



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 8, 2026 – 02:09 AM UTC

PDB ID : 1E6C / pdb_00001e6c
Title : K15M MUTANT OF SHIKIMATE KINASE FROM ERWINIA CHRYSANTHEMI
Authors : Maclean, J.; Krell, T.; Coggins, J.R.; Lapthorn, A.J.
Deposited on : 2000-08-10
Resolution : 1.80 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

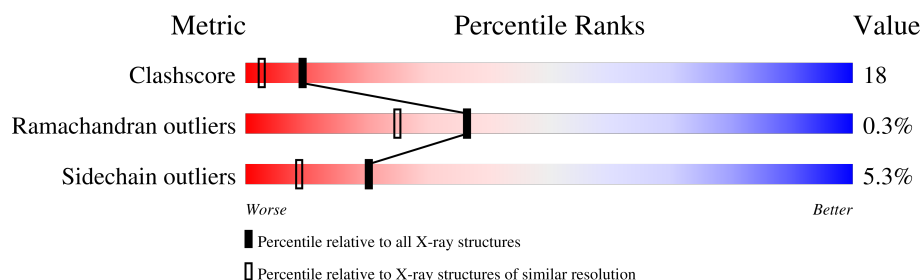
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.80 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	8479 (1.80-1.80)
Ramachandran outliers	187476	8391 (1.80-1.80)
Sidechain outliers	187428	8390 (1.80-1.80)

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	173	
1	B	173	

The following table lists non-polymeric compounds, carbohydrate monomers and non-standard residues in protein, DNA, RNA chains that are outliers for geometric or electron-density-fit criteria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
4	MPD	A	906	-	X	X	-
4	MPD	B	904	-	X	-	-

2 Entry composition

There are 6 unique types of molecules in this entry. The entry contains 2968 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.

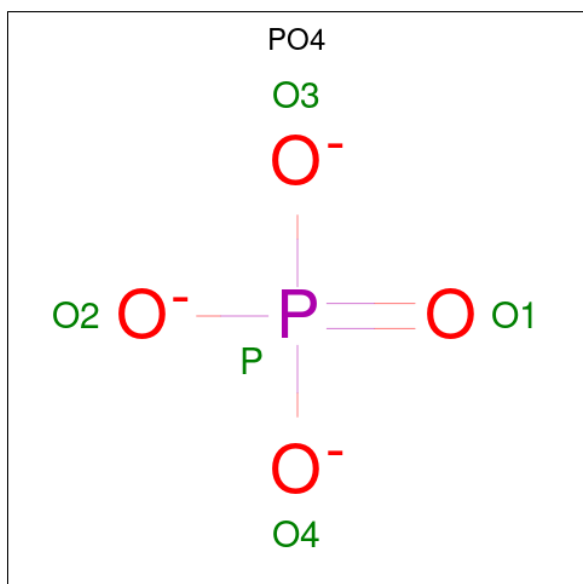
- Molecule 1 is a protein called SHIKIMATE KINASE.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	170	Total	C	N	O	S	0	13	0
			1347	842	243	246	16			
1	B	170	Total	C	N	O	S	0	13	0
			1347	842	243	246	16			

There are 4 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	15	MET	LYS	engineered mutation	UNP P10880
B	15	MET	LYS	engineered mutation	UNP P10880
A	115	LEU	PRO	cloning artifact	UNP P10880
B	115	LEU	PRO	cloning artifact	UNP P10880

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

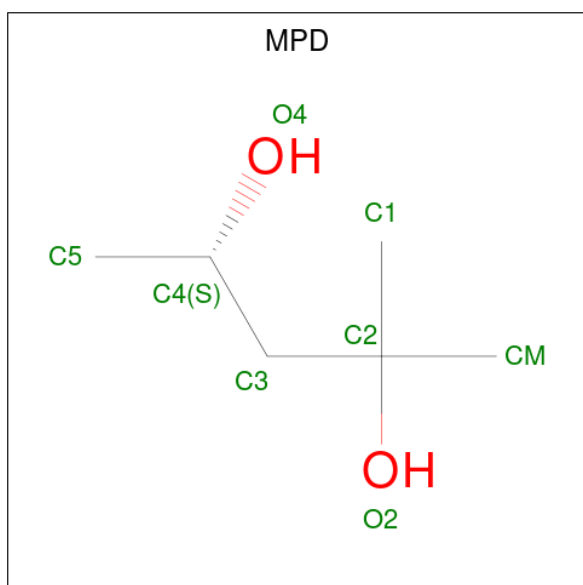


Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
2	A	1	Total	O	P	0	0
			5	4	1		
2	B	1	Total	O	P	0	0
			5	4	1		

- Molecule 3 is CHLORIDE ION (CCD ID: CL) (formula: Cl).

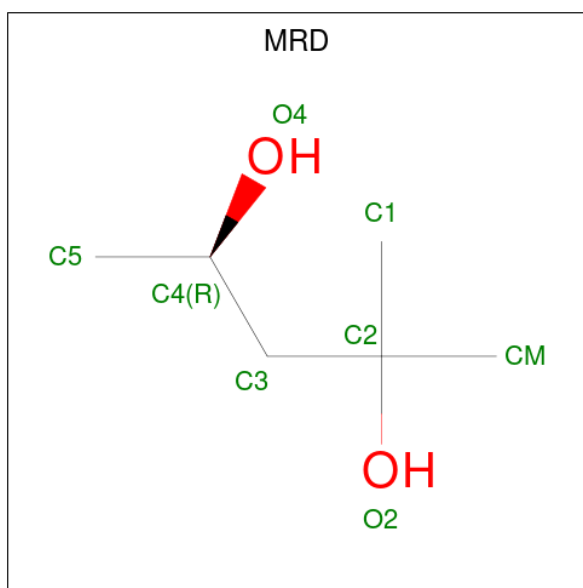
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	1	Total	Cl	0	0
			1	1		
3	B	1	Total	Cl	0	0
			1	1		

- Molecule 4 is (4S)-2-METHYL-2,4-PENTANEDIOL (CCD ID: MPD) (formula: C₆H₁₄O₂).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
4	A	1	Total	C	O	0	0
			8	6	2		
4	A	1	Total	C	O	0	0
			8	6	2		
4	B	1	Total	C	O	0	0
			8	6	2		
4	B	1	Total	C	O	0	0
			8	6	2		
4	B	1	Total	C	O	0	0
			8	6	2		

- Molecule 5 is (4R)-2-METHYLPENTANE-2,4-DIOL (CCD ID: MRD) (formula: $C_6H_{14}O_2$).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
5	A	1	Total	C	O	0	0
			8	6	2		

- Molecule 6 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	A	111	Total	O	0	0
			111	111		
6	B	103	Total	O	0	0
			103	103		

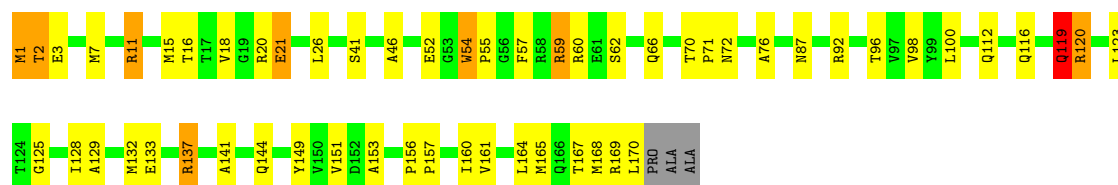
3 Residue-property plots

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.

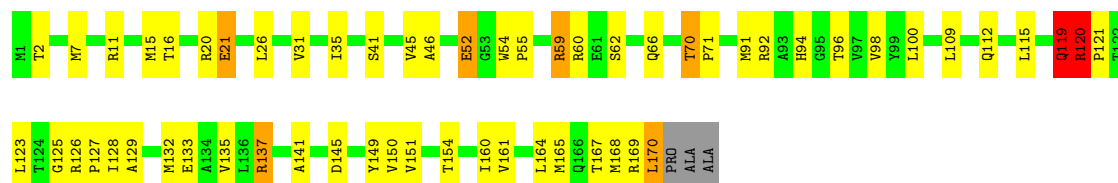
• Molecule 1: SHIKIMATE KINASE

Chain A: 



• Molecule 1: SHIKIMATE KINASE

Chain B: 



4 Data and refinement statistics

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

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	42.86 Å 106.94 Å 42.75 Å 90.00° 119.96° 90.00°	Depositor
Resolution (Å)	25.00 – 1.80	Depositor
% Data completeness (in resolution range)	93.0 (25.00-1.80)	Depositor
R_{merge}	0.08	Depositor
R_{sym}	0.08	Depositor
Refinement program	REFMAC	Depositor
R, R_{free}	0.188 , 0.227	Depositor
Estimated twinning fraction	No twinning to report.	Xtriage
Total number of atoms	2968	wwPDB-VP
Average B, all atoms (Å ²)	24.0	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: PO4, MRD, MPD, CL

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	0.94	3/1434 (0.2%)	1.95	31/1943 (1.6%)
1	B	0.92	1/1434 (0.1%)	1.80	23/1943 (1.2%)
All	All	0.93	4/2868 (0.1%)	1.88	54/3886 (1.4%)

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
1	A	0	1
1	B	0	1
All	All	0	2

All (4) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	1[A]	MET	CA-CB	7.67	1.68	1.53
1	A	1[B]	MET	CA-CB	7.67	1.68	1.53
1	B	59	ARG	CD-NE	-5.74	1.38	1.46
1	A	59	ARG	CD-NE	-5.53	1.38	1.46

All (54) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	59	ARG	CD-NE-CZ	18.67	150.54	124.40
1	B	59	ARG	CG-CD-NE	18.51	152.71	112.00
1	A	1[A]	MET	N-CA-CB	-15.97	83.36	110.50
1	A	1[B]	MET	N-CA-CB	-15.97	83.36	110.50
1	A	59	ARG	CG-CD-NE	12.05	138.52	112.00

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	59	ARG	CD-NE-CZ	11.07	139.90	124.40
1	A	1[A]	MET	CA-CB-CG	10.78	135.67	114.10
1	A	1[B]	MET	CA-CB-CG	10.78	135.67	114.10
1	A	1[A]	MET	CB-CA-C	-10.29	90.55	110.10
1	A	1[B]	MET	CB-CA-C	-10.29	90.55	110.10
1	B	91	MET	O-C-N	9.71	132.07	122.07
1	B	119	GLN	N-CA-C	8.17	121.97	108.49
1	B	125	GLY	N-CA-C	7.53	121.23	112.50
1	A	92	ARG	CA-C-O	-7.14	112.98	120.55
1	B	52	GLU	CA-C-N	7.03	131.63	121.44
1	B	52	GLU	C-N-CA	7.03	131.63	121.44
1	B	31	VAL	CA-C-O	-6.89	114.89	121.64
1	A	46	ALA	CA-C-O	-6.88	113.53	120.90
1	A	137	ARG	CA-C-O	-6.51	113.51	120.42
1	A	125	GLY	N-CA-C	6.47	120.01	112.50
1	B	91	MET	CA-C-O	-6.42	114.08	120.82
1	A	52	GLU	CA-C-N	6.36	130.66	121.44
1	A	52	GLU	C-N-CA	6.36	130.66	121.44
1	B	141	ALA	O-C-N	-6.15	115.02	122.22
1	B	137	ARG	CA-C-O	-6.12	113.93	120.42
1	A	144	GLN	OE1-CD-NE2	5.95	128.55	122.60
1	B	154	THR	N-CA-C	-5.94	105.89	113.02
1	A	87	ASN	OD1-CG-ND2	-5.86	116.74	122.60
1	A	54	TRP	CA-C-O	5.86	124.02	118.34
1	A	1[A]	MET	CB-CG-SD	5.82	130.16	112.70
1	A	1[B]	MET	CB-CG-SD	5.82	130.16	112.70
1	A	119	GLN	N-CA-C	5.74	117.95	108.49
1	A	141	ALA	O-C-N	-5.65	115.61	122.22
1	B	150	VAL	O-C-N	-5.63	117.17	123.26
1	A	116[A]	GLN	O-C-N	-5.59	116.44	123.27
1	A	116[B]	GLN	O-C-N	-5.59	116.44	123.27
1	A	11	ARG	CB-CG-CD	5.52	123.99	111.30
1	B	46	ALA	CA-C-O	-5.47	115.05	120.90
1	B	92	ARG	CA-C-O	-5.46	114.64	120.42
1	A	72	ASN	OD1-CG-ND2	5.27	127.87	122.60
1	B	15	MET	CG-SD-CE	5.20	112.34	100.90
1	A	92	ARG	O-C-N	5.18	127.61	122.12
1	B	109	LEU	CA-C-O	-5.18	115.06	120.55
1	B	94	HIS	CA-CB-CG	-5.16	108.64	113.80
1	A	120	ARG	N-CA-CB	5.15	118.16	110.02
1	B	120	ARG	N-CA-CB	5.15	118.16	110.02
1	B	109	LEU	O-C-N	5.14	127.57	122.12

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	45	VAL	N-CA-C	-5.12	105.55	110.72
1	A	137	ARG	N-CA-CB	5.10	117.71	110.16
1	A	116[A]	GLN	OE1-CD-NE2	-5.09	117.51	122.60
1	A	116[B]	GLN	OE1-CD-NE2	-5.09	117.51	122.60
1	A	137	ARG	CB-CA-C	-5.05	102.26	110.85
1	B	11	ARG	CB-CG-CD	5.03	122.87	111.30
1	B	35	ILE	O-C-N	-5.01	117.00	121.91

There are no chirality outliers.

All (2) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	11	ARG	Mainchain
1	B	70	THR	Mainchain

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	1347	0	1359	59	1
1	B	1347	0	1359	29	1
2	A	5	0	0	0	0
2	B	5	0	0	0	0
3	A	1	0	0	1	0
3	B	1	0	0	0	0
4	A	16	0	28	14	0
4	B	24	0	42	8	0
5	A	8	0	14	2	0
6	A	111	0	0	19	0
6	B	103	0	0	0	0
All	All	2968	0	2802	101	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 18.

All (101) 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:1[B]:MET:HA	6:A:2001:HOH:O	1.14	1.27
1:A:1[B]:MET:HB3	1:A:2:THR:N	1.55	1.20
4:A:906:MPD:H52	4:A:906:MPD:O2	1.21	1.15
4:A:906:MPD:O2	4:A:906:MPD:C5	1.97	1.09
4:B:904:MPD:HM1	4:B:904:MPD:H52	1.35	1.05
1:A:1[B]:MET:HB3	1:A:2:THR:H	1.08	1.04
1:A:1[B]:MET:CB	6:A:2001:HOH:O	2.11	0.98
1:A:1[B]:MET:CB	1:A:2:THR:N	2.28	0.94
4:B:904:MPD:H52	4:B:904:MPD:CM	1.91	0.93
1:A:1[A]:MET:CB	6:A:2002:HOH:O	2.15	0.92
1:B:21:GLU:HG2	1:B:161:VAL:HG21	1.52	0.92
1:A:1[A]:MET:HA	6:A:2002:HOH:O	1.70	0.91
1:A:21:GLU:HG2	1:A:161:VAL:HG21	1.54	0.89
4:B:904:MPD:HM1	4:B:904:MPD:C5	1.99	0.87
1:A:129:ALA:HA	4:A:906:MPD:H4	1.56	0.85
4:A:906:MPD:H52	4:A:906:MPD:HO2	1.42	0.84
4:B:904:MPD:H52	4:B:904:MPD:O2	1.79	0.82
1:A:7[B]:MET:CE	1:A:100:LEU:HD11	2.18	0.74
4:B:904:MPD:C5	4:B:904:MPD:O2	2.37	0.73
1:A:7[B]:MET:HE2	1:A:100:LEU:HD11	1.70	0.73
1:A:1[A]:MET:N	6:A:2001:HOH:O	2.13	0.72
1:A:1[B]:MET:HB2	6:A:2002:HOH:O	1.88	0.72
3:A:804:CL:CL	5:A:903:MRD:HMC3	2.27	0.72
1:A:112:GLN:HE21	4:A:906:MPD:H53	1.55	0.70
1:A:1[A]:MET:CB	6:A:2001:HOH:O	2.33	0.69
1:B:96:THR:HG21	1:B:168[A]:MET:HE2	1.75	0.68
1:A:1[B]:MET:CB	6:A:2002:HOH:O	2.41	0.68
1:B:132:MET:HG3	4:B:905:MPD:HM3	1.75	0.68
1:A:1[A]:MET:CG	6:A:2002:HOH:O	2.38	0.67
1:A:129:ALA:CA	4:A:906:MPD:H4	2.24	0.67
1:A:1[B]:MET:CB	1:A:2:THR:H	1.94	0.67
1:A:1[B]:MET:SD	6:A:2001:HOH:O	2.55	0.65
1:A:96:THR:HG21	1:A:168[A]:MET:HE2	1.80	0.63
4:A:906:MPD:H53	4:A:906:MPD:H12	1.80	0.63
1:B:16:THR:O	1:B:20:ARG:HG2	2.01	0.60
1:A:16:THR:O	1:A:20:ARG:HG2	2.02	0.60
1:A:1[B]:MET:CG	6:A:2001:HOH:O	2.41	0.59
1:B:128:ILE:HG13	1:B:129:ALA:N	2.18	0.58
1:A:26:LEU:HD21	1:A:170:LEU:HG	1.86	0.57
1:A:128:ILE:HG13	1:A:129:ALA:N	2.20	0.56
1:A:57:PHE:HE1	4:A:902:MPD:C5	2.19	0.56
1:B:62:SER:O	1:B:66[B]:GLN:HG3	2.06	0.56

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:161:VAL:O	1:B:165:MET:HG2	2.06	0.55
1:B:26:LEU:HD21	1:B:170:LEU:HG	1.86	0.55
1:A:112:GLN:OE1	1:A:119:GLN:NE2	2.40	0.55
1:B:112:GLN:OE1	1:B:119:GLN:NE2	2.40	0.55
1:A:161:VAL:O	1:A:165:MET:HG2	2.07	0.54
1:A:1[A]:MET:SD	6:A:2002:HOH:O	2.58	0.54
1:A:1[B]:MET:N	6:A:2002:HOH:O	2.12	0.54
1:B:7[B]:MET:HE2	1:B:100:LEU:HD11	1.89	0.54
1:B:115:LEU:HD12	4:B:905:MPD:H52	1.91	0.53
1:B:151[A]:VAL:HG21	1:B:160:ILE:HG23	1.91	0.53
1:A:96:THR:HG21	1:A:168[B]:MET:HE3	1.91	0.52
1:A:151[A]:VAL:HG21	1:A:160:ILE:HG23	1.92	0.52
1:A:133[B]:GLU:OE2	1:A:137:ARG:NH2	2.38	0.52
1:A:112:GLN:HG3	4:A:906:MPD:H12	1.90	0.52
1:A:1[B]:MET:SD	6:A:2003:HOH:O	2.59	0.51
1:A:98[A]:VAL:HG11	1:A:164:LEU:HD11	1.93	0.51
1:A:1[B]:MET:HE2	6:A:2005:HOH:O	2.11	0.50
1:A:62:SER:O	1:A:66[B]:GLN:HG3	2.11	0.50
1:A:57:PHE:HE1	4:A:902:MPD:H53	1.78	0.49
1:B:41[B]:SER:OG	1:B:60:ARG:HD3	2.13	0.48
1:A:98[B]:VAL:HG21	1:A:164:LEU:HD11	1.94	0.48
1:A:1[B]:MET:HE3	6:A:2001:HOH:O	2.14	0.47
1:A:3:GLU:HG3	6:A:2005:HOH:O	2.15	0.46
1:B:96:THR:HG21	1:B:168[B]:MET:HE3	1.97	0.46
1:B:132:MET:O	1:B:135[B]:VAL:HG12	2.16	0.46
1:A:41[B]:SER:OG	1:A:60:ARG:HD3	2.16	0.46
1:A:112:GLN:NE2	4:A:906:MPD:H53	2.28	0.46
1:B:7[B]:MET:CE	1:B:100:LEU:HD11	2.46	0.45
1:B:120:ARG:HD2	1:B:121:PRO:O	2.17	0.45
1:A:132:MET:HB2	4:A:906:MPD:H32	1.97	0.45
1:A:119:GLN:HE21	1:A:119:GLN:HB2	1.44	0.44
1:A:7[B]:MET:HE1	1:A:18:VAL:HB	2.00	0.44
1:B:132:MET:HG3	4:B:905:MPD:CM	2.47	0.44
1:A:70:THR:HB	1:A:71:PRO:CD	2.48	0.44
1:A:156:PRO:HA	1:A:157:PRO:HD3	1.92	0.44
5:A:903:MRD:HMC1	5:A:903:MRD:H4	1.36	0.43
1:A:15:MET:SD	1:A:76:ALA:HB1	2.59	0.42
1:B:52:GLU:OE2	1:B:60:ARG:NH2	2.49	0.42
1:A:112:GLN:HE21	4:A:906:MPD:C5	2.27	0.42
1:B:126[B]:ARG:HB3	1:B:127:PRO:HD3	2.02	0.42
1:A:100:LEU:HB3	1:A:153:ALA:HB2	2.01	0.41

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:133[B]:GLU:OE2	1:B:137:ARG:NH2	2.46	0.41
1:B:149:TYR:CD2	1:B:168[B]:MET:HG2	2.55	0.41
1:B:98[B]:VAL:HG21	1:B:164:LEU:HD21	2.02	0.41
1:A:57:PHE:HE1	4:A:902:MPD:H51	1.86	0.41
1:A:149:TYR:CD2	1:A:168[B]:MET:HG2	2.56	0.41
1:B:70:THR:HB	1:B:71:PRO:CD	2.51	0.41
1:B:54:TRP:N	1:B:55:PRO:CD	2.85	0.40
1:B:98[B]:VAL:CG2	1:B:164:LEU:HD21	2.51	0.40
1:A:54:TRP:N	1:A:55:PRO:CD	2.84	0.40
1:B:164:LEU:HD22	1:B:168[B]:MET:SD	2.61	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:A:1[A]:MET:CG	1:B:145:ASP:OD1[2_646]	1.86	0.34

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	180/173 (104%)	175 (97%)	5 (3%)	0	100	100
1	B	180/173 (104%)	177 (98%)	2 (1%)	1 (1%)	21	11
All	All	360/346 (104%)	352 (98%)	7 (2%)	1 (0%)	36	25

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	2	THR

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	146/135 (108%)	139 (95%)	7 (5%)	23	11
1	B	146/135 (108%)	139 (95%)	7 (5%)	23	11
All	All	292/270 (108%)	278 (95%)	14 (5%)	20	11

All (14) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	2	THR
1	A	21	GLU
1	A	59	ARG
1	A	119	GLN
1	A	120	ARG
1	A	123	LEU
1	A	167	THR
1	B	21	GLU
1	B	59	ARG
1	B	119	GLN
1	B	120	ARG
1	B	123	LEU
1	B	167	THR
1	B	170	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (5) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	89	GLN
1	A	112	GLN
1	A	119	GLN
1	B	89	GLN
1	B	119	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 ⓘ

Of 10 ligands modelled in this entry, 2 are monoatomic - leaving 8 for Mogul analysis.

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	802	-	4,4,4	1.63	1 (25%)	6,6,6	1.38	1 (16%)
4	MPD	A	906	-	7,7,7	1.13	1 (14%)	9,10,10	2.79	4 (44%)
4	MPD	B	901	-	7,7,7	1.16	1 (14%)	9,10,10	2.48	2 (22%)
4	MPD	A	902	-	7,7,7	1.15	1 (14%)	9,10,10	4.42	4 (44%)
4	MPD	B	905	-	7,7,7	1.20	1 (14%)	9,10,10	3.35	4 (44%)
5	MRD	A	903	-	7,7,7	1.04	1 (14%)	9,10,10	4.04	4 (44%)
2	PO4	B	801	-	4,4,4	2.31	1 (25%)	6,6,6	1.62	1 (16%)
4	MPD	B	904	-	7,7,7	1.18	1 (14%)	9,10,10	3.82	5 (55%)

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

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
4	MPD	A	906	-	-	4/5/5/5	-
4	MPD	B	901	-	-	1/5/5/5	-
4	MPD	A	902	-	-	3/5/5/5	-
4	MPD	B	905	-	-	3/5/5/5	-
5	MRD	A	903	-	-	1/5/5/5	-
4	MPD	B	904	-	-	3/5/5/5	-

All (8) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	801	PO4	P-O1	4.13	1.60	1.50
4	B	905	MPD	O2-C2	2.81	1.51	1.44
4	B	904	MPD	O2-C2	2.75	1.51	1.44
2	A	802	PO4	P-O1	2.63	1.56	1.50
4	A	906	MPD	O2-C2	2.56	1.50	1.44
4	A	902	MPD	O2-C2	2.52	1.50	1.44
5	A	903	MRD	O2-C2	2.50	1.50	1.44
4	B	901	MPD	O2-C2	2.48	1.50	1.44

All (25) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	A	902	MPD	CM-C2-C1	11.46	136.28	110.63
5	A	903	MRD	CM-C2-C1	10.76	134.72	110.63
4	B	904	MPD	CM-C2-C1	9.32	131.49	110.63
4	B	905	MPD	CM-C2-C1	8.36	129.34	110.63
4	A	906	MPD	CM-C2-C1	6.93	126.14	110.63
4	B	901	MPD	CM-C2-C1	6.37	124.89	110.63
4	B	904	MPD	O2-C2-CM	-4.52	93.91	107.99
4	A	902	MPD	O2-C2-CM	-4.48	94.01	107.99
4	B	905	MPD	O4-C4-C3	-3.92	95.77	111.35
4	A	902	MPD	O2-C2-C1	-3.46	97.20	107.99
5	A	903	MRD	O2-C2-C1	-3.43	97.31	107.99
2	B	801	PO4	O4-P-O3	3.22	117.92	107.91
4	B	904	MPD	O4-C4-C3	-3.02	99.34	111.35
4	B	901	MPD	O2-C2-CM	-2.84	99.15	107.99
4	A	906	MPD	O2-C2-CM	-2.82	99.19	107.99
4	B	905	MPD	O2-C2-CM	-2.65	99.72	107.99
5	A	903	MRD	O4-C4-C3	-2.61	100.97	111.35
5	A	903	MRD	O2-C2-CM	-2.56	100.01	107.99
4	B	905	MPD	O2-C2-C1	-2.54	100.07	107.99
4	B	904	MPD	O2-C2-C1	-2.52	100.14	107.99

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	802	PO4	O4-P-O1	-2.45	102.30	110.95
4	B	904	MPD	C5-C4-C3	-2.42	100.42	111.67
4	A	906	MPD	O4-C4-C5	2.37	119.65	109.45
4	A	906	MPD	O4-C4-C3	-2.18	102.67	111.35
4	A	902	MPD	O4-C4-C5	2.16	118.76	109.45

There are no chirality outliers.

All (15) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
4	A	902	MPD	C1-C2-C3-C4
4	A	902	MPD	O2-C2-C3-C4
4	A	902	MPD	C2-C3-C4-C5
4	A	906	MPD	C2-C3-C4-O4
4	A	906	MPD	C2-C3-C4-C5
4	B	904	MPD	C2-C3-C4-O4
4	B	905	MPD	CM-C2-C3-C4
4	B	905	MPD	O2-C2-C3-C4
4	A	906	MPD	CM-C2-C3-C4
4	B	904	MPD	CM-C2-C3-C4
4	B	905	MPD	C1-C2-C3-C4
5	A	903	MRD	CM-C2-C3-C4
4	B	904	MPD	C2-C3-C4-C5
4	A	906	MPD	C1-C2-C3-C4
4	B	901	MPD	C1-C2-C3-C4

There are no ring outliers.

5 monomers are involved in 24 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	A	906	MPD	11	0
4	A	902	MPD	3	0
4	B	905	MPD	3	0
5	A	903	MRD	2	0
4	B	904	MPD	5	0

5.7 Other polymers [i](#)

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

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.