



Full wwPDB X-ray Structure Validation Report ⓘ

Feb 26, 2024 – 12:11 pm GMT

PDB ID : 5OVT
Title : Thiobacillus denitrificans BPH in complex with Epoxomicin
Authors : Fuchs, A.C.D.; Albrecht, R.; Martin, J.; Hartmann, M.D.
Deposited on : 2017-08-29
Resolution : 2.95 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 : 4.02b-467
Mogul : 1.8.4, CSD as541be (2020)
Xtrriage (Phenix) : 1.13
EDS : 2.36
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac : 5.8.0158
CCP4 : 7.0.044 (Gargrove)
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.36

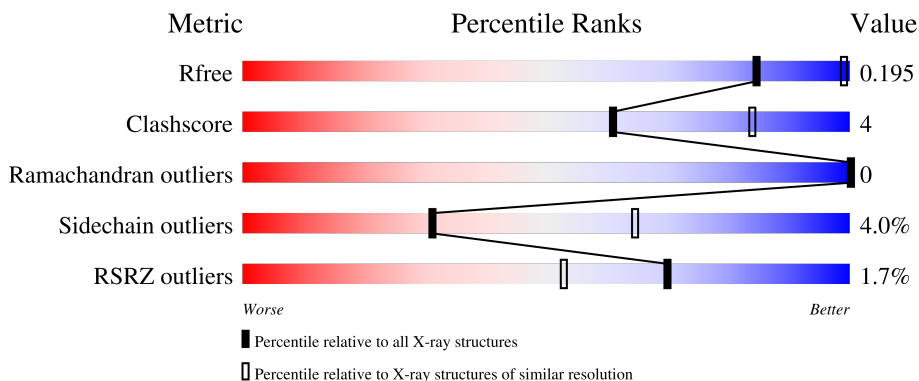
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.95 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.



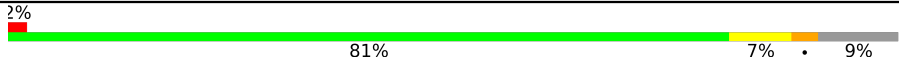




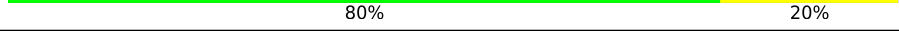
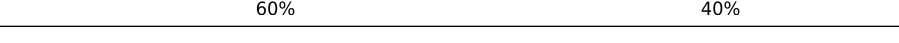
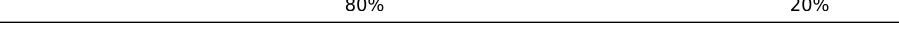
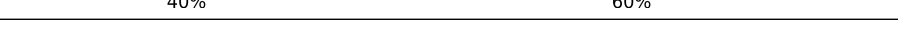
Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	130704	3104 (3.00-2.92)
Clashscore	141614	3462 (3.00-2.92)
Ramachandran outliers	138981	3340 (3.00-2.92)
Sidechain outliers	138945	3343 (3.00-2.92)
RSRZ outliers	127900	2986 (3.00-2.92)

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	201	2% 80% 8% 9%
1	B	201	2% 80% 8% 9%
1	C	201	2% 79% 8% 9%
1	D	201	2% 81% 8% 9%
1	E	201	2% 80% 8% 9%

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Mol	Chain	Length	Quality of chain
1	F	201	 2% 81% 7% 9%
1	G	201	 80% 8% 9%
2	a	5	 80% 20%
2	b	5	 60% 40%
2	c	5	 60% 40%
2	d	5	 80% 20%
2	e	5	 60% 40%
2	f	5	 80% 20%
2	g	5	 40% 60%

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
2	IML	a	2	-	X	-	-
2	IML	c	2	-	X	-	-
2	IML	d	2	-	X	-	-
2	IML	e	2	-	X	-	-
2	IML	g	2	-	X	-	-

2 Entry composition

There are 4 unique types of molecules in this entry. The entry contains 10257 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.

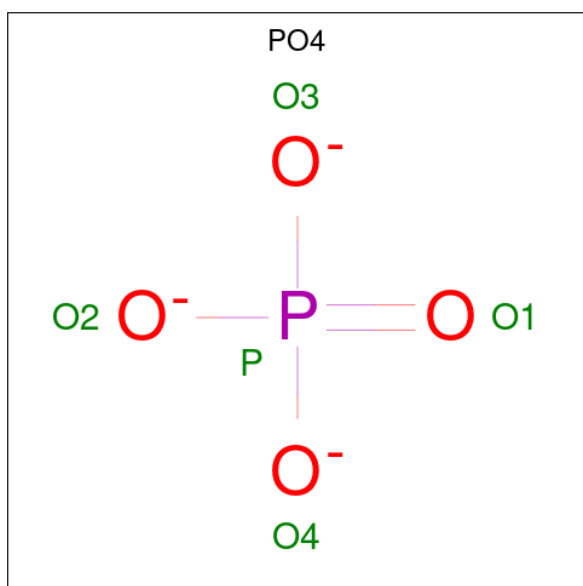
- Molecule 1 is a protein called BPH.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
			Total	C	N	O	S	Se			
1	A	183	1410	902	239	264	1	4	0	1	0
1	B	183	1410	902	239	264	1	4	0	1	0
1	C	183	1410	902	239	264	1	4	0	1	0
1	D	183	1410	902	239	264	1	4	0	1	0
1	E	183	1410	902	239	264	1	4	0	1	0
1	F	183	1410	902	239	264	1	4	0	1	0
1	G	183	1410	902	239	264	1	4	0	1	0

- Molecule 2 is a protein called Epoxomicin.

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
			Total	C	N	O			
2	a	5	39	28	4	7	0	0	0
2	b	5	39	28	4	7	0	0	0
2	c	5	39	28	4	7	0	0	0
2	d	5	39	28	4	7	0	0	0
2	e	5	39	28	4	7	0	0	0
2	f	5	39	28	4	7	0	0	0
2	g	5	39	28	4	7	0	0	0

- Molecule 3 is PHOSPHATE ION (three-letter code: PO4) (formula: O₄P).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	A	1	Total O P 5 4 1	0	0
3	C	1	Total O P 5 4 1	0	0
3	E	1	Total O P 5 4 1	0	0
3	G	1	Total O P 5 4 1	0	0
3	b	1	Total O P 5 4 1	0	0
3	d	1	Total O P 5 4 1	0	0
3	f	1	Total O P 5 4 1	0	0

- Molecule 4 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	A	12	Total O 12 12	0	0
4	B	13	Total O 13 13	0	0
4	C	11	Total O 11 11	0	0
4	D	9	Total O 9 9	0	0

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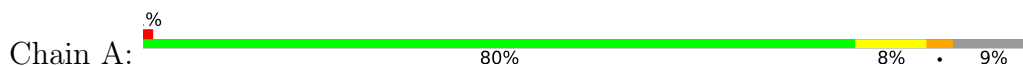
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Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	E	10	Total O 10 10	0	0
4	F	10	Total O 10 10	0	0
4	G	14	Total O 14 14	0	0

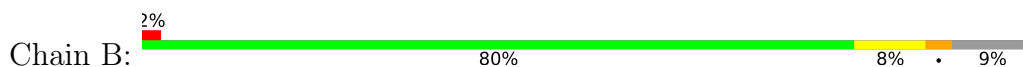
3 Residue-property plots [i](#)

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: BPH

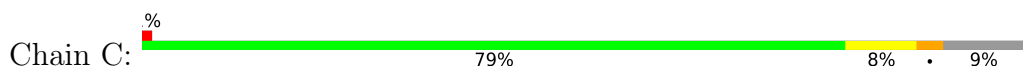


- Molecule 1: BPH



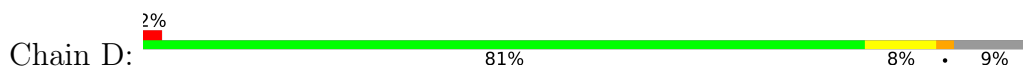
TYR
PHE
GLN

- Molecule 1: BPH



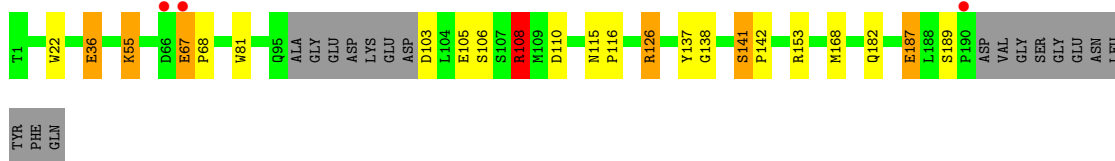
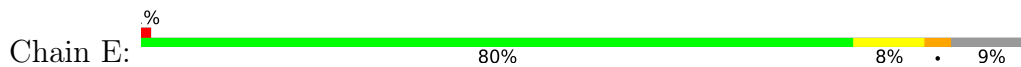
LEU
TYR
PHE
GLN

- Molecule 1: BPH

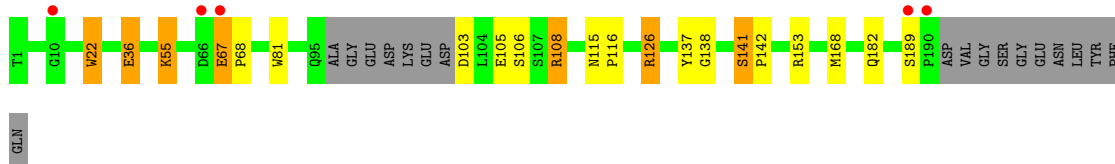
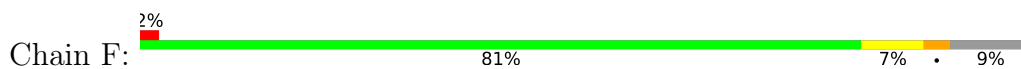


GLN

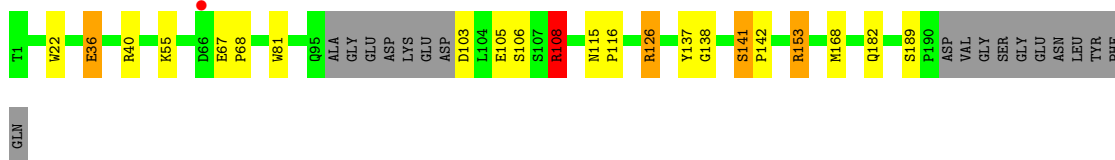
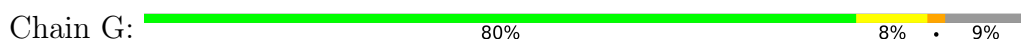
- Molecule 1: BPH



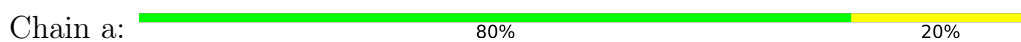
• Molecule 1: BPH



• Molecule 1: BPH



• Molecule 2: Epoxomicin




• Molecule 2: Epoxomicin



• Molecule 2: Epoxomicin



• Molecule 2: Epoxomicin

Chain d:  80% 20%




- Molecule 2: Epoxomicin

Chain e:  60% 40%



- Molecule 2: Epoxomicin

Chain f:  80% 20%



- Molecule 2: Epoxomicin

Chain g:  40% 60%



4 Data and refinement statistics

Property	Value	Source
Space group	P 61 2 2	Depositor
Cell constants a, b, c, α , β , γ	196.82Å 196.82Å 296.37Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	39.20 – 2.95 39.20 – 2.95	Depositor EDS
% Data completeness (in resolution range)	99.8 (39.20-2.95) 100.0 (39.20-2.95)	Depositor EDS
R_{merge}	0.44	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.58 (at 2.95Å)	Xtrriage
Refinement program	REFMAC 5.8.0049	Depositor
R, R_{free}	0.172 , 0.189 0.181 , 0.195	Depositor DCC
R_{free} test set	3609 reflections (5.04%)	wwPDB-VP
Wilson B-factor (Å ²)	50.9	Xtrriage
Anisotropy	0.040	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.37 , 43.2	EDS
L-test for twinning ²	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.34$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
F_o, F_c correlation	0.94	EDS
Total number of atoms	10257	wwPDB-VP
Average B, all atoms (Å ²)	41.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.03% 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: IML, PO4, ACE, 6VO

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	0.92	2/1439 (0.1%)	1.02	8/1947 (0.4%)
1	B	0.94	2/1439 (0.1%)	1.02	7/1947 (0.4%)
1	C	1.00	2/1439 (0.1%)	1.04	7/1947 (0.4%)
1	D	0.90	2/1439 (0.1%)	1.01	6/1947 (0.3%)
1	E	0.95	3/1439 (0.2%)	1.02	8/1947 (0.4%)
1	F	0.95	3/1439 (0.2%)	0.99	6/1947 (0.3%)
1	G	0.96	2/1439 (0.1%)	1.05	8/1947 (0.4%)
2	a	1.25	0/14	0.99	0/18
2	b	1.45	0/14	0.74	0/18
2	c	1.54	0/14	0.84	0/18
2	d	1.51	0/14	1.07	0/18
2	e	1.25	0/14	1.01	0/18
2	f	1.36	0/14	1.50	0/18
2	g	1.53	0/14	1.01	0/18
All	All	0.95	16/10171 (0.2%)	1.02	50/13755 (0.4%)

Chiral center outliers are detected by calculating the chiral volume of a chiral center and verifying if the center is modelled as a planar moiety or with the opposite hand. A planarity outlier is detected by checking planarity of atoms in a peptide group, atoms in a mainchain group or atoms of a sidechain that are expected to be planar.

Mol	Chain	#Chirality outliers	#Planarity outliers
2	b	0	1
2	c	0	1
2	e	0	1
2	g	0	1
All	All	0	4

All (16) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	G	36	GLU	CD-OE1	8.86	1.35	1.25
1	D	36	GLU	CD-OE1	8.02	1.34	1.25
1	A	36	GLU	CD-OE1	7.83	1.34	1.25
1	B	36	GLU	CD-OE1	7.72	1.34	1.25
1	C	36	GLU	CD-OE1	7.70	1.34	1.25
1	F	36	GLU	CD-OE1	7.66	1.34	1.25
1	C	36	GLU	CG-CD	7.13	1.62	1.51
1	E	36	GLU	CD-OE1	7.00	1.33	1.25
1	G	36	GLU	CG-CD	6.57	1.61	1.51
1	E	36	GLU	CG-CD	6.36	1.61	1.51
1	A	36	GLU	CG-CD	6.31	1.61	1.51
1	B	36	GLU	CG-CD	6.24	1.61	1.51
1	F	36	GLU	CG-CD	5.68	1.60	1.51
1	D	36	GLU	CG-CD	5.59	1.60	1.51
1	E	187	GLU	CD-OE1	5.55	1.31	1.25
1	F	22	TRP	CB-CG	5.14	1.59	1.50

All (50) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	103	ASP	CB-CG-OD1	11.26	128.43	118.30
1	B	103	ASP	CB-CG-OD1	11.06	128.26	118.30
1	D	103	ASP	CB-CG-OD1	10.83	128.05	118.30
1	E	103	ASP	CB-CG-OD1	10.22	127.50	118.30
1	G	103	ASP	CB-CG-OD1	10.21	127.49	118.30
1	F	103	ASP	CB-CG-OD1	9.96	127.27	118.30
1	G	126	ARG	NE-CZ-NH2	-9.69	115.45	120.30
1	C	103	ASP	CB-CG-OD1	9.61	126.95	118.30
1	E	103	ASP	CB-CG-OD2	-9.34	109.90	118.30
1	C	126	ARG	NE-CZ-NH2	-9.06	115.77	120.30
1	E	126	ARG	NE-CZ-NH2	-8.80	115.90	120.30
1	C	103	ASP	CB-CG-OD2	-8.64	110.53	118.30
1	D	103	ASP	CB-CG-OD2	-8.48	110.66	118.30
1	F	103	ASP	CB-CG-OD2	-8.39	110.75	118.30
1	D	126	ARG	NE-CZ-NH2	-8.29	116.16	120.30
1	G	103	ASP	CB-CG-OD2	-8.15	110.96	118.30
1	A	103	ASP	CB-CG-OD2	-8.04	111.06	118.30
1	A	126	ARG	NE-CZ-NH2	-7.94	116.33	120.30
1	B	103	ASP	CB-CG-OD2	-7.93	111.16	118.30
1	G	126	ARG	NE-CZ-NH1	7.47	124.03	120.30
1	B	126	ARG	NE-CZ-NH2	-7.15	116.72	120.30
1	F	126	ARG	NE-CZ-NH2	-7.04	116.78	120.30
1	E	153	ARG	NE-CZ-NH1	6.81	123.70	120.30

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	G	40	ARG	NE-CZ-NH2	-6.43	117.08	120.30
1	D	126	ARG	NE-CZ-NH1	6.32	123.46	120.30
1	B	126	ARG	NE-CZ-NH1	6.25	123.43	120.30
1	E	108	ARG	NE-CZ-NH2	-6.20	117.20	120.30
1	F	126	ARG	NE-CZ-NH1	6.19	123.40	120.30
1	C	153	ARG	NE-CZ-NH1	6.03	123.31	120.30
1	E	126	ARG	NE-CZ-NH1	6.00	123.30	120.30
1	A	126	ARG	NE-CZ-NH1	5.98	123.29	120.30
1	C	40	ARG	NE-CZ-NH2	-5.97	117.31	120.30
1	A	153	ARG	NE-CZ-NH1	5.97	123.28	120.30
1	B	95	GLN	N-CA-C	5.82	126.72	111.00
1	E	168	MSE	CG-SE-CE	-5.82	86.09	98.90
1	C	126	ARG	NE-CZ-NH1	5.82	123.21	120.30
1	G	153	ARG	NE-CZ-NH1	5.78	123.19	120.30
1	D	153	ARG	NE-CZ-NH1	5.58	123.09	120.30
1	A	95	GLN	N-CA-C	5.57	126.04	111.00
1	D	168	MSE	CG-SE-CE	-5.49	86.82	98.90
1	B	168	MSE	CG-SE-CE	-5.35	87.14	98.90
1	G	168	MSE	CG-SE-CE	-5.33	87.18	98.90
1	A	168	MSE	CG-SE-CE	-5.25	87.34	98.90
1	F	168	MSE	CG-SE-CE	-5.24	87.37	98.90
1	A	153	ARG	NE-CZ-NH2	-5.17	117.72	120.30
1	G	108	ARG	NE-CZ-NH2	-5.16	117.72	120.30
1	E	110	ASP	CB-CG-OD1	5.15	122.94	118.30
1	F	153	ARG	NE-CZ-NH1	5.13	122.86	120.30
1	B	110	ASP	CB-CG-OD1	5.08	122.87	118.30
1	C	7	ARG	CG-CD-NE	-5.04	101.22	111.80

There are no chirality outliers.

All (4) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
2	b	4	THR	Mainchain
2	c	4	THR	Mainchain
2	e	4	THR	Peptide
2	g	4	THR	Mainchain

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	1410	0	1375	12	0
1	B	1410	0	1375	13	0
1	C	1410	0	1375	16	0
1	D	1410	0	1375	15	0
1	E	1410	0	1375	13	1
1	F	1410	0	1375	10	0
1	G	1410	0	1375	11	0
2	a	39	0	34	0	0
2	b	39	0	34	0	0
2	c	39	0	34	0	0
2	d	39	0	34	0	0
2	e	39	0	34	0	0
2	f	39	0	34	0	0
2	g	39	0	34	0	0
3	A	5	0	0	0	0
3	C	5	0	0	0	0
3	E	5	0	0	0	0
3	G	5	0	0	0	0
3	b	5	0	0	0	0
3	d	5	0	0	0	0
3	f	5	0	0	0	0
4	A	12	0	0	0	0
4	B	13	0	0	1	0
4	C	11	0	0	0	0
4	D	9	0	0	0	0
4	E	10	0	0	0	0
4	F	10	0	0	0	0
4	G	14	0	0	0	0
All	All	10257	0	9863	76	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 4.

All (76) close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:105:GLU:O	1:C:126:ARG:NH2	2.30	0.65
1:A:105:GLU:O	1:A:126:ARG:NH2	2.31	0.63
1:B:105:GLU:O	1:B:126:ARG:NH2	2.32	0.63

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:105:GLU:O	1:D:126:ARG:NH2	2.32	0.62
1:F:105:GLU:O	1:F:126:ARG:NH2	2.31	0.62
1:G:105:GLU:O	1:G:126:ARG:NH2	2.33	0.61
1:E:105:GLU:O	1:E:126:ARG:NH2	2.32	0.61
1:C:36:GLU:O	1:C:55:LYS:HD3	2.02	0.59
1:C:137:TYR:CE1	1:D:22:TRP:HZ3	2.20	0.59
1:G:36:GLU:O	1:G:55:LYS:HD3	2.03	0.58
1:E:36:GLU:O	1:E:55:LYS:HD3	2.03	0.58
1:F:36:GLU:O	1:F:55:LYS:HD3	2.04	0.58
1:B:36:GLU:O	1:B:55:LYS:HD3	2.04	0.56
1:D:36:GLU:O	1:D:55:LYS:HD3	2.05	0.56
1:A:36:GLU:O	1:A:55:LYS:HD3	2.06	0.55
1:D:137:TYR:CE1	1:E:22:TRP:HZ3	2.23	0.55
1:A:22:TRP:HZ3	1:G:137:TYR:CE1	2.25	0.54
1:A:137:TYR:CE1	1:B:22:TRP:HZ3	2.26	0.54
1:E:137:TYR:CE1	1:F:22:TRP:HZ3	2.27	0.53
1:A:138:GLY:O	1:A:141:SER:HB3	2.11	0.51
1:G:138:GLY:O	1:G:141:SER:HB3	2.11	0.51
1:C:141:SER:N	1:C:142:PRO:HD2	2.26	0.51
1:F:138:GLY:O	1:F:141:SER:HB3	2.11	0.50
1:E:138:GLY:O	1:E:141:SER:HB3	2.12	0.50
1:B:137:TYR:CE1	1:C:22:TRP:HZ3	2.29	0.50
1:B:138:GLY:O	1:B:141:SER:HB3	2.12	0.50
1:D:138:GLY:O	1:D:141:SER:HB3	2.11	0.50
1:C:138:GLY:O	1:C:141:SER:HB3	2.13	0.49
1:D:103:ASP:HB3	1:E:108:ARG:CZ	2.42	0.49
1:C:36:GLU:HB3	1:C:182:GLN:NE2	2.28	0.48
1:B:126:ARG:NH1	4:B:301:HOH:O	2.47	0.47
1:C:36:GLU:HB3	1:C:182:GLN:HE22	1.78	0.47
1:F:137:TYR:CE1	1:G:22:TRP:HZ3	2.33	0.46
1:C:137:TYR:CE1	1:D:22:TRP:CZ3	3.02	0.46
1:C:115:ASN:HB2	1:C:116:PRO:CD	2.45	0.46
1:E:115:ASN:HB2	1:E:116:PRO:CD	2.45	0.46
1:G:36:GLU:HB3	1:G:182:GLN:HE22	1.81	0.46
1:G:36:GLU:HB3	1:G:182:GLN:NE2	2.32	0.45
1:G:115:ASN:HB2	1:G:116:PRO:CD	2.46	0.45
1:A:106:SER:HB3	1:A:108:ARG:HD3	1.97	0.45
1:F:106:SER:HB3	1:F:108:ARG:HD3	1.98	0.44
1:C:22:TRP:CD1	1:C:22:TRP:C	2.91	0.44
1:D:141:SER:N	1:D:142:PRO:HD2	2.32	0.44
1:B:106:SER:HB3	1:B:108:ARG:HD3	2.00	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:E:36:GLU:HB3	1:E:182:GLN:NE2	2.32	0.43
1:D:106:SER:HB3	1:D:108:ARG:HD3	1.99	0.43
1:E:106:SER:HB3	1:E:108:ARG:HD3	2.00	0.43
1:G:67:GLU:HB2	1:G:68:PRO:CD	2.49	0.43
1:E:36:GLU:HB3	1:E:182:GLN:HE22	1.83	0.43
1:A:141:SER:N	1:A:142:PRO:HD2	2.34	0.43
1:G:106:SER:HB3	1:G:108:ARG:HD3	2.00	0.43
1:E:141:SER:N	1:E:142:PRO:HD2	2.34	0.42
1:F:115:ASN:HB2	1:F:116:PRO:CD	2.49	0.42
1:G:141:SER:N	1:G:142:PRO:HD2	2.34	0.42
1:A:67:GLU:HB2	1:A:68:PRO:CD	2.49	0.42
1:A:137:TYR:CE1	1:B:22:TRP:CZ3	3.07	0.42
1:D:115:ASN:HB2	1:D:116:PRO:CD	2.48	0.42
1:F:67:GLU:HB2	1:F:68:PRO:CD	2.50	0.42
1:C:103:ASP:HB3	1:D:108:ARG:CZ	2.49	0.42
1:E:67:GLU:HB2	1:E:68:PRO:CD	2.49	0.42
1:F:36:GLU:HB3	1:F:182:GLN:HE22	1.85	0.42
1:F:141:SER:N	1:F:142:PRO:HD2	2.34	0.41
1:C:106:SER:HB3	1:C:108:ARG:HD3	2.01	0.41
1:D:36:GLU:HB3	1:D:182:GLN:HE22	1.85	0.41
1:D:67:GLU:HB2	1:D:68:PRO:CD	2.50	0.41
1:B:115:ASN:HB2	1:B:116:PRO:CD	2.50	0.41
1:D:103:ASP:HB2	1:E:108:ARG:HG3	2.01	0.41
1:C:67:GLU:HB2	1:C:68:PRO:CD	2.50	0.41
1:A:115:ASN:HB2	1:A:116:PRO:CD	2.51	0.41
1:B:36:GLU:HB3	1:B:182:GLN:HE22	1.86	0.41
1:C:103:ASP:HB2	1:D:108:ARG:HG3	2.03	0.41
1:B:67:GLU:HB2	1:B:68:PRO:CD	2.50	0.41
1:B:141:SER:N	1:B:142:PRO:HD2	2.36	0.40
1:A:103:ASP:HB3	1:B:108:ARG:CZ	2.51	0.40
1:C:179:LEU:HB3	1:C:180:PRO:HA	2.04	0.40
1:A:36:GLU:HB3	1:A:182:GLN:HE22	1.86	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)
1:E:187:GLU:OE2	1:E:187:GLU:OE2[11_555]	1.85	0.35

5.3 Torsion angles [i](#)

5.3.1 Protein backbone [i](#)

In the following table, the Percentiles column shows the percent Ramachandran outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the backbone conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	A	180/201 (90%)	177 (98%)	3 (2%)	0	100	100
1	B	180/201 (90%)	178 (99%)	2 (1%)	0	100	100
1	C	180/201 (90%)	178 (99%)	2 (1%)	0	100	100
1	D	180/201 (90%)	178 (99%)	2 (1%)	0	100	100
1	E	180/201 (90%)	178 (99%)	2 (1%)	0	100	100
1	F	180/201 (90%)	178 (99%)	2 (1%)	0	100	100
1	G	180/201 (90%)	177 (98%)	3 (2%)	0	100	100
2	a	2/5 (40%)	2 (100%)	0	0	100	100
2	b	2/5 (40%)	2 (100%)	0	0	100	100
2	c	2/5 (40%)	2 (100%)	0	0	100	100
2	d	2/5 (40%)	2 (100%)	0	0	100	100
2	e	2/5 (40%)	2 (100%)	0	0	100	100
2	f	2/5 (40%)	2 (100%)	0	0	100	100
2	g	2/5 (40%)	2 (100%)	0	0	100	100
All	All	1274/1442 (88%)	1258 (99%)	16 (1%)	0	100	100

There are no Ramachandran outliers to report.

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	143/153 (94%)	138 (96%)	5 (4%)	36	68
1	B	143/153 (94%)	136 (95%)	7 (5%)	25	58
1	C	143/153 (94%)	137 (96%)	6 (4%)	30	63
1	D	143/153 (94%)	139 (97%)	4 (3%)	43	74
1	E	143/153 (94%)	137 (96%)	6 (4%)	30	63
1	F	143/153 (94%)	137 (96%)	6 (4%)	30	63
1	G	143/153 (94%)	138 (96%)	5 (4%)	36	68
2	a	2/2 (100%)	2 (100%)	0	100	100
2	b	2/2 (100%)	2 (100%)	0	100	100
2	c	2/2 (100%)	2 (100%)	0	100	100
2	d	2/2 (100%)	2 (100%)	0	100	100
2	e	2/2 (100%)	2 (100%)	0	100	100
2	f	2/2 (100%)	2 (100%)	0	100	100
2	g	2/2 (100%)	1 (50%)	1 (50%)	0	0
All	All	1015/1085 (94%)	975 (96%)	40 (4%)	31	65

All (40) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	55	LYS
1	A	81	TRP
1	A	108	ARG
1	A	141	SER
1	A	189	SER
1	B	55	LYS
1	B	67	GLU
1	B	81	TRP
1	B	108	ARG
1	B	141	SER
1	B	153	ARG
1	B	189	SER
1	C	67	GLU
1	C	81	TRP
1	C	108	ARG
1	C	141	SER
1	C	153	ARG
1	C	189	SER
1	D	81	TRP

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Mol	Chain	Res	Type
1	D	108	ARG
1	D	141	SER
1	D	189	SER
1	E	55	LYS
1	E	67	GLU
1	E	81	TRP
1	E	108	ARG
1	E	141	SER
1	E	189	SER
1	F	55	LYS
1	F	67	GLU
1	F	81	TRP
1	F	108	ARG
1	F	141	SER
1	F	189	SER
1	G	81	TRP
1	G	108	ARG
1	G	141	SER
1	G	153	ARG
1	G	189	SER
2	g	3	ILE

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (4) such sidechains are listed below:

Mol	Chain	Res	Type
1	B	70	GLN
1	C	70	GLN
1	E	70	GLN
1	F	70	GLN

5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

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

7 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	IML	b	2	2	7,8,9	2.36	3 (42%)	7,9,11	1.31	1 (14%)
2	IML	a	2	2	7,8,9	2.22	2 (28%)	7,9,11	2.21	3 (42%)
2	IML	f	2	2	7,8,9	2.10	3 (42%)	7,9,11	1.50	1 (14%)
2	IML	d	2	2	7,8,9	1.90	3 (42%)	7,9,11	1.98	2 (28%)
2	IML	c	2	2	7,8,9	1.80	2 (28%)	7,9,11	1.62	2 (28%)
2	IML	e	2	2	7,8,9	2.10	2 (28%)	7,9,11	2.39	2 (28%)
2	IML	g	2	2	7,8,9	1.93	3 (42%)	7,9,11	1.70	2 (28%)

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	IML	b	2	2	-	6/8/10/12	-
2	IML	a	2	2	-	8/8/10/12	-
2	IML	f	2	2	-	5/8/10/12	-
2	IML	d	2	2	-	6/8/10/12	-
2	IML	c	2	2	-	7/8/10/12	-
2	IML	e	2	2	-	8/8/10/12	-
2	IML	g	2	2	-	6/8/10/12	-

All (18) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	b	2	IML	CA-N	3.99	1.54	1.47
2	e	2	IML	CA-N	3.98	1.54	1.47
2	a	2	IML	CA-N	3.65	1.53	1.47
2	f	2	IML	CA-N	3.59	1.53	1.47
2	g	2	IML	CA-N	3.23	1.53	1.47
2	a	2	IML	CG2-CB	3.08	1.60	1.53
2	b	2	IML	CG2-CB	2.92	1.60	1.53
2	c	2	IML	CA-N	2.83	1.52	1.47
2	d	2	IML	CG2-CB	2.64	1.59	1.53

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	d	2	IML	CA-N	2.56	1.51	1.47
2	b	2	IML	O-C	2.54	1.30	1.19
2	f	2	IML	CG2-CB	2.49	1.59	1.53
2	g	2	IML	CG2-CB	2.46	1.59	1.53
2	g	2	IML	O-C	2.32	1.29	1.19
2	c	2	IML	CG2-CB	2.29	1.58	1.53
2	e	2	IML	CG2-CB	2.27	1.58	1.53
2	f	2	IML	O-C	2.25	1.28	1.19
2	d	2	IML	O-C	2.15	1.28	1.19

All (13) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	e	2	IML	CB-CA-C	-5.25	105.66	112.82
2	a	2	IML	CB-CA-C	-4.29	106.97	112.82
2	d	2	IML	O-C-CA	-3.66	114.62	124.83
2	g	2	IML	CB-CA-C	-2.88	108.90	112.82
2	e	2	IML	O-C-CA	-2.83	116.93	124.83
2	a	2	IML	O-C-CA	-2.72	117.24	124.83
2	d	2	IML	CB-CA-C	-2.71	109.13	112.82
2	f	2	IML	CB-CA-C	-2.69	109.15	112.82
2	c	2	IML	O-C-CA	-2.69	117.34	124.83
2	a	2	IML	CG2-CB-CG1	2.54	118.19	111.78
2	c	2	IML	CB-CA-C	-2.46	109.47	112.82
2	g	2	IML	CG2-CB-CG1	2.38	117.80	111.78
2	b	2	IML	CG2-CB-CG1	2.31	117.62	111.78

There are no chirality outliers.

All (46) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	a	2	IML	N-CA-CB-CG1
2	a	2	IML	C-CA-CB-CG2
2	a	2	IML	C-CA-CB-CG1
2	a	2	IML	CG2-CB-CG1-CD1
2	b	2	IML	CB-CA-N-CN
2	b	2	IML	N-CA-CB-CG1
2	b	2	IML	C-CA-CB-CG2
2	b	2	IML	C-CA-CB-CG1
2	c	2	IML	N-CA-CB-CG1
2	c	2	IML	C-CA-CB-CG2
2	c	2	IML	C-CA-CB-CG1

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Mol	Chain	Res	Type	Atoms
2	d	2	IML	N-CA-CB-CG1
2	d	2	IML	C-CA-CB-CG2
2	d	2	IML	C-CA-CB-CG1
2	e	2	IML	N-CA-CB-CG2
2	e	2	IML	N-CA-CB-CG1
2	e	2	IML	C-CA-CB-CG2
2	e	2	IML	C-CA-CB-CG1
2	f	2	IML	CB-CA-N-CN
2	f	2	IML	N-CA-CB-CG1
2	f	2	IML	C-CA-CB-CG2
2	f	2	IML	C-CA-CB-CG1
2	g	2	IML	CB-CA-N-CN
2	g	2	IML	O-C-CA-CB
2	g	2	IML	N-CA-CB-CG1
2	g	2	IML	C-CA-CB-CG2
2	g	2	IML	C-CA-CB-CG1
2	c	2	IML	CG2-CB-CG1-CD1
2	a	2	IML	N-CA-CB-CG2
2	b	2	IML	N-CA-CB-CG2
2	d	2	IML	N-CA-CB-CG2
2	f	2	IML	N-CA-CB-CG2
2	g	2	IML	N-CA-CB-CG2
2	d	2	IML	CG2-CB-CG1-CD1
2	c	2	IML	CA-CB-CG1-CD1
2	c	2	IML	N-CA-CB-CG2
2	a	2	IML	CA-CB-CG1-CD1
2	e	2	IML	CG2-CB-CG1-CD1
2	e	2	IML	CA-CB-CG1-CD1
2	b	2	IML	CG2-CB-CG1-CD1
2	a	2	IML	CB-CA-N-CN
2	c	2	IML	CB-CA-N-CN
2	d	2	IML	CB-CA-N-CN
2	e	2	IML	CB-CA-N-CN
2	a	2	IML	O-C-CA-CB
2	e	2	IML	O-C-CA-CB

There are no ring outliers.

No monomer is involved in short contacts.

5.5 Carbohydrates [i](#)

There are no monosaccharides in this entry.

5.6 Ligand geometry

7 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
3	PO4	d	101	-	4,4,4	0.79	0	6,6,6	2.34	3 (50%)
3	PO4	G	301	-	4,4,4	1.10	0	6,6,6	2.17	2 (33%)
3	PO4	b	101	-	4,4,4	0.86	0	6,6,6	1.92	2 (33%)
3	PO4	f	101	-	4,4,4	0.72	0	6,6,6	3.02	3 (50%)
3	PO4	C	301	-	4,4,4	0.88	0	6,6,6	2.25	2 (33%)
3	PO4	E	301	-	4,4,4	0.94	0	6,6,6	1.86	2 (33%)
3	PO4	A	301	-	4,4,4	0.23	0	6,6,6	2.28	3 (50%)

There are no bond length outliers.

All (17) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	f	101	PO4	O4-P-O2	4.13	121.23	107.97
3	A	301	PO4	O4-P-O3	4.01	120.85	107.97
3	G	301	PO4	O3-P-O2	3.96	120.67	107.97
3	f	101	PO4	O3-P-O1	3.93	125.29	110.89
3	f	101	PO4	O2-P-O1	-3.87	96.74	110.89
3	C	301	PO4	O3-P-O2	-3.63	96.33	107.97
3	d	101	PO4	O4-P-O1	-3.17	99.30	110.89
3	b	101	PO4	O4-P-O2	3.13	118.03	107.97
3	G	301	PO4	O4-P-O3	-3.11	97.98	107.97
3	C	301	PO4	O4-P-O3	3.03	117.68	107.97
3	d	101	PO4	O2-P-O1	2.97	121.77	110.89
3	d	101	PO4	O4-P-O3	2.88	117.21	107.97
3	A	301	PO4	O4-P-O1	-2.84	100.50	110.89
3	b	101	PO4	O3-P-O2	-2.83	98.89	107.97
3	E	301	PO4	O4-P-O1	-2.71	100.99	110.89
3	E	301	PO4	O2-P-O1	2.28	119.23	110.89
3	A	301	PO4	O2-P-O1	2.04	118.35	110.89

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

There are no such residues in this entry.

5.8 Polymer linkage issues

There are no chain breaks in this entry.

6 Fit of model and data [i](#)

6.1 Protein, DNA and RNA chains [i](#)

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	179/201 (89%)	-0.43	2 (1%) 80 65	24, 38, 65, 90	0
1	B	179/201 (89%)	-0.38	4 (2%) 62 45	24, 36, 61, 91	0
1	C	179/201 (89%)	-0.51	2 (1%) 80 65	24, 35, 59, 83	0
1	D	179/201 (89%)	-0.35	5 (2%) 53 36	28, 39, 67, 90	0
1	E	179/201 (89%)	-0.43	3 (1%) 70 53	27, 37, 67, 99	0
1	F	179/201 (89%)	-0.40	5 (2%) 53 36	23, 37, 60, 94	0
1	G	179/201 (89%)	-0.52	1 (0%) 89 78	26, 36, 57, 84	0
2	a	2/5 (40%)	0.19	0 100 100	74, 74, 74, 83	0
2	b	2/5 (40%)	-0.34	0 100 100	65, 65, 65, 65	0
2	c	2/5 (40%)	-0.41	0 100 100	65, 65, 65, 68	0
2	d	2/5 (40%)	-0.17	0 100 100	68, 68, 68, 81	0
2	e	2/5 (40%)	0.01	0 100 100	67, 67, 67, 71	0
2	f	2/5 (40%)	0.06	0 100 100	69, 69, 69, 84	0
2	g	2/5 (40%)	-0.16	0 100 100	66, 66, 66, 69	0
All	All	1267/1442 (87%)	-0.43	22 (1%) 70 53	23, 37, 66, 99	0

All (22) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	D	190	PRO	3.2
1	E	67	GLU	3.0
1	E	66	ASP	2.8
1	D	66	ASP	2.7
1	D	189	SER	2.7
1	B	67	GLU	2.7
1	G	66	ASP	2.6
1	B	155	PRO	2.5

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Mol	Chain	Res	Type	RSRZ
1	F	190	PRO	2.5
1	B	190	PRO	2.4
1	B	66	ASP	2.3
1	C	66	ASP	2.3
1	F	66	ASP	2.3
1	F	189	SER	2.2
1	F	67	GLU	2.2
1	F	10	GLY	2.2
1	D	187	GLU	2.2
1	E	190	PRO	2.1
1	D	188	LEU	2.1
1	A	190	PRO	2.1
1	A	9	ASP	2.1
1	C	67	GLU	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	IML	c	2	9/10	0.75	0.28	68,80,100,100	0
2	IML	a	2	9/10	0.80	0.31	74,88,96,99	0
2	IML	f	2	9/10	0.80	0.32	68,80,98,98	0
2	IML	d	2	9/10	0.82	0.31	84,95,120,122	0
2	IML	b	2	9/10	0.85	0.31	65,74,83,84	0
2	IML	g	2	9/10	0.87	0.36	67,79,87,90	0
2	IML	e	2	9/10	0.88	0.30	78,87,101,102	0

6.3 Carbohydrates [i](#)

There are no monosaccharides 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(\AA^2)	Q<0.9
3	PO4	G	301	5/5	0.89	0.20	60,60,89,108	0
3	PO4	C	301	5/5	0.93	0.23	77,80,84,87	0
3	PO4	b	101	5/5	0.93	0.16	65,65,78,88	0
3	PO4	d	101	5/5	0.94	0.15	57,61,83,94	0
3	PO4	f	101	5/5	0.94	0.17	71,72,88,89	0
3	PO4	E	301	5/5	0.95	0.14	61,70,82,82	0
3	PO4	A	301	5/5	0.96	0.16	65,66,83,91	0

6.5 Other polymers [i](#)

There are no such residues in this entry.