	B	273	6/6	0.97	0.06	17,18,19,20	0
2	GOL	F	272	6/6	0.97	0.06	19,19,21,21	0
2	GOL	C	272	6/6	0.98	0.05	18,19,20,21	0
2	GOL	E	275	6/6	0.98	0.06	29,30,30,30	0

6.5 Other polymers [i](#)

There are no such residues in this entry.