



Full wwPDB X-ray Structure Validation Report ⓘ

Oct 19, 2024 – 01:52 PM EDT

PDB ID : 2ZAU
Title : Crystal structure of an N-terminally truncated selenophosphate synthetase from Aquifex aeolicus
Authors : Sekine, S.; Matsumoto, E.; Yokoyama, S.; RIKEN Structural Genomics/Proteomics Initiative (RSGI)
Deposited on : 2007-10-10
Resolution : 2.00 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 : 2022.3.0, CSD as543be (2022)
Xtriage (Phenix) : 1.20.1
EDS : 3.0
Percentile statistics : 20231227.v01 (using entries in the PDB archive December 27th 2023)
CCP4 : 9.0.003 (Gargrove)
Density-Fitness : 1.0.11
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.39

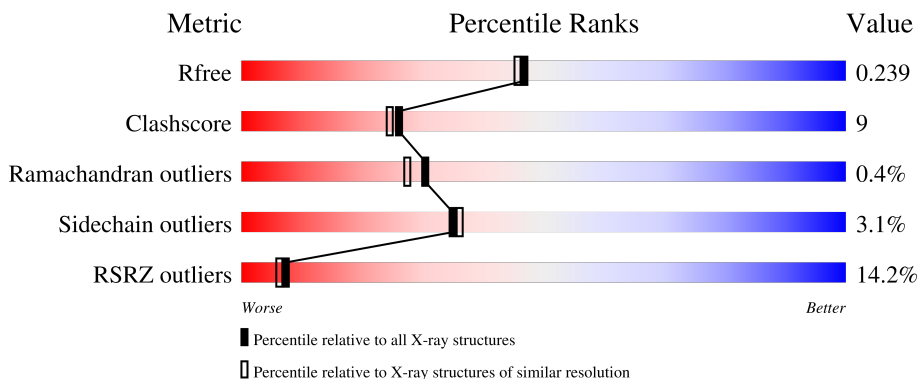
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.00 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}	164625	9409 (2.00-2.00)
Clashscore	180529	10737 (2.00-2.00)
Ramachandran outliers	177936	10628 (2.00-2.00)
Sidechain outliers	177891	10627 (2.00-2.00)
RSRZ outliers	164620	9409 (2.00-2.00)

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	311	
1	B	311	
1	C	311	

2 Entry composition [i](#)

There are 3 unique types of molecules in this entry. The entry contains 7533 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.

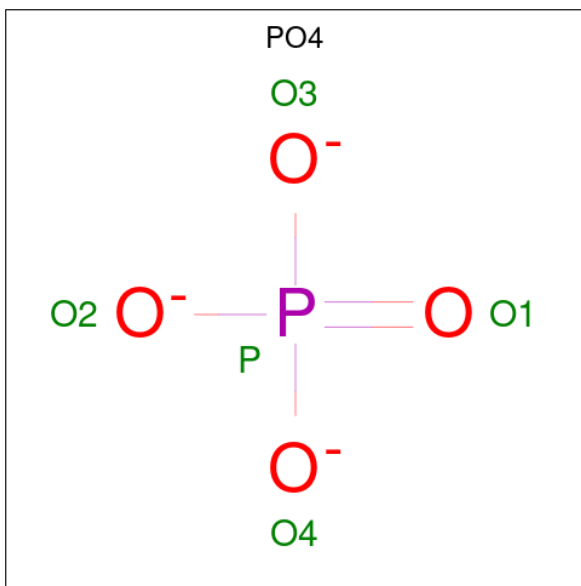
- Molecule 1 is a protein called Selenide, water dikinase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	307	Total 2377	C 1530	N 383	O 456	S 8	0	0	0
1	B	303	Total 2348	C 1513	N 379	O 448	S 8	0	0	0
1	C	304	Total 2352	C 1517	N 380	O 447	S 8	0	0	0

There are 3 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	26	MET	-	initiating methionine	UNP O67139
B	26	MET	-	initiating methionine	UNP O67139
C	26	MET	-	initiating methionine	UNP O67139

- Molecule 2 is PHOSPHATE ION (three-letter code: PO4) (formula: O₄P).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
2	A	1	Total O P 5 4 1	0	0
2	B	1	Total O P 5 4 1	0	0
2	C	1	Total O P 5 4 1	0	0

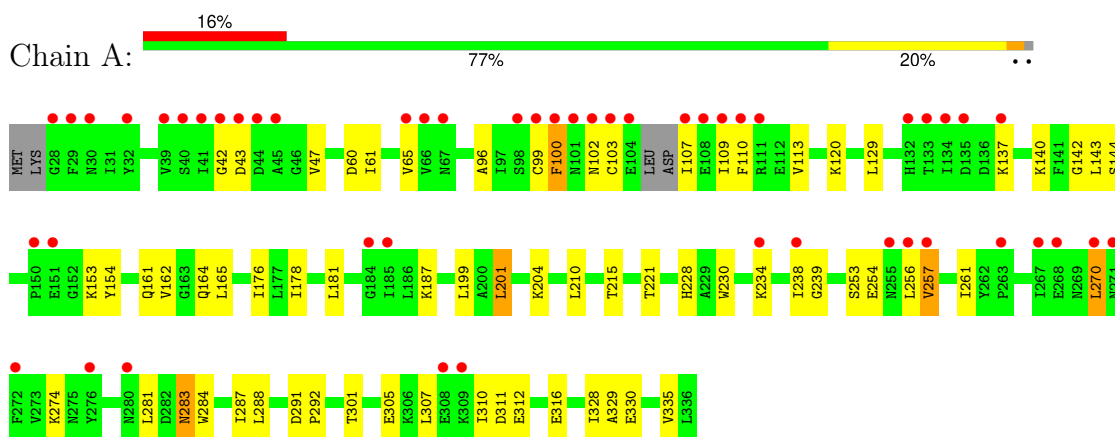
- Molecule 3 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	A	140	Total O 140 140	0	0
3	B	162	Total O 162 162	0	0
3	C	139	Total O 139 139	0	0

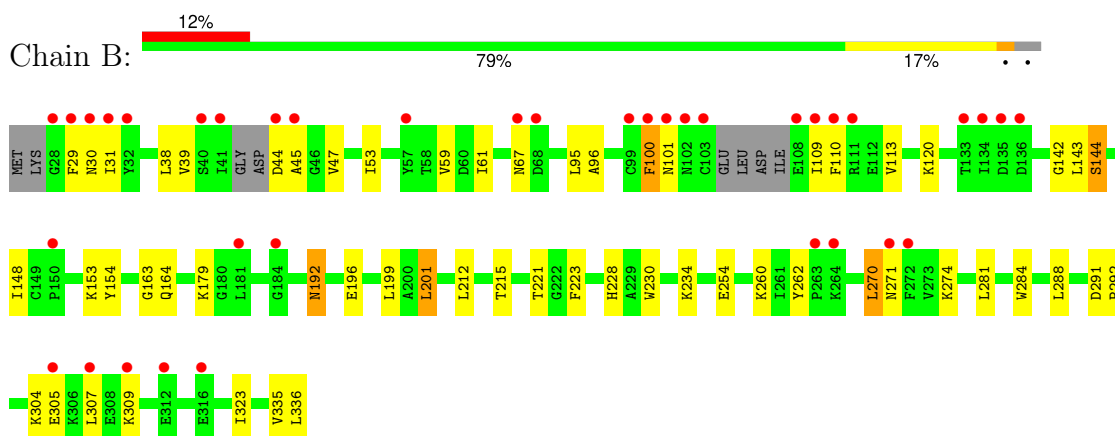
3 Residue-property plots [i](#)

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.

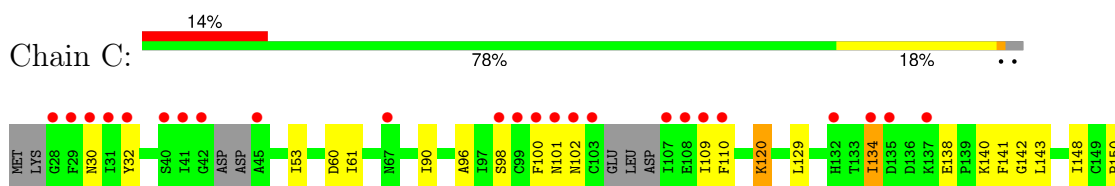
- Molecule 1: Selenide, water dikinase

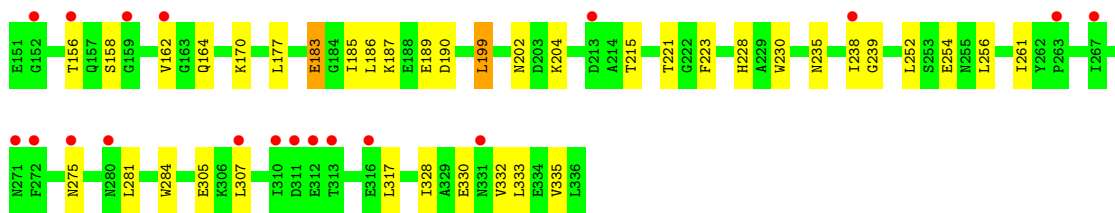


- Molecule 1: Selenide, water dikinase



- Molecule 1: Selenide, water dikinase





4 Data and refinement statistics i

Property	Value	Source
Space group	C 2 2 21	Depositor
Cell constants a, b, c, α , β , γ	93.16Å 165.20Å 167.68Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	46.29 – 2.00 46.29 – 2.00	Depositor EDS
% Data completeness (in resolution range)	93.8 (46.29-2.00) 93.9 (46.29-2.00)	Depositor EDS
R_{merge}	0.10	Depositor
R_{sym}	0.10	Depositor
$\langle I/\sigma(I) \rangle$ ¹	3.42 (at 2.00Å)	Xtrriage
Refinement program	CNS 1.1	Depositor
R, R_{free}	0.212 , 0.239 0.212 , 0.239	Depositor DCC
R_{free} test set	4140 reflections (5.05%)	wwPDB-VP
Wilson B-factor (Å ²)	31.0	Xtrriage
Anisotropy	0.212	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.36 , 52.4	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.33$	Xtrriage
Estimated twinning fraction	0.025 for 1/2*h-1/2*k,-3/2*h-1/2*k,-l 0.025 for 1/2*h+1/2*k,3/2*h-1/2*k,-l	Xtrriage
F_o, F_c correlation	0.95	EDS
Total number of atoms	7533	wwPDB-VP
Average B, all atoms (Å ²)	39.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.90% 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: PO4

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	0.33	0/2417	0.56	1/3277 (0.0%)
1	B	0.34	0/2387	0.58	1/3235 (0.0%)
1	C	0.32	0/2391	0.55	0/3240
All	All	0.33	0/7195	0.56	2/9752 (0.0%)

There are no bond length outliers.

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	144	SER	N-CA-C	-5.98	94.84	111.00
1	A	144	SER	N-CA-C	-5.83	95.25	111.00

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	2377	0	2413	47	0
1	B	2348	0	2388	42	1
1	C	2352	0	2398	44	0
2	A	5	0	0	0	0
2	B	5	0	0	0	0
2	C	5	0	0	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
3	A	140	0	0	2	0
3	B	162	0	0	5	0
3	C	139	0	0	6	0
All	All	7533	0	7199	133	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 9.

All (133) 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:B:144:SER:HB3	3:B:1412:HOH:O	1.56	1.05
1:B:95:LEU:HB2	3:B:1412:HOH:O	1.68	0.92
1:A:162:VAL:HG22	1:A:238:ILE:HD11	1.53	0.89
1:C:134:ILE:H	1:C:134:ILE:HD13	1.49	0.78
1:B:44:ASP:HB3	1:B:59:VAL:HG21	1.67	0.75
1:A:254:GLU:HG3	1:A:284:TRP:CZ3	2.27	0.70
1:A:238:ILE:HG13	1:A:328:ILE:O	1.93	0.68
1:A:253:SER:O	1:A:257:VAL:HG22	1.95	0.66
1:A:312:GLU:O	1:A:316:GLU:HG3	1.96	0.66
1:A:176:ILE:HD13	1:A:257:VAL:HG13	1.76	0.66
1:C:330:GLU:HG2	1:C:332:VAL:HG22	1.80	0.63
1:C:221:THR:HG21	3:C:1027:HOH:O	1.99	0.61
1:C:223:PHE:HB2	1:C:228:HIS:CE1	2.36	0.61
1:A:120:LYS:HD2	1:A:201:LEU:HD13	1.83	0.61
1:B:221:THR:H	1:B:228:HIS:CE1	2.19	0.60
1:B:254:GLU:HG3	1:B:284:TRP:CZ3	2.38	0.59
1:C:183:GLU:HB3	1:C:185:ILE:HG13	1.84	0.59
1:A:47:VAL:HG21	1:A:154:TYR:OH	2.03	0.59
1:A:162:VAL:CG2	1:A:238:ILE:HD11	2.30	0.58
1:A:270:LEU:O	1:A:274:LYS:HG2	2.04	0.58
1:C:162:VAL:HB	1:C:238:ILE:HD11	1.86	0.58
1:B:120:LYS:HD2	1:B:201:LEU:HD13	1.86	0.57
1:A:176:ILE:CD1	1:A:257:VAL:HG13	2.34	0.57
1:A:161:GLN:HG2	3:A:1274:HOH:O	2.04	0.57
1:C:156:THR:HG23	1:C:158:SER:H	1.69	0.57
1:C:185:ILE:HD13	1:C:261:ILE:HD13	1.87	0.57
1:A:238:ILE:HG13	1:A:239:GLY:H	1.68	0.56
1:A:153:LYS:HD3	1:A:210:LEU:HD22	1.87	0.56
1:B:53:ILE:HD11	1:B:148:ILE:HG23	1.87	0.55
1:C:177:LEU:HD21	1:C:252:LEU:HB3	1.87	0.55

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:153:LYS:HB3	3:B:1387:HOH:O	2.06	0.55
1:B:53:ILE:HD11	1:B:148:ILE:CG2	2.36	0.55
1:C:238:ILE:HG13	1:C:239:GLY:H	1.70	0.55
1:A:238:ILE:HD11	1:A:329:ALA:HA	1.89	0.54
1:B:192:ASN:O	1:B:196:GLU:HG3	2.07	0.54
1:C:223:PHE:H	1:C:228:HIS:HE1	1.55	0.54
1:A:61:ILE:HA	1:A:142:GLY:HA3	1.89	0.54
1:C:238:ILE:HG13	1:C:328:ILE:O	2.08	0.53
1:B:260:LYS:H	1:B:260:LYS:HE2	1.74	0.53
1:A:65:VAL:HG13	1:A:178:ILE:CD1	2.40	0.52
1:A:65:VAL:HG13	1:A:178:ILE:HD13	1.92	0.52
1:B:305:GLU:H	1:B:305:GLU:CD	2.13	0.52
1:B:45:ALA:HB2	3:B:1383:HOH:O	2.09	0.51
1:A:270:LEU:HD22	1:A:274:LYS:HD3	1.92	0.51
1:A:239:GLY:HA3	1:A:330:GLU:O	2.10	0.51
1:B:192:ASN:H	1:B:192:ASN:HD22	1.58	0.51
1:B:29:PHE:CZ	1:B:31:ILE:HD11	2.46	0.51
1:C:158:SER:HB3	1:C:235:ASN:HB3	1.91	0.51
1:C:134:ILE:H	1:C:134:ILE:CD1	2.23	0.50
1:C:53:ILE:HD12	3:C:1399:HOH:O	2.12	0.50
1:C:90:ILE:HD12	1:C:150:PRO:HG2	1.94	0.50
1:A:102:ASN:O	1:A:137:LYS:HA	2.12	0.49
1:B:44:ASP:HB3	1:B:59:VAL:CG2	2.38	0.49
1:C:138:GLU:HB3	1:C:140:LYS:NZ	2.28	0.49
1:B:29:PHE:O	1:B:30:ASN:ND2	2.43	0.49
1:B:223:PHE:H	1:B:228:HIS:CE1	2.31	0.49
1:A:140:LYS:NZ	1:A:140:LYS:HB2	2.28	0.48
1:B:260:LYS:HE2	1:B:260:LYS:N	2.27	0.48
1:C:156:THR:HG22	3:C:1340:HOH:O	2.12	0.48
1:C:185:ILE:CD1	1:C:261:ILE:HD13	2.43	0.48
1:A:230:TRP:HE1	1:A:234:LYS:HD3	1.77	0.48
1:A:164:GLN:HE22	1:A:215:THR:CG2	2.26	0.48
1:C:61:ILE:HA	1:C:142:GLY:HA3	1.96	0.48
1:B:61:ILE:HA	1:B:142:GLY:HA3	1.96	0.47
1:B:179:LYS:HD2	1:B:262:TYR:C	2.35	0.47
1:B:230:TRP:NE1	1:B:234:LYS:HD3	2.29	0.47
1:C:187:LYS:HG2	1:C:190:ASP:OD2	2.15	0.47
1:C:228:HIS:HD2	3:C:1343:HOH:O	1.97	0.46
1:C:96:ALA:HA	1:C:143:LEU:HD23	1.98	0.46
1:A:109:ILE:HG13	1:A:110:PHE:N	2.31	0.46
1:B:95:LEU:HD12	3:B:1412:HOH:O	2.16	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:170:LYS:HE3	1:C:202:ASN:OD1	2.16	0.46
1:B:212:LEU:HD23	1:B:309:LYS:HE3	1.97	0.46
1:C:186:LEU:HD11	1:C:256:LEU:HD11	1.96	0.46
1:A:99:CYS:O	1:A:100:PHE:O	2.34	0.46
1:A:281:LEU:HD12	1:A:335:VAL:HG12	1.98	0.46
1:B:307:LEU:HD11	1:B:323:ILE:CD1	2.46	0.46
1:A:283:ASN:O	1:A:287:ILE:HG12	2.16	0.45
1:C:238:ILE:HG23	1:C:239:GLY:N	2.30	0.45
1:A:305:GLU:H	1:A:305:GLU:CD	2.19	0.45
1:B:223:PHE:H	1:B:228:HIS:HE1	1.62	0.45
1:C:199:LEU:HG	3:C:1128:HOH:O	2.16	0.45
1:A:204:LYS:HE2	3:A:1192:HOH:O	2.17	0.45
1:A:270:LEU:HD12	1:A:287:ILE:HD13	1.99	0.45
1:B:100:PHE:O	1:B:101:ASN:HB3	2.17	0.45
1:C:254:GLU:HG3	1:C:284:TRP:CZ3	2.51	0.45
1:B:270:LEU:O	1:B:274:LYS:HG3	2.17	0.44
1:C:98:SER:HB3	1:C:141:PHE:HD1	1.81	0.44
1:A:310:ILE:HG23	1:A:311:ASP:N	2.32	0.44
1:C:230:TRP:HB2	1:C:333:LEU:HD11	1.99	0.44
1:B:164:GLN:HE22	1:B:215:THR:CG2	2.29	0.44
1:C:30:ASN:HB3	1:C:32:TYR:CE1	2.53	0.44
1:B:47:VAL:HG21	1:B:154:TYR:OH	2.18	0.44
1:C:221:THR:H	1:C:228:HIS:CE1	2.34	0.44
1:C:164:GLN:HE22	1:C:215:THR:CG2	2.30	0.44
1:B:230:TRP:HE1	1:B:234:LYS:HD3	1.83	0.44
1:C:100:PHE:C	1:C:102:ASN:H	2.20	0.44
1:A:256:LEU:HB3	1:A:261:ILE:HB	1.99	0.43
1:A:281:LEU:CD1	1:A:335:VAL:HG12	2.48	0.43
1:A:230:TRP:NE1	1:A:234:LYS:HD3	2.34	0.43
1:C:164:GLN:HE22	1:C:215:THR:HG21	1.84	0.43
1:C:187:LYS:HD2	1:C:189:GLU:HB2	2.00	0.43
1:A:96:ALA:HA	1:A:143:LEU:HD23	2.01	0.43
1:A:162:VAL:HG22	1:A:238:ILE:CD1	2.36	0.43
1:B:109:ILE:HG13	1:B:110:PHE:N	2.34	0.42
1:B:109:ILE:O	1:B:113:VAL:HG23	2.18	0.42
1:B:38:LEU:HD23	1:B:39:VAL:N	2.34	0.42
1:B:291:ASP:HA	1:B:292:PRO:HD3	1.90	0.42
1:A:187:LYS:HB2	1:A:187:LYS:NZ	2.34	0.42
1:B:223:PHE:HB2	1:B:228:HIS:CE1	2.54	0.42
1:C:281:LEU:HD12	1:C:335:VAL:HG12	2.02	0.42
1:B:291:ASP:OD2	1:B:292:PRO:HD2	2.20	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:100:PHE:C	1:A:102:ASN:H	2.23	0.41
1:C:177:LEU:CD2	1:C:252:LEU:HB3	2.50	0.41
1:A:221:THR:H	1:A:228:HIS:CD2	2.38	0.41
1:B:163:GLY:O	1:B:304:LYS:HE2	2.20	0.41
1:C:120:LYS:HA	1:C:120:LYS:HE2	2.01	0.41
1:C:109:ILE:HG13	1:C:110:PHE:N	2.36	0.41
1:B:336:LEU:HD23	1:B:336:LEU:N	2.35	0.41
1:A:291:ASP:HA	1:A:292:PRO:HD3	1.96	0.41
1:B:96:ALA:HA	1:B:143:LEU:HD23	2.03	0.41
1:C:275:ASN:ND2	3:C:1359:HOH:O	2.53	0.41
1:A:165:LEU:O	1:A:301:THR:HA	2.21	0.41
1:A:165:LEU:HD11	1:A:307:LEU:HD11	2.03	0.41
1:C:204:LYS:HD3	1:C:317:LEU:O	2.21	0.41
1:C:305:GLU:OE2	1:C:305:GLU:N	2.52	0.41
1:A:61:ILE:HG22	1:A:142:GLY:HA3	2.03	0.40
1:A:238:ILE:HD12	1:A:238:ILE:HA	1.89	0.40
1:C:148:ILE:O	1:C:150:PRO:HD3	2.20	0.40
1:A:109:ILE:O	1:A:113:VAL:HG23	2.21	0.40
1:A:107:ILE:O	1:A:107:ILE:HG22	2.21	0.40
1:B:234:LYS:HB2	1:B:234:LYS:NZ	2.37	0.40
1:B:281:LEU:HD12	1:B:335:VAL:HG12	2.04	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:B:271:ASN:OD1	1:B:271:ASN:OD1[4_576]	1.75	0.45

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	303/311 (97%)	292 (96%)	8 (3%)	3 (1%)	13	8
1	B	297/311 (96%)	286 (96%)	10 (3%)	1 (0%)	37	35
1	C	298/311 (96%)	287 (96%)	11 (4%)	0	100	100
All	All	898/933 (96%)	865 (96%)	29 (3%)	4 (0%)	30	27

All (4) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	43	ASP
1	A	100	PHE
1	B	100	PHE
1	A	42	GLY

5.3.2 Protein sidechains [i](#)

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

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

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	259/263 (98%)	249 (96%)	10 (4%)	27	27
1	B	256/263 (97%)	250 (98%)	6 (2%)	45	49
1	C	256/263 (97%)	248 (97%)	8 (3%)	35	36
All	All	771/789 (98%)	747 (97%)	24 (3%)	35	36

All (24) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	60	ASP
1	A	103	CYS
1	A	129	LEU
1	A	181	LEU
1	A	199	LEU
1	A	201	LEU
1	A	257	VAL
1	A	270	LEU
1	A	283	ASN

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Mol	Chain	Res	Type
1	A	288	LEU
1	B	67	ASN
1	B	192	ASN
1	B	199	LEU
1	B	201	LEU
1	B	270	LEU
1	B	288	LEU
1	C	60	ASP
1	C	101	ASN
1	C	120	LYS
1	C	129	LEU
1	C	134	ILE
1	C	183	GLU
1	C	199	LEU
1	C	307	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (11) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	161	GLN
1	B	30	ASN
1	B	102	ASN
1	B	192	ASN
1	B	228	HIS
1	B	231	ASN
1	B	271	ASN
1	B	331	ASN
1	C	192	ASN
1	C	228	HIS
1	C	331	ASN

5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

3 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
2	PO4	B	903	-	4,4,4	2.00	3 (75%)	6,6,6	0.49	0
2	PO4	A	902	-	4,4,4	1.80	3 (75%)	6,6,6	0.46	0
2	PO4	C	901	-	4,4,4	1.75	1 (25%)	6,6,6	0.48	0

All (7) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	903	PO4	P-O2	-2.29	1.48	1.54
2	B	903	PO4	P-O4	-2.15	1.48	1.54
2	B	903	PO4	P-O3	-2.07	1.48	1.54
2	A	902	PO4	P-O2	-2.03	1.48	1.54
2	A	902	PO4	P-O3	-2.03	1.48	1.54
2	A	902	PO4	P-O4	-2.02	1.48	1.54
2	C	901	PO4	P-O4	-2.01	1.48	1.54

There are no bond angle outliers.

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

No monomer is involved in short contacts.

5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

6 Fit of model and data

6.1 Protein, DNA and RNA chains

In the following table, the column labelled ‘#RSRZ > 2’ contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 95th percentile and maximum values of the occupancy-weighted average B-factor per residue. The column labelled ‘Q < 0.9’ lists the number of (and percentage) of residues with an average occupancy less than 0.9.

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å ²)	Q<0.9
1	A	307/311 (98%)	0.73	50 (16%) 5 5	21, 35, 67, 95	0
1	B	303/311 (97%)	0.46	37 (12%) 10 8	18, 33, 56, 78	0
1	C	304/311 (97%)	0.80	43 (14%) 7 6	21, 37, 65, 91	0
All	All	914/933 (97%)	0.66	130 (14%) 7 6	18, 35, 65, 95	0

All (130) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	107	ILE	8.4
1	C	100	PHE	7.0
1	C	107	ILE	6.8
1	B	100	PHE	6.4
1	C	99	CYS	6.3
1	B	109	ILE	6.1
1	C	103	CYS	6.0
1	A	99	CYS	5.4
1	C	28	GLY	5.4
1	A	100	PHE	5.2
1	A	272	PHE	5.1
1	A	28	GLY	5.1
1	B	45	ALA	4.9
1	A	134	ILE	4.5
1	A	41	ILE	4.2
1	C	41	ILE	4.2
1	B	135	ASP	4.1
1	C	271	ASN	4.0
1	C	267	ILE	4.0
1	A	42	GLY	4.0
1	A	267	ILE	3.9
1	B	99	CYS	3.9
1	C	272	PHE	3.8

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Mol	Chain	Res	Type	RSRZ
1	A	30	ASN	3.7
1	A	102	ASN	3.7
1	C	109	ILE	3.7
1	B	101	ASN	3.7
1	B	271	ASN	3.6
1	C	134	ILE	3.6
1	B	41	ILE	3.5
1	A	110	PHE	3.5
1	A	109	ILE	3.5
1	C	110	PHE	3.4
1	A	255	ASN	3.4
1	C	316	GLU	3.4
1	A	29	PHE	3.3
1	C	67	ASN	3.3
1	C	40	SER	3.3
1	C	45	ALA	3.3
1	A	238	ILE	3.2
1	A	66	VAL	3.2
1	B	103	CYS	3.2
1	C	312	GLU	3.2
1	B	110	PHE	3.2
1	B	28	GLY	3.2
1	C	238	ILE	3.2
1	A	104	GLU	3.1
1	B	184	GLY	3.1
1	A	45	ALA	3.1
1	C	135	ASP	3.1
1	B	31	ILE	3.0
1	A	263	PRO	3.0
1	B	67	ASN	3.0
1	C	101	ASN	3.0
1	A	101	ASN	2.9
1	A	270	LEU	2.9
1	B	44	ASP	2.9
1	B	272	PHE	2.9
1	A	67	ASN	2.9
1	A	108	GLU	2.9
1	B	316	GLU	2.9
1	C	98	SER	2.8
1	A	44	ASP	2.8
1	C	102	ASN	2.8
1	C	42	GLY	2.8

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Mol	Chain	Res	Type	RSRZ
1	A	111	ARG	2.8
1	C	137	LYS	2.7
1	B	263	PRO	2.7
1	B	108	GLU	2.7
1	A	40	SER	2.7
1	C	30	ASN	2.7
1	A	43	ASP	2.7
1	B	32	TYR	2.7
1	A	185	ILE	2.7
1	C	310	ILE	2.7
1	A	271	ASN	2.6
1	B	307	LEU	2.6
1	A	133	THR	2.6
1	C	31	ILE	2.6
1	C	263	PRO	2.6
1	C	162	VAL	2.6
1	A	98	SER	2.6
1	B	181	LEU	2.6
1	C	311	ASP	2.5
1	B	102	ASN	2.5
1	B	111	ARG	2.5
1	A	103	CYS	2.5
1	A	184	GLY	2.5
1	A	257	VAL	2.5
1	C	156	THR	2.5
1	C	331	ASN	2.5
1	C	108	GLU	2.4
1	B	264	LYS	2.4
1	A	135	ASP	2.4
1	B	305	GLU	2.4
1	A	308	GLU	2.4
1	C	132	HIS	2.4
1	A	132	HIS	2.3
1	A	65	VAL	2.3
1	B	312	GLU	2.3
1	B	134	ILE	2.3
1	A	234	LYS	2.3
1	B	309	LYS	2.3
1	C	280	ASN	2.3
1	C	159	GLY	2.3
1	B	133	THR	2.3
1	C	152	GLY	2.3

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Mol	Chain	Res	Type	RSRZ
1	A	280	ASN	2.3
1	C	275	ASN	2.3
1	A	309	LYS	2.2
1	A	32	TYR	2.2
1	A	151	GLU	2.2
1	C	32	TYR	2.2
1	B	136	ASP	2.2
1	B	30	ASN	2.2
1	C	29	PHE	2.2
1	A	256	LEU	2.1
1	C	307	LEU	2.1
1	A	137	LYS	2.1
1	C	213	ASP	2.1
1	B	68	ASP	2.1
1	A	150	PRO	2.1
1	A	39	VAL	2.1
1	B	150	PRO	2.1
1	A	276	TYR	2.1
1	B	57	TYR	2.1
1	B	40	SER	2.1
1	C	313	THR	2.1
1	B	29	PHE	2.0
1	A	268	GLU	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 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.

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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(\AA^2)	Q<0.9
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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(\AA^2)	Q<0.9
2	PO4	B	903	5/5	0.83	0.17	60,62,64,64	0
2	PO4	C	901	5/5	0.93	0.11	50,51,54,54	0
2	PO4	A	902	5/5	0.95	0.10	54,55,57,57	0

6.5 Other polymers [i](#)

There are no such residues in this entry.