



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 10, 2026 – 12:57 AM UTC

PDB ID : 1TPC / pdb_00001tpc
Title : OFFSET OF A CATALYTIC LESION BY A BOUND WATER SOLUBLE
Authors : Zhang, Z.; Sugio, S.; Komives, E.A.; Liu, K.D.; Knowles, J.R.; Petsko, G.A.;
Ringe, D.
Deposited on : 1994-02-03
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)	:	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

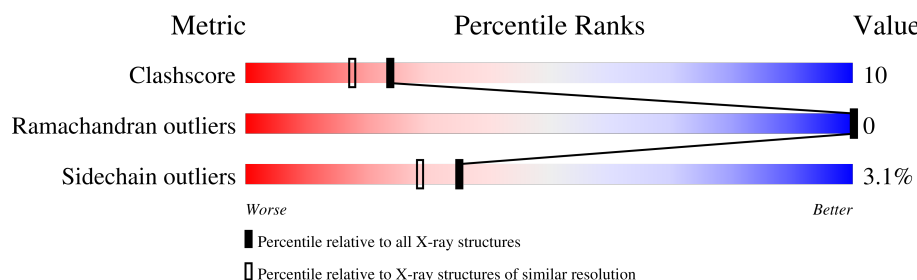
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 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))
Clashscore	190562	8410 (1.90-1.90)
Ramachandran outliers	187476	8333 (1.90-1.90)
Sidechain outliers	187428	8333 (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 $\leq 5\%$.

Note EDS was not executed.

Mol	Chain	Length	Quality of chain
1	1	247	
1	2	247	

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	PGH	1	250	-	X	-	-

2 Entry composition [i](#)

There are 3 unique types of molecules in this entry. The entry contains 3966 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.

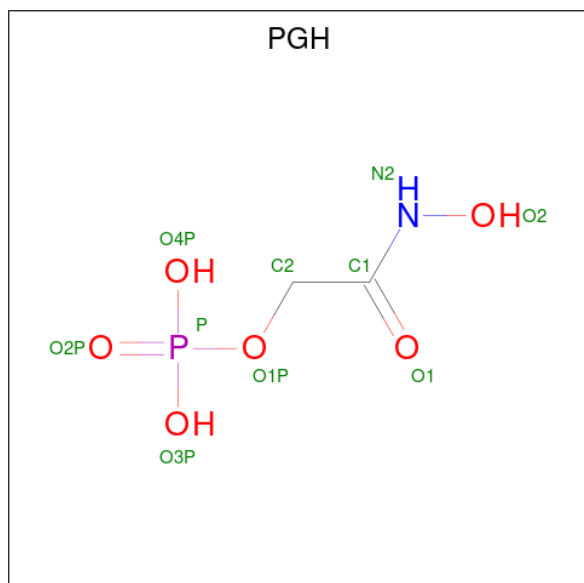
- Molecule 1 is a protein called TRIOSEPHOSPHATE ISOMERASE.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	1	245	Total	C	N	O	S	0	0	0
			1856	1177	325	348	6			
1	2	245	Total	C	N	O	S	0	0	0
			1856	1177	325	348	6			

There are 6 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
1	96	PRO	SER	conflict	UNP P00940
1	165	ASP	GLU	conflict	UNP P00940
1	194	THR	SER	conflict	UNP P00940
2	96	PRO	SER	conflict	UNP P00940
2	165	ASP	GLU	conflict	UNP P00940
2	194	THR	SER	conflict	UNP P00940

- Molecule 2 is PHOSPHOGLYCOLOHYDROXAMIC ACID (CCD ID: PGH) (formula: $\text{C}_2\text{H}_6\text{NO}_6\text{P}$).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
2	1	1	Total	C	N	O	P	0	0
			10	2	1	6	1		
2	2	1	Total	C	N	O	P	0	0
			10	2	1	6	1		

- Molecule 3 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	1	116	Total	O	0	0
			116	116		
3	2	118	Total	O	0	0
			118	118		

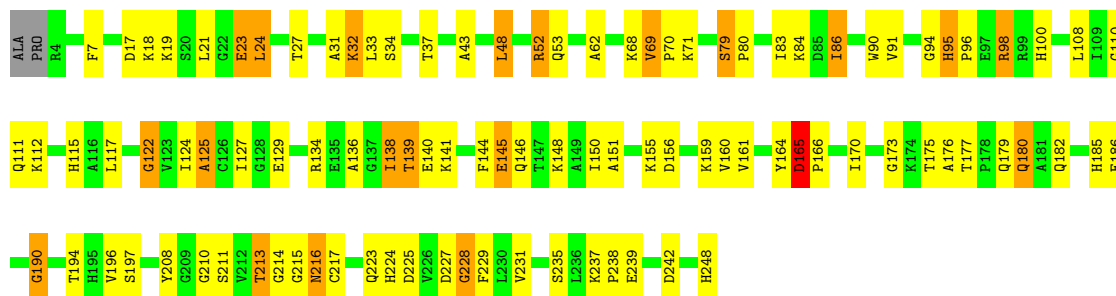
3 Residue-property plots

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.

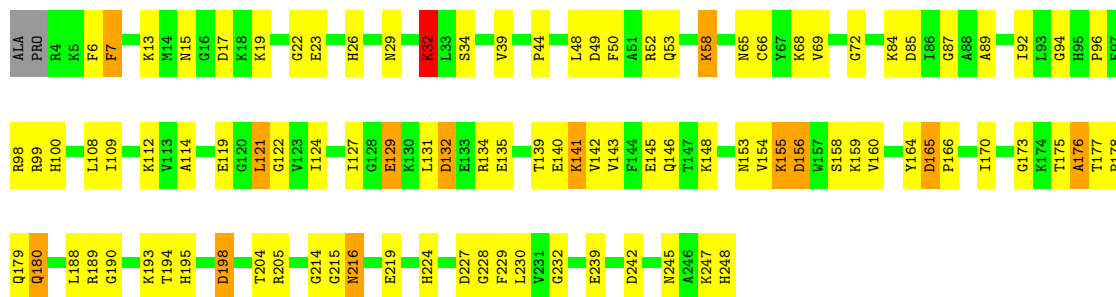
• Molecule 1: TRIOSEPHOSPHATE ISOMERASE

Chain 1: 



• Molecule 1: TRIOSEPHOSPHATE ISOMERASE

Chain 2: 



4 Data and refinement statistics

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

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	136.40Å 73.90Å 55.90Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	6.00 – 1.90	Depositor
% Data completeness (in resolution range)	(Not available) (6.00-1.90)	Depositor
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
Refinement program	PROLSQ	Depositor
R, R_{free}	0.182 , (Not available)	Depositor
Estimated twinning fraction	No twinning to report.	Xtriage
Total number of atoms	3966	wwPDB-VP
Average B, all atoms (Å ²)	17.0	wwPDB-VP

5 Model quality

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: PGH

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	1	1.32	4/1892 (0.2%)	2.23	89/2555 (3.5%)
1	2	1.32	2/1892 (0.1%)	2.29	95/2555 (3.7%)
All	All	1.32	6/3784 (0.2%)	2.26	184/5110 (3.6%)

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	1	0	1
1	2	0	1
All	All	0	2

All (6) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	2	165	ASP	CA-CB	9.81	1.63	1.53
1	1	165	ASP	CA-CB	7.93	1.61	1.53
1	2	216	ASN	CA-CB	7.21	1.65	1.53
1	1	216	ASN	CA-CB	6.97	1.64	1.53
1	1	228	GLY	N-CA	5.15	1.50	1.45
1	1	145	GLU	CD-OE2	5.07	1.34	1.25

All (184) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	2	216	ASN	OD1-CG-ND2	-16.00	106.60	122.60
1	1	215	GLY	CA-C-N	12.42	137.93	120.29
1	1	215	GLY	C-N-CA	12.42	137.93	120.29

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	2	215	GLY	CA-C-N	11.58	146.30	121.64
1	2	215	GLY	C-N-CA	11.58	146.30	121.64
1	2	180	GLN	OE1-CD-NE2	11.57	134.17	122.60
1	1	217	CYS	N-CA-C	10.74	122.99	111.28
1	2	198	ASP	CA-CB-CG	-10.18	102.42	112.60
1	2	216	ASN	CA-CB-CG	10.17	122.77	112.60
1	1	216	ASN	CB-CG-ND2	10.01	131.41	116.40
1	1	216	ASN	CB-CA-C	-9.48	94.74	110.85
1	2	216	ASN	CB-CA-C	-9.08	92.95	110.11
1	1	53	GLN	OE1-CD-NE2	-8.72	113.88	122.60
1	1	115	HIS	CA-CB-CG	-8.40	105.40	113.80
1	2	165	ASP	CB-CG-OD2	8.40	137.72	118.40
1	2	179	GLN	OE1-CD-NE2	-8.30	114.30	122.60
1	1	145	GLU	CB-CG-CD	8.24	126.62	112.60
1	2	98	ARG	CD-NE-CZ	-8.22	112.89	124.40
1	1	129	GLU	CB-CG-CD	8.20	126.54	112.60
1	1	227	ASP	CA-CB-CG	8.13	120.73	112.60
1	2	122	GLY	N-CA-C	-8.11	100.13	113.02
1	2	214	GLY	N-CA-C	-8.00	102.76	113.24
1	1	84	LYS	CB-CA-C	-7.88	97.72	110.79
1	2	109	ILE	CA-C-N	7.87	128.67	119.94
1	2	109	ILE	C-N-CA	7.87	128.67	119.94
1	1	68	LYS	N-CA-C	7.86	122.59	112.92
1	2	68	LYS	N-CA-C	7.81	122.39	113.02
1	1	17	ASP	N-CA-C	-7.68	98.15	108.74
1	2	99	ARG	NE-CZ-NH2	7.49	125.94	119.20
1	1	164	TYR	CA-C-N	7.40	132.89	123.34
1	1	164	TYR	C-N-CA	7.40	132.89	123.34
1	2	179	GLN	CG-CD-NE2	7.30	127.35	116.40
1	1	52	ARG	NE-CZ-NH2	-7.29	112.64	119.20
1	1	173	GLY	N-CA-C	-7.23	105.52	114.92
1	2	216	ASN	CB-CG-OD1	7.08	134.96	120.80
1	1	216	ASN	O-C-N	7.03	130.16	122.15
1	1	216	ASN	N-CA-C	6.93	118.91	111.36
1	1	71	LYS	CA-C-O	-6.91	114.06	121.38
1	1	83	ILE	CA-C-N	6.90	129.52	120.28
1	1	83	ILE	C-N-CA	6.90	129.52	120.28
1	2	39	VAL	O-C-N	6.90	130.17	123.14
1	2	173	GLY	CA-C-O	6.83	126.58	119.27
1	2	180	GLN	CB-CG-CD	-6.80	101.04	112.60
1	2	155	LYS	N-CA-C	-6.78	105.01	113.55
1	1	110	GLY	O-C-N	6.77	128.69	122.19

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	2	224	HIS	N-CA-C	6.74	119.46	111.71
1	1	79	SER	O-C-N	6.66	125.94	121.14
1	2	154	VAL	O-C-N	6.66	130.17	123.18
1	2	15	ASN	CA-CB-CG	6.64	119.25	112.60
1	2	17	ASP	N-CA-C	-6.62	99.52	108.86
1	1	216	ASN	CA-CB-CG	-6.60	106.00	112.60
1	2	165	ASP	N-CA-CB	-6.56	99.24	111.24
1	1	125	ALA	CA-C-O	-6.56	113.34	120.36
1	1	213	THR	CA-CB-OG1	-6.54	99.78	109.60
1	2	179	GLN	CB-CG-CD	6.54	123.72	112.60
1	2	156	ASP	CA-CB-CG	6.52	119.12	112.60
1	2	189	ARG	NE-CZ-NH1	-6.51	114.99	121.50
1	2	50	PHE	CA-CB-CG	6.47	120.27	113.80
1	1	122	GLY	N-CA-C	-6.47	98.98	112.04
1	2	164	TYR	CA-C-N	6.42	131.62	123.34
1	2	164	TYR	C-N-CA	6.42	131.62	123.34
1	1	136	ALA	N-CA-C	-6.42	105.42	113.18
1	2	232	GLY	CA-C-O	6.36	131.63	120.57
1	2	69	VAL	CB-CA-C	6.34	116.74	109.89
1	2	7	PHE	CA-CB-CG	6.34	120.14	113.80
1	2	180	GLN	CG-CD-NE2	-6.33	106.90	116.40
1	1	48	LEU	N-CA-C	6.27	118.11	111.28
1	2	229	PHE	CA-C-N	-6.25	114.23	123.11
1	2	229	PHE	C-N-CA	-6.25	114.23	123.11
1	2	229	PHE	O-C-N	6.25	130.74	123.17
1	1	95	HIS	CA-C-N	6.25	126.72	119.47
1	1	95	HIS	C-N-CA	6.25	126.72	119.47
1	1	210	GLY	CA-C-N	6.19	131.16	122.36
1	1	210	GLY	C-N-CA	6.19	131.16	122.36
1	1	175	THR	CA-CB-OG1	-6.19	100.31	109.60
1	2	29	ASN	O-C-N	6.19	129.88	122.27
1	2	242	ASP	CA-CB-CG	-6.19	106.41	112.60
1	1	148	LYS	O-C-N	6.18	129.20	122.15
1	1	100	HIS	CA-CB-CG	-6.17	107.63	113.80
1	1	224	HIS	N-CA-C	6.17	118.81	111.71
1	1	182	GLN	OE1-CD-NE2	-6.16	116.44	122.60
1	1	160	VAL	O-C-N	6.15	129.41	123.14
1	2	121	LEU	CA-C-N	-6.13	112.85	121.13
1	2	121	LEU	C-N-CA	-6.13	112.85	121.13
1	1	185	HIS	ND1-CE1-NE2	6.12	114.52	108.40
1	1	185	HIS	CB-CG-ND1	-6.06	113.61	122.70
1	2	180	GLN	CA-C-O	-6.06	112.64	119.79

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	1	151	ALA	O-C-N	6.05	128.53	122.12
1	2	215	GLY	O-C-N	-6.04	115.69	122.28
1	2	89	ALA	O-C-N	6.04	129.55	122.24
1	2	176	ALA	N-CA-C	-6.02	102.58	110.53
1	2	108	LEU	O-C-N	6.02	128.27	122.07
1	2	227	ASP	CA-CB-CG	-5.99	106.61	112.60
1	1	223	GLN	CA-C-O	-5.97	114.47	121.16
1	1	110	GLY	CA-C-O	-5.91	114.66	120.75
1	2	69	VAL	CA-C-N	5.91	125.45	119.19
1	2	69	VAL	C-N-CA	5.91	125.45	119.19
1	2	215	GLY	N-CA-C	5.91	121.28	113.37
1	2	34	SER	CA-C-O	-5.89	114.54	120.96
1	2	72	GLY	CA-C-O	5.88	128.72	121.55
1	1	177	THR	CA-C-N	5.86	125.72	119.28
1	1	177	THR	C-N-CA	5.86	125.72	119.28
1	2	195	HIS	CA-CB-CG	-5.85	107.95	113.80
1	2	160	VAL	CA-C-N	5.84	130.87	123.10
1	2	160	VAL	C-N-CA	5.84	130.87	123.10
1	2	124	ILE	N-CA-C	-5.82	98.84	107.51
1	2	49	ASP	CA-C-N	5.82	128.00	120.44
1	2	49	ASP	C-N-CA	5.82	128.00	120.44
1	1	125	ALA	N-CA-CB	-5.80	100.97	110.42
1	2	154	VAL	CA-C-O	-5.80	114.34	120.48
1	2	48	LEU	N-CA-C	5.79	117.59	111.28
1	1	228	GLY	CA-C-O	5.75	128.08	121.47
1	1	91	VAL	O-C-N	5.73	129.41	123.05
1	1	156	ASP	CA-C-O	5.72	127.45	120.25
1	1	185	HIS	CB-CG-CD2	5.71	138.62	131.20
1	1	27	THR	CA-CB-OG1	-5.70	101.05	109.60
1	1	146	GLN	OE1-CD-NE2	5.69	128.29	122.60
1	2	132	ASP	CA-C-O	-5.69	114.52	120.55
1	1	180	GLN	CA-C-O	-5.68	114.40	120.42
1	1	138	ILE	N-CA-C	5.67	117.67	111.77
1	2	87	GLY	CA-C-O	-5.67	112.72	119.01
1	1	124	ILE	N-CA-C	-5.63	99.04	107.37
1	1	231	VAL	N-CA-C	5.61	116.38	108.36
1	1	179	GLN	CG-CD-NE2	5.61	124.81	116.40
1	1	235	SER	N-CA-C	-5.59	106.42	113.18
1	2	165	ASP	CB-CG-OD1	-5.58	105.57	118.40
1	1	214	GLY	N-CA-C	-5.55	105.97	113.24
1	2	245	ASN	CA-C-N	5.53	127.69	120.28
1	2	245	ASN	C-N-CA	5.53	127.69	120.28

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	1	83	ILE	O-C-N	-5.51	116.43	121.94
1	1	186	GLU	CB-CG-CD	-5.49	103.27	112.60
1	2	99	ARG	CB-CA-C	-5.47	102.26	110.90
1	2	52	ARG	N-CA-CB	5.43	118.10	110.12
1	2	53	GLN	CA-C-O	-5.42	114.68	120.42
1	2	129	GLU	CB-CG-CD	5.42	121.81	112.60
1	1	134	ARG	CA-C-N	5.41	129.76	120.72
1	1	134	ARG	C-N-CA	5.41	129.76	120.72
1	2	99	ARG	NH1-CZ-NH2	-5.39	112.29	119.30
1	2	205	ARG	CD-NE-CZ	5.39	131.94	124.40
1	1	134	ARG	NE-CZ-NH1	-5.38	116.11	121.50
1	2	230	LEU	CA-C-O	-5.38	114.70	120.46
1	2	216	ASN	N-CA-C	5.37	119.91	112.45
1	1	43	ALA	N-CA-CB	-5.36	101.21	110.10
1	1	18	LYS	O-C-N	5.33	128.83	122.27
1	1	69	VAL	N-CA-C	-5.33	102.98	109.01
1	2	232	GLY	O-C-N	-5.32	115.79	122.70
1	2	22	GLY	N-CA-C	-5.30	106.35	112.50
1	2	204	THR	CA-C-O	-5.26	114.70	120.69
1	1	17	ASP	CA-C-O	-5.24	115.81	121.36
1	1	37	THR	CA-CB-OG1	-5.22	101.77	109.60
1	2	160	VAL	CA-CB-CG1	5.22	119.28	110.40
1	1	161	VAL	CA-C-O	-5.22	114.83	120.36
1	1	117	LEU	CA-C-O	-5.21	114.90	120.42
1	1	180	GLN	CB-CA-C	5.20	119.69	110.85
1	1	69	VAL	CA-C-N	5.18	124.68	119.19
1	1	69	VAL	C-N-CA	5.18	124.68	119.19
1	2	92	ILE	O-C-N	-5.17	117.06	122.95
1	1	98	ARG	CA-C-N	5.16	127.46	120.65
1	1	98	ARG	C-N-CA	5.16	127.46	120.65
1	2	85	ASP	CA-CB-CG	5.16	117.75	112.60
1	1	139	THR	CA-CB-OG1	-5.14	101.89	109.60
1	1	111	GLN	CG-CD-NE2	5.14	124.10	116.40
1	1	185	HIS	CE1-NE2-CD2	-5.14	103.86	109.00
1	2	26	HIS	CA-CB-CG	5.13	118.93	113.80
1	2	94	GLY	CA-C-O	-5.13	112.92	119.58
1	2	173	GLY	N-CA-C	-5.13	108.59	114.69
1	2	100	HIS	CA-C-N	-5.09	116.34	122.35
1	2	100	HIS	C-N-CA	-5.09	116.34	122.35
1	1	84	LYS	O-C-N	5.08	127.51	122.12
1	1	145	GLU	CG-CD-OE1	5.08	130.09	118.40
1	1	190	GLY	O-C-N	5.07	127.10	122.19

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	2	121	LEU	O-C-N	5.06	128.75	123.03
1	2	239	GLU	CG-CD-OE1	-5.06	106.77	118.40
1	2	32	LYS	CB-CG-CD	5.05	122.92	111.30
1	2	65	ASN	CA-C-O	-5.04	115.46	121.06
1	2	52	ARG	NE-CZ-NH1	5.04	126.54	121.50
1	2	98	ARG	N-CA-C	-5.03	105.88	111.36
1	1	225	ASP	CA-CB-CG	-5.03	107.57	112.60
1	2	140	GLU	N-CA-C	5.03	116.84	111.36
1	1	216	ASN	CB-CG-OD1	-5.02	110.76	120.80
1	1	111	GLN	OE1-CD-NE2	-5.01	117.59	122.60
1	1	23	GLU	CG-CD-OE1	-5.00	106.89	118.40
1	2	166	PRO	CA-C-O	-5.00	115.87	121.32
1	1	31	ALA	CA-C-O	5.00	127.67	121.87

There are no chirality outliers.

All (2) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	1	98	ARG	Sidechain
1	2	134	ARG	Sidechain

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	1	1856	0	1863	37	0
1	2	1856	0	1862	35	2
2	1	10	0	4	3	0
2	2	10	0	4	0	0
3	1	116	0	0	3	0
3	2	118	0	0	5	0
All	All	3966	0	3733	75	2

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 (75) 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)
1:1:32:LYS:HD3	1:1:32:LYS:H	1.00	1.08
1:2:58:LYS:HB3	3:2:487:HOH:O	1.63	0.97
1:1:32:LYS:HD3	1:1:32:LYS:N	1.80	0.95
1:1:32:LYS:H	1:1:32:LYS:CD	1.79	0.95
1:2:175:THR:HG21	1:2:216:ASN:ND2	1.93	0.83
1:2:159:LYS:HB2	3:2:453:HOH:O	1.86	0.75
2:1:250:PGH:N2	3:1:326:HOH:O	2.20	0.74
1:1:140:GLU:HG2	1:1:144:PHE:CE2	2.24	0.71
1:1:48:LEU:HB3	1:1:86:ILE:HD12	1.74	0.70
1:2:141:LYS:C	1:2:141:LYS:HD3	2.18	0.68
1:2:127:ILE:HD11	1:2:188:LEU:HD11	1.76	0.68
1:2:19:LYS:O	1:2:23:GLU:HG3	1.95	0.66
2:1:250:PGH:O2	3:1:326:HOH:O	2.12	0.65
1:2:176:ALA:HB1	1:2:180:GLN:HG3	1.79	0.64
1:2:156:ASP:O	3:2:453:HOH:O	2.14	0.64
1:2:141:LYS:NZ	1:2:145:GLU:OE1	2.29	0.64
2:1:250:PGH:C1	3:1:326:HOH:O	2.44	0.63
1:1:141:LYS:O	1:1:145:GLU:HG2	1.98	0.63
1:1:32:LYS:HG2	1:1:32:LYS:O	1.98	0.62
1:2:7:PHE:O	1:2:228:GLY:HA3	2.00	0.62
1:1:237:LYS:HB3	1:1:238:PRO:HD2	1.81	0.61
1:2:114:ALA:HB2	1:2:153:ASN:HB3	1.83	0.60
1:1:176:ALA:HB1	1:1:180:GLN:HG3	1.85	0.59
1:1:213:THR:H	1:1:216:ASN:HB2	1.68	0.59
1:2:177:THR:H	1:2:180:GLN:HG2	1.66	0.59
1:2:177:THR:H	1:2:180:GLN:CG	2.16	0.59
1:1:48:LEU:HB3	1:1:86:ILE:CD1	2.33	0.57
1:2:131:LEU:O	1:2:135:GLU:HG3	2.05	0.57
1:1:239:GLU:O	1:1:242:ASP:N	2.38	0.56
1:2:247:LYS:HE3	3:2:349:HOH:O	2.07	0.55
1:1:34:SER:HB2	1:1:248:HIS:NE2	2.22	0.54
1:2:66:CYS:O	1:2:112:LYS:HD3	2.06	0.54
1:2:127:ILE:HD11	1:2:188:LEU:CD1	2.37	0.54
1:2:32:LYS:NZ	3:2:415:HOH:O	2.40	0.54
1:1:96:PRO:HG2	1:1:170:ILE:CD1	2.38	0.53
1:1:7:PHE:O	1:1:228:GLY:HA3	2.08	0.53
1:1:211:SER:O	1:1:216:ASN:ND2	2.43	0.52
1:1:62:ALA:HB2	1:1:90:TRP:HB2	1.91	0.52
1:2:141:LYS:HD3	1:2:142:VAL:N	2.26	0.51
1:1:208:TYR:O	1:1:229:PHE:HA	2.11	0.51
1:2:127:ILE:HD12	1:2:143:VAL:HB	1.93	0.51
1:2:247:LYS:C	1:2:248:HIS:HD2	2.19	0.51

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:2:177:THR:N	1:2:180:GLN:HG2	2.28	0.49
1:2:190:GLY:O	1:2:194:THR:HG23	2.12	0.49
1:1:95:HIS:CG	1:1:96:PRO:HD2	2.47	0.49
1:1:24:LEU:C	1:1:24:LEU:HD23	2.38	0.49
1:1:19:LYS:O	1:1:23:GLU:HG3	2.13	0.48
1:2:96:PRO:HG2	1:2:170:ILE:HD11	1.95	0.48
1:2:193:LYS:HE2	1:2:198:ASP:OD1	2.14	0.47
1:1:122:GLY:HA2	1:1:159:LYS:HB3	1.97	0.47
1:2:142:VAL:O	1:2:146:GLN:HG3	2.15	0.47
1:1:138:ILE:O	1:1:139:THR:C	2.56	0.46
1:1:33:LEU:O	1:1:34:SER:C	2.57	0.46
1:1:69:VAL:HB	1:1:70:PRO:HD2	1.98	0.45
1:2:13:LYS:O	1:2:44:PRO:HG3	2.16	0.45
1:1:190:GLY:O	1:1:194:THR:HG23	2.17	0.45
1:1:52:ARG:NE	1:1:52:ARG:HA	2.32	0.45
1:1:79:SER:HB2	1:1:80:PRO:HD2	1.99	0.44
1:1:94:GLY:O	1:1:95:HIS:C	2.59	0.44
1:1:196:VAL:O	1:1:197:SER:HB3	2.16	0.44
1:1:108:LEU:HG	1:1:112:LYS:HE3	1.99	0.44
1:2:247:LYS:C	1:2:248:HIS:CD2	2.96	0.43
1:2:141:LYS:C	1:2:141:LYS:CD	2.88	0.43
1:2:180:GLN:HE21	1:2:180:GLN:HB3	1.01	0.43
1:2:84:LYS:HG3	1:2:121:LEU:HD21	2.02	0.42
1:2:84:LYS:HD2	1:2:119:GLU:O	2.20	0.42
1:1:62:ALA:CB	1:1:90:TRP:HB2	2.49	0.42
1:2:129:GLU:CD	1:2:139:THR:HG23	2.46	0.41
1:1:48:LEU:CB	1:1:86:ILE:HD12	2.48	0.41
1:2:6:PHE:CE1	1:2:228:GLY:HA2	2.55	0.41
1:1:96:PRO:HG2	1:1:170:ILE:HD11	2.02	0.41
1:1:165:ASP:O	1:1:166:PRO:C	2.64	0.41
1:1:21:LEU:HD23	1:1:21:LEU:HA	1.83	0.40
1:1:125:ALA:HB1	1:1:150:ILE:HD13	2.04	0.40
1:2:178:PRO:HG2	1:2:219:GLU:HG2	2.04	0.40

All (2) 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)
1:2:19:LYS:NZ	1:2:194:THR:O[1_554]	1.56	0.64
1:2:132:ASP:OD2	1:2:155:LYS:NZ[3_546]	1.88	0.32

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	1	243/247 (98%)	235 (97%)	8 (3%)	0	100	100
1	2	243/247 (98%)	234 (96%)	9 (4%)	0	100	100
All	All	486/494 (98%)	469 (96%)	17 (4%)	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	1	191/192 (100%)	185 (97%)	6 (3%)	35	29
1	2	191/192 (100%)	185 (97%)	6 (3%)	35	29
All	All	382/384 (100%)	370 (97%)	12 (3%)	35	29

All (12) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	1	24	LEU
1	1	32	LYS
1	1	86	ILE
1	1	127	ILE
1	1	155	LYS
1	1	165	ASP
1	2	32	LYS
1	2	58	LYS

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Mol	Chain	Res	Type
1	2	141	LYS
1	2	148	LYS
1	2	158	SER
1	2	165	ASP

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

Mol	Chain	Res	Type
1	1	15	ASN
1	1	53	GLN
1	2	53	GLN
1	2	111	GLN
1	2	115	HIS
1	2	180	GLN
1	2	185	HIS
1	2	216	ASN
1	2	248	HIS

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](#)

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	PGH	1	250	-	9,9,9	3.06	4 (44%)	10,12,12	2.08	5 (50%)
2	PGH	2	250	-	9,9,9	2.89	3 (33%)	10,12,12	1.46	2 (20%)

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	PGH	1	250	-	-	3/8/8/8	-
2	PGH	2	250	-	-	2/8/8/8	-

All (7) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	1	250	PGH	P-O2P	6.88	1.71	1.50
2	2	250	PGH	P-O3P	6.55	1.79	1.54
2	2	250	PGH	P-O2P	4.80	1.65	1.50
2	1	250	PGH	P-O3P	4.79	1.72	1.54
2	1	250	PGH	P-O1P	2.65	1.68	1.60
2	1	250	PGH	P-O4P	2.20	1.63	1.54
2	2	250	PGH	P-O1P	2.09	1.66	1.60

All (7) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	1	250	PGH	O4P-P-O2P	-3.69	96.45	110.83
2	1	250	PGH	O3P-P-O1P	3.00	114.50	106.67
2	2	250	PGH	O4P-P-O1P	2.87	114.16	106.67
2	1	250	PGH	O1-C1-N2	2.55	126.40	123.27
2	2	250	PGH	O1P-P-O2P	2.33	112.74	106.44
2	1	250	PGH	O2-N2-C1	-2.26	116.45	119.79
2	1	250	PGH	O4P-P-O1P	2.25	112.52	106.67

There are no chirality outliers.

All (5) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	1	250	PGH	N2-C1-C2-O1P
2	2	250	PGH	N2-C1-C2-O1P
2	1	250	PGH	C2-O1P-P-O2P
2	1	250	PGH	O1-C1-C2-O1P
2	2	250	PGH	O1-C1-C2-O1P

There are no ring outliers.

1 monomer is involved in 3 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	1	250	PGH	3	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.