



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 5, 2026 – 08:26 PM UTC

PDB ID : 1PII / pdb_00001pii
Title : THREE-DIMENSIONAL STRUCTURE OF THE BIFUNCTIONAL ENZYME PHOSPHORIBOSYLANTHRANILATE ISOMERASE: INDOLE GLYCEROLPHOSPHATE SYNTHASE FROM ESCHERICHIA COLI REFINED AT 2.0 ANGSTROMS RESOLUTION
Authors : Wilmanns, M.; Priestle, J.P.; Jansonius, J.N.
Deposited on : 1991-06-21
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	:	4-5-2 with Phenix2.0
Mogul	:	2022.3.0, CSD as543be (2022)
Xtriage (Phenix)	:	NOT EXECUTED
EDS	:	NOT EXECUTED
Percentile statistics	:	20250101.v01 (using entries in the PDB archive January 1st 2025)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.49

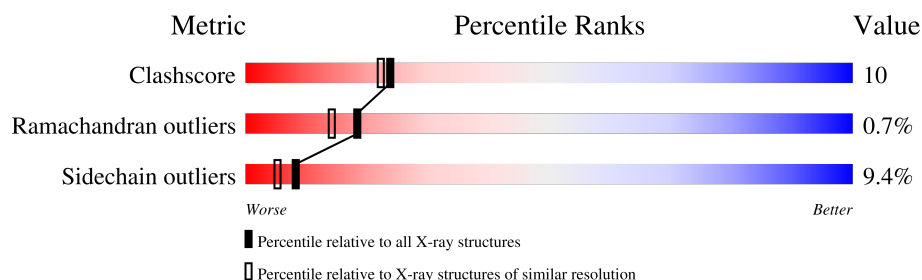
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.00 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))
Clashscore	190562	11152 (2.00-2.00)
Ramachandran outliers	187476	11031 (2.00-2.00)
Sidechain outliers	187428	11029 (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 $\leq 5\%$.

Note EDS was not executed.

Mol	Chain	Length	Quality of chain
1	A	452	 66% 27% . .

2 Entry composition [i](#)

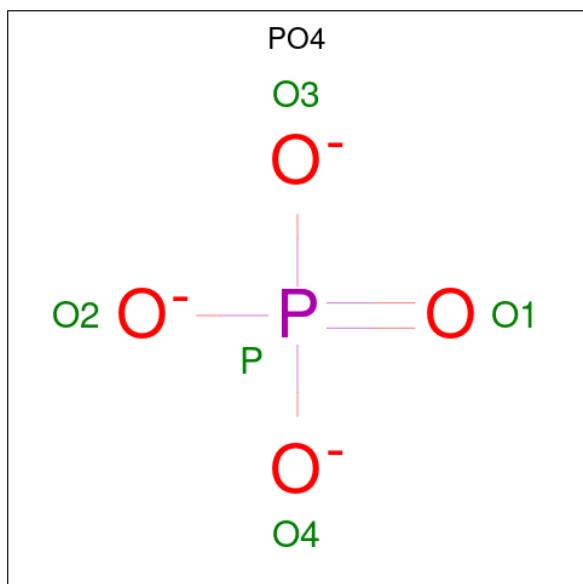
There are 3 unique types of molecules in this entry. The entry contains 4162 atoms, of which 0 are hydrogens and 0 are deuteriums.

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 N-(5'PHOSPHORIBOSYL)ANTHRANILATE ISOMERASE.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	452	Total	C	N	O	S	0	5	0
			3524	2225	621	665	13			

- Molecule 2 is PHOSPHATE ION (CCD ID: PO4) (formula: O₄P).



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

- Molecule 3 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	628	Total	O	8	0
			628	628		

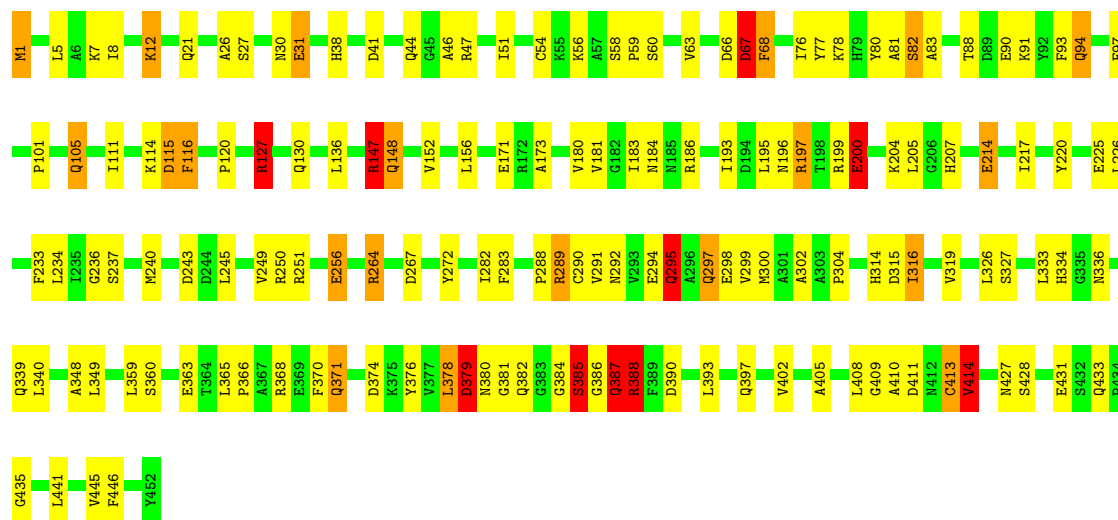
3 Residue-property plots

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. 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. 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.

Note EDS was not executed.

• Molecule 1: N-(5'PHOSPHORIBOSYL)ANTHRANILATE ISOMERASE

Chain A: 



4 Data and refinement statistics

Xtriage (Phenix) and EDS were not executed - this section is therefore incomplete.

Property	Value	Source
Space group	P 41	Depositor
Cell constants a, b, c, α , β , γ	104.70Å 104.70Å 68.00Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	15.00 – 2.00	Depositor
% Data completeness (in resolution range)	(Not available) (15.00-2.00)	Depositor
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
Refinement program	TNT, X-PLOR	Depositor
R, R_{free}	0.173 , (Not available)	Depositor
Estimated twinning fraction	No twinning to report.	Xtriage
Total number of atoms	4162	wwPDB-VP
Average B, all atoms (Å ²)	24.0	wwPDB-VP

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	1.00	5/3587 (0.1%)	2.10	107/4863 (2.2%)

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
1	A	0	1

All (5) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	147	ARG	CD-NE	6.00	1.54	1.46
1	A	147	ARG	CA-CB	5.92	1.62	1.53
1	A	147	ARG	NE-CZ	5.25	1.38	1.33
1	A	148[A]	GLN	C-O	5.13	1.29	1.24
1	A	148[B]	GLN	C-O	5.13	1.29	1.24

All (107) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	385	SER	N-CA-C	-16.13	90.37	112.30
1	A	387	GLN	N-CA-C	14.14	134.32	108.17
1	A	66	ASP	CA-C-N	12.07	144.60	121.54
1	A	66	ASP	C-N-CA	12.07	144.60	121.54
1	A	365	LEU	CB-CA-C	-11.77	91.55	109.08
1	A	388	ARG	N-CA-C	11.70	135.72	110.80
1	A	386	GLY	CA-C-N	11.68	142.88	122.32
1	A	386	GLY	C-N-CA	11.68	142.88	122.32

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	68	PHE	N-CA-C	10.95	127.27	107.99
1	A	59	PRO	CA-C-N	-10.06	106.90	122.49
1	A	59	PRO	C-N-CA	-10.06	106.90	122.49
1	A	414	VAL	N-CA-CB	9.54	120.63	110.62
1	A	115	ASP	CA-CB-CG	9.41	122.01	112.60
1	A	380	ASN	N-CA-C	-9.32	89.26	107.62
1	A	387	GLN	CA-C-N	9.31	139.32	121.54
1	A	387	GLN	C-N-CA	9.31	139.32	121.54
1	A	46	ALA	CA-C-N	9.29	134.78	120.75
1	A	46	ALA	C-N-CA	9.29	134.78	120.75
1	A	67	ASP	CA-CB-CG	9.09	121.69	112.60
1	A	233	PHE	CA-CB-CG	-8.30	105.50	113.80
1	A	297	GLN	CB-CG-CD	8.30	126.70	112.60
1	A	80	TYR	CB-CA-C	-8.26	98.50	109.16
1	A	41	ASP	CA-CB-CG	-8.25	104.35	112.60
1	A	116	PHE	CA-CB-CG	-8.20	105.60	113.80
1	A	200	GLU	CB-CG-CD	7.89	126.01	112.60
1	A	446	PHE	CA-CB-CG	-7.57	106.23	113.80
1	A	348	ALA	N-CA-C	7.50	122.72	112.90
1	A	38	HIS	CA-CB-CG	-7.25	106.55	113.80
1	A	363	GLU	N-CA-CB	7.23	122.18	110.40
1	A	384	GLY	N-CA-C	-7.18	96.17	113.18
1	A	243	ASP	CA-CB-CG	7.07	119.67	112.60
1	A	295	GLN	CB-CA-C	7.04	122.47	110.79
1	A	387	GLN	N-CA-CB	-7.02	100.49	110.46
1	A	360	SER	CB-CA-C	7.02	121.28	109.48
1	A	58	SER	CA-C-N	-6.97	112.52	120.04
1	A	58	SER	C-N-CA	-6.97	112.52	120.04
1	A	381	GLY	N-CA-C	6.89	125.08	112.27
1	A	365	LEU	CA-C-N	-6.82	113.28	120.03
1	A	365	LEU	C-N-CA	-6.82	113.28	120.03
1	A	205	LEU	N-CA-CB	6.80	120.12	110.12
1	A	380	ASN	CA-CB-CG	6.74	119.34	112.60
1	A	319	VAL	N-CA-C	-6.73	103.96	110.42
1	A	289	ARG	CD-NE-CZ	6.70	133.78	124.40
1	A	180	VAL	CA-C-N	-6.69	114.89	123.19
1	A	180	VAL	C-N-CA	-6.69	114.89	123.19
1	A	127	ARG	CD-NE-CZ	-6.66	115.07	124.40
1	A	67	ASP	CB-CA-C	6.64	123.64	110.42
1	A	63	VAL	N-CA-CB	6.57	118.04	110.49
1	A	413	CYS	N-CA-CB	-6.55	100.48	110.12
1	A	371	GLN	CA-CB-CG	6.49	127.08	114.10

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	288	PRO	N-CA-C	-6.45	105.80	113.86
1	A	292	ASN	N-CA-CB	6.44	120.39	110.60
1	A	181	VAL	CA-C-N	-6.42	116.76	122.73
1	A	181	VAL	C-N-CA	-6.42	116.76	122.73
1	A	115	ASP	CA-C-O	-6.42	114.25	121.25
1	A	97	PHE	CA-CB-CG	-6.41	107.39	113.80
1	A	30	ASN	CA-CB-CG	-6.28	106.32	112.60
1	A	283	PHE	CA-C-N	-6.14	114.69	122.43
1	A	283	PHE	C-N-CA	-6.14	114.69	122.43
1	A	435	GLY	CA-C-N	-6.13	114.95	123.10
1	A	435	GLY	C-N-CA	-6.13	114.95	123.10
1	A	299	VAL	CA-C-O	6.11	127.33	120.85
1	A	82	SER	N-CA-C	-6.08	104.93	112.90
1	A	93	PHE	CA-C-N	-6.02	113.45	122.07
1	A	93	PHE	C-N-CA	-6.02	113.45	122.07
1	A	297	GLN	N-CA-CB	6.01	119.48	110.22
1	A	382	GLN	N-CA-C	-6.00	103.12	111.52
1	A	316	ILE	N-CA-C	5.97	116.63	110.36
1	A	374	ASP	CA-CB-CG	-5.97	106.63	112.60
1	A	173	ALA	N-CA-CB	5.93	118.83	110.12
1	A	207	HIS	CA-CB-CG	5.92	119.72	113.80
1	A	207	HIS	N-CA-CB	5.87	120.31	110.32
1	A	47	ARG	CA-CB-CG	5.84	125.79	114.10
1	A	381	GLY	O-C-N	5.84	128.24	122.92
1	A	199	ARG	NE-CZ-NH1	-5.81	115.69	121.50
1	A	94	GLN	CA-C-N	-5.66	117.39	122.43
1	A	94	GLN	C-N-CA	-5.66	117.39	122.43
1	A	370[A]	PHE	N-CA-C	5.65	118.21	110.24
1	A	370[B]	PHE	N-CA-C	5.65	118.21	110.24
1	A	8	ILE	CB-CA-C	-5.60	104.49	112.22
1	A	411	ASP	CA-CB-CG	5.52	118.12	112.60
1	A	47	ARG	CB-CA-C	-5.49	99.80	109.62
1	A	220	TYR	O-C-N	-5.46	116.34	122.12
1	A	41	ASP	CA-C-O	-5.44	114.66	120.42
1	A	183	ILE	CA-C-N	-5.42	115.22	122.42
1	A	183	ILE	C-N-CA	-5.42	115.22	122.42
1	A	297	GLN	CB-CA-C	5.41	120.64	110.63
1	A	81	ALA	N-CA-C	5.37	117.80	110.55
1	A	41	ASP	N-CA-C	5.35	117.19	111.36
1	A	349	LEU	CB-CA-C	-5.33	101.42	109.26
1	A	197[A]	ARG	CA-C-O	5.27	126.14	120.55
1	A	197[B]	ARG	CA-C-O	5.27	126.14	120.55

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	379	ASP	CA-C-O	-5.22	115.72	121.31
1	A	80	TYR	O-C-N	5.22	128.06	121.64
1	A	314	HIS	ND1-CG-CD2	5.15	111.25	106.10
1	A	94	GLN	CA-CB-CG	-5.13	103.83	114.10
1	A	120	PRO	N-CA-CB	5.13	108.93	103.39
1	A	289	ARG	NE-CZ-NH1	5.12	126.62	121.50
1	A	68	PHE	CA-CB-CG	5.12	118.92	113.80
1	A	91	LYS	N-CA-C	5.12	116.55	111.07
1	A	111	ILE	CB-CA-C	-5.11	103.50	110.96
1	A	105	GLN	CA-C-N	-5.09	116.34	122.35
1	A	105	GLN	C-N-CA	-5.09	116.34	122.35
1	A	60	SER	CA-CB-OG	-5.08	100.95	111.10
1	A	339	GLN	N-CA-C	5.06	117.45	111.33
1	A	256	GLU	CB-CG-CD	-5.02	104.07	112.60
1	A	249	VAL	N-CA-CB	5.02	116.09	110.62

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	197[A]	ARG	Sidechain

5.2 Too-close contacts ⓘ

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	3524	0	3503	71	0
2	A	10	0	0	2	0
3	A	628	0	0	21	0
All	All	4162	0	3503	71	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 10.

All (71) 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:186:ARG:NH2	1:A:193:ILE:HD11	1.76	1.01
1:A:147:ARG:HH11	1:A:147:ARG:HG2	1.44	0.82
1:A:101:PRO:O	1:A:105:GLN:HG2	1.84	0.78
1:A:414:VAL:HG23	3:A:953:HOH:O	1.88	0.74
1:A:300:MET:HE1	1:A:326:LEU:O	1.90	0.72
1:A:186:ARG:CZ	1:A:193:ILE:HD11	2.19	0.71
1:A:295:GLN:HG2	3:A:663:HOH:O	1.93	0.67
1:A:31:GLU:HG3	3:A:908:HOH:O	1.92	0.67
1:A:289:ARG:NH1	1:A:431:GLU:OE1	2.31	0.64
1:A:184:ASN:HA	1:A:214:GLU:HG3	1.81	0.62
1:A:27:SER:HB3	3:A:646:HOH:O	1.99	0.62
1:A:76:ILE:HD13	1:A:245:LEU:HB3	1.81	0.61
1:A:67:ASP:HA	3:A:834:HOH:O	2.00	0.61
1:A:304:PRO:HB2	3:A:562:HOH:O	1.99	0.60
1:A:147:ARG:HG2	1:A:147:ARG:NH1	2.15	0.58
1:A:371:GLN:OE1	3:A:467:HOH:O	2.18	0.56
1:A:359:LEU:HB3	1:A:366:PRO:HG3	1.86	0.56
1:A:378:LEU:HD22	1:A:402:VAL:HG11	1.88	0.56
1:A:264:ARG:HD3	1:A:267:ASP:OD2	2.05	0.56
1:A:379:ASP:HB3	1:A:405:ALA:HB3	1.89	0.55
1:A:371:GLN:HG3	3:A:1042:HOH:O	2.06	0.55
1:A:368:ARG:NH2	1:A:397:GLN:HB3	2.22	0.55
1:A:433:GLN:NE2	3:A:764:HOH:O	2.40	0.54
1:A:379:ASP:CB	1:A:405:ALA:HB3	2.37	0.54
1:A:171:GLU:HG2	3:A:784:HOH:O	2.08	0.54
1:A:148[B]:GLN:O	1:A:152:VAL:HG23	2.08	0.54
1:A:237:SER:OG	2:A:453:PO4:O2	2.11	0.53
1:A:186:ARG:HH22	1:A:193:ILE:HD11	1.70	0.52
1:A:433:GLN:HG2	3:A:967:HOH:O	2.10	0.52
1:A:148[A]:GLN:O	1:A:152:VAL:HG23	2.10	0.52
1:A:385:SER:OG	3:A:605:HOH:O	2.19	0.51
1:A:225:GLU:OE1	3:A:716:HOH:O	2.19	0.51
1:A:410:ALA:HA	1:A:445:VAL:HG12	1.93	0.51
1:A:1:MET:N	3:A:900:HOH:O	2.43	0.51
1:A:427:ASN:HB3	2:A:454:PO4:O2	2.11	0.50
1:A:105:GLN:HG3	3:A:555:HOH:O	2.12	0.50
1:A:26:ALA:HA	3:A:922:HOH:O	2.13	0.48
1:A:409:GLY:O	1:A:413:CYS:HB2	2.13	0.48
1:A:272:TYR:HE1	3:A:693:HOH:O	1.95	0.48
1:A:56:LYS:HE3	1:A:94:GLN:OE1	2.14	0.48
1:A:234:LEU:C	1:A:234:LEU:HD23	2.39	0.47
1:A:56:LYS:HE2	3:A:715:HOH:O	2.13	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:368:ARG:HB3	1:A:376:TYR:CZ	2.51	0.46
1:A:390:ASP:O	1:A:393:LEU:HB2	2.16	0.46
1:A:196:ASN:O	1:A:200:GLU:HG2	2.16	0.46
1:A:250:ARG:NH1	1:A:272:TYR:O	2.48	0.46
1:A:240:MET:HA	1:A:240:MET:HE2	1.97	0.46
1:A:368:ARG:HH22	1:A:397:GLN:HB3	1.80	0.45
1:A:88:THR:OG1	1:A:115:ASP:OD2	2.32	0.45
1:A:127:ARG:HG3	1:A:156:LEU:HD13	1.98	0.45
1:A:251:ARG:NH1	1:A:256:GLU:OE1	2.50	0.45
1:A:291:VAL:HG12	1:A:295:GLN:CG	2.46	0.45
1:A:428:SER:O	1:A:431:GLU:HB2	2.17	0.45
1:A:326:LEU:HD23	1:A:326:LEU:HA	1.74	0.44
1:A:12:LYS:HD2	1:A:116:PHE:HB2	2.00	0.43
1:A:136:LEU:HA	1:A:136:LEU:HD23	1.69	0.43
1:A:282:ILE:O	1:A:290:CYS:HA	2.18	0.43
1:A:90:GLU:O	1:A:94:GLN:HA	2.18	0.43
1:A:195:LEU:HD13	1:A:226:LEU:HD11	2.01	0.43
1:A:245:LEU:HD12	1:A:245:LEU:HA	1.77	0.43
1:A:387:GLN:H	1:A:387:GLN:HG2	1.52	0.42
1:A:77:TYR:OH	1:A:240:MET:HE3	2.19	0.42
1:A:82:SER:CB	3:A:825:HOH:O	2.68	0.42
1:A:359:LEU:HD13	1:A:366:PRO:HG2	2.02	0.42
1:A:51:ILE:HG12	1:A:83:ALA:HB3	2.02	0.42
1:A:94:GLN:OE1	3:A:715:HOH:O	2.22	0.42
1:A:302:ALA:HB1	3:A:1039:HOH:O	2.19	0.42
1:A:315:ASP:O	1:A:316:ILE:C	2.61	0.41
1:A:54[B]:CYS:SG	1:A:68:PHE:CZ	3.14	0.41
1:A:408:LEU:HD23	1:A:408:LEU:HA	1.77	0.40
1:A:54[B]:CYS:HG	1:A:68:PHE:HZ	1.64	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	455/452 (101%)	440 (97%)	12 (3%)	3 (1%)	18 14

All (3) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	67	ASP
1	A	388	ARG
1	A	236	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	367/362 (101%)	333 (91%)	34 (9%)	8 5

All (34) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	1	MET
1	A	5	LEU
1	A	7	LYS
1	A	12	LYS
1	A	21	GLN
1	A	31	GLU
1	A	44	GLN
1	A	67	ASP
1	A	78	LYS
1	A	114	LYS
1	A	127	ARG
1	A	130	GLN
1	A	147	ARG
1	A	200	GLU
1	A	204	LYS
1	A	214	GLU
1	A	217	ILE
1	A	264	ARG

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Mol	Chain	Res	Type
1	A	294	GLU
1	A	295	GLN
1	A	297	GLN
1	A	298	GLU
1	A	327	SER
1	A	333	LEU
1	A	334	HIS
1	A	336	ASN
1	A	340	LEU
1	A	378	LEU
1	A	379	ASP
1	A	385	SER
1	A	387	GLN
1	A	388	ARG
1	A	414	VAL
1	A	441	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (9) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	22	GLN
1	A	29	GLN
1	A	242	HIS
1	A	266	GLN
1	A	306	GLN
1	A	371	GLN
1	A	387	GLN
1	A	418	GLN
1	A	433	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

2 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	A	453	-	4,4,4	3.33	3 (75%)	6,6,6	1.02	0
2	PO4	A	454	-	4,4,4	1.40	1 (25%)	6,6,6	0.76	0

All (4) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	453	PO4	P-O1	4.76	1.61	1.50
2	A	453	PO4	P-O3	3.99	1.66	1.54
2	A	454	PO4	P-O1	2.47	1.56	1.50
2	A	453	PO4	P-O2	2.18	1.61	1.54

There are no bond angle outliers.

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

2 monomers are involved in 2 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	A	453	PO4	1	0
2	A	454	PO4	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

EDS was not executed - this section is therefore empty.

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

EDS was not executed - this section is therefore empty.

6.3 Carbohydrates

EDS was not executed - this section is therefore empty.

6.4 Ligands

EDS was not executed - this section is therefore empty.

6.5 Other polymers

EDS was not executed - this section is therefore empty.