



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 13, 2026 – 11:19 PM UTC

PDB ID : 1I80 / pdb_00001i80
Title : CRYSTAL STRUCTURE OF M. TUBERCULOSIS PNP IN COMPLEX WITH IMINORIBITOL, 9-DEAZAHYPOXANTHINE AND PHOSPHATE ION
Authors : Shi, W.; Basso, L.A.; Tyler, P.C.; Furneaux, R.H.; Blanchard, J.S.; Almo, S.C.; Schramm, V.L.
Deposited on : 2001-03-12
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

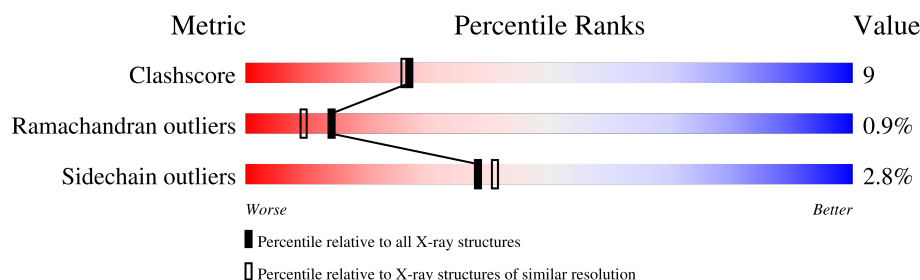
1 Overall quality at a glance

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	268	
1	B	268	
1	C	268	

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	PO4	A	401	-	X	-	-

2 Entry composition [i](#)

There are 5 unique types of molecules in this entry. The entry contains 6046 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 PURINE NUCLEOSIDE PHOSPHORYLASE.

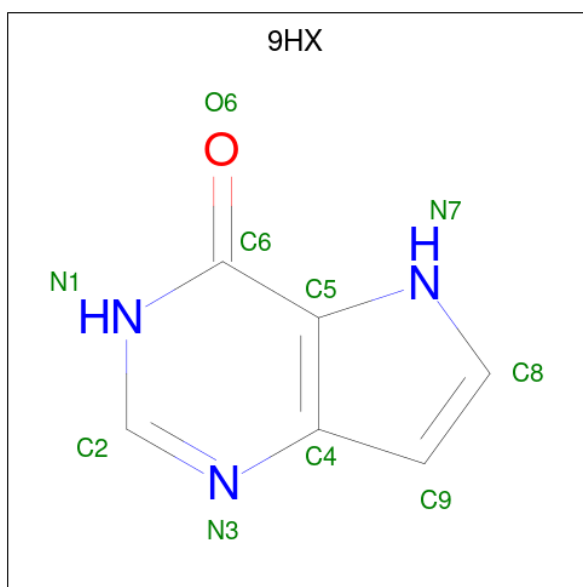
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	266	Total	C	N	O	S	0	0	0
			1929	1211	352	362	4			
1	B	263	Total	C	N	O	S	0	0	0
			1903	1196	346	357	4			
1	C	262	Total	C	N	O	S	0	0	0
			1896	1191	345	356	4			

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



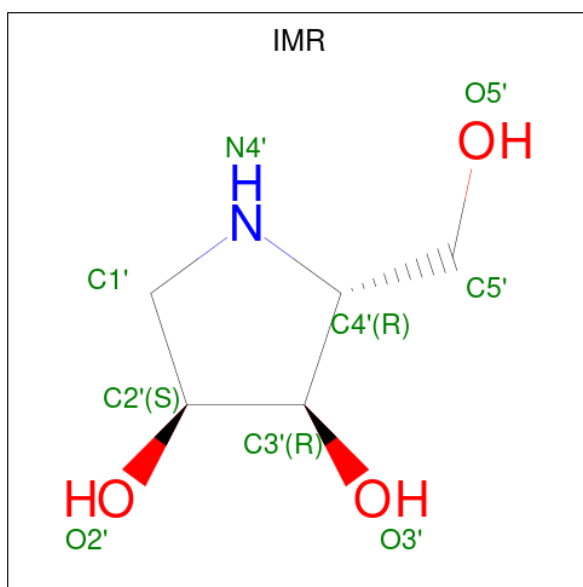
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
2	A	1	Total	O	P	0	0
			5	4	1		

- Molecule 3 is 9-DEAZAHYPOXANTHINE (CCD ID: 9HX) (formula: C₆H₅N₃O).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
3	A	1	Total	C	N	O	0	0
			10	6	3	1		
3	B	1	Total	C	N	O	0	0
			10	6	3	1		
3	C	1	Total	C	N	O	0	0
			10	6	3	1		

- Molecule 4 is IMINORIBITOL (CCD ID: IMR) (formula: $C_5H_{11}NO_3$).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
4	A	1	Total	C	N	O	0	0
			9	5	1	3		

- Molecule 5 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	116	Total 116	O 116	0	0
5	B	83	Total 83	O 83	0	0
5	C	75	Total 75	O 75	0	0

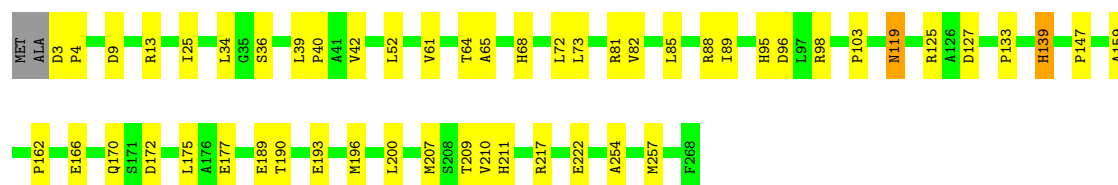
3 Residue-property plots [i](#)

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. 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.

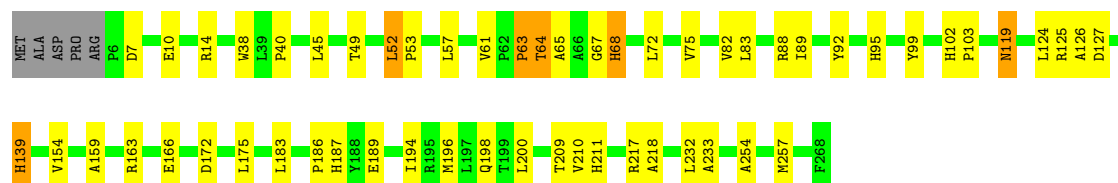
• Molecule 1: PURINE NUCLEOSIDE PHOSPHORYLASE

Chain A:  80% 19% ..



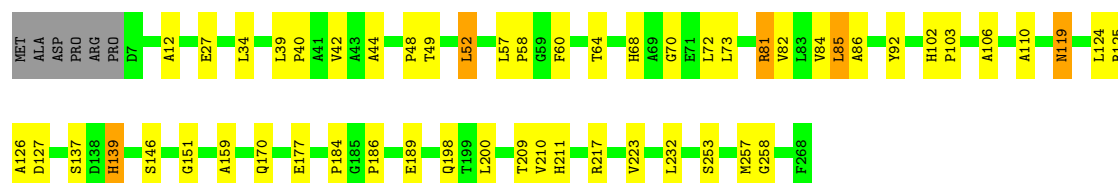
• Molecule 1: PURINE NUCLEOSIDE PHOSPHORYLASE

Chain B:  77% 19% ..



• Molecule 1: PURINE NUCLEOSIDE PHOSPHORYLASE

Chain C:  78% 18% ..



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 2	Depositor
Cell constants a, b, c, α , β , γ	119.98Å 135.77Å 45.01Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	20.00 – 2.00	Depositor
% Data completeness (in resolution range)	10.0 (20.00-2.00)	Depositor
R_{merge}	(Not available)	Depositor
R_{sym}	0.07	Depositor
Refinement program	CNS 1.0	Depositor
R, R_{free}	0.206 , 0.235	Depositor
Estimated twinning fraction	No twinning to report.	Xtriage
Total number of atoms	6046	wwPDB-VP
Average B, all atoms (Å ²)	22.0	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: IMR, 9HX, 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	0.41	0/1967	0.95	5/2691 (0.2%)
1	B	0.40	0/1940	0.97	10/2653 (0.4%)
1	C	0.39	0/1932	0.97	11/2642 (0.4%)
All	All	0.40	0/5839	0.97	26/7986 (0.3%)

There are no bond length outliers.

All (26) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	75	VAL	N-CA-C	6.84	115.75	107.61
1	A	170	GLN	N-CA-C	-6.57	104.74	112.89
1	A	210	VAL	N-CA-C	6.52	117.21	110.36
1	A	82	VAL	N-CA-C	6.30	116.99	108.17
1	A	209	THR	N-CA-C	6.17	123.94	110.80
1	C	49	THR	N-CA-C	-6.11	105.96	113.41
1	B	61	VAL	N-CA-C	6.09	114.53	107.89
1	C	151	GLY	N-CA-C	6.03	127.47	113.18
1	C	232	LEU	N-CA-C	-6.00	100.72	110.20
1	C	126	ALA	N-CA-C	5.92	119.33	111.75
1	B	49	THR	N-CA-C	-5.89	106.25	113.50
1	C	209	THR	N-CA-C	5.80	123.15	110.80
1	B	82	VAL	N-CA-C	5.79	116.27	108.17
1	B	210	VAL	N-CA-C	5.73	116.38	110.36
1	A	61	VAL	N-CA-C	5.70	114.39	107.61
1	C	82	VAL	N-CA-C	5.69	116.50	108.36
1	C	223	VAL	N-CA-C	5.59	116.17	108.12
1	B	126	ALA	N-CA-C	5.52	118.01	111.33
1	C	170	GLN	N-CA-C	-5.50	105.44	111.82
1	C	81	ARG	N-CA-C	-5.47	98.31	107.99
1	C	210	VAL	N-CA-C	5.34	116.07	110.62

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	209	THR	N-CA-C	5.32	122.12	110.80
1	C	189	GLU	N-CA-C	5.25	117.64	110.55
1	B	183	LEU	CA-C-N	5.17	124.34	118.97
1	B	183	LEU	C-N-CA	5.17	124.34	118.97
1	B	232	LEU	N-CA-C	-5.06	102.20	110.20

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	1929	0	1946	35	0
1	B	1903	0	1923	36	0
1	C	1896	0	1915	35	0
2	A	5	0	0	0	0
3	A	10	0	5	2	0
3	B	10	0	5	0	0
3	C	10	0	5	1	0
4	A	9	0	11	3	0
5	A	116	0	0	7	0
5	B	83	0	0	3	0
5	C	75	0	0	5	0
All	All	6046	0	5810	106	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 9.

All (106) 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)
3:A:301:9HX:H9	4:A:351:IMR:H1'1	1.45	0.97
1:A:3:ASP:HB3	1:A:4:PRO:HD3	1.71	0.73
1:C:137:SER:HB3	1:C:177:GLU:HG2	1.71	0.72
1:C:119:ASN:HD22	1:C:119:ASN:C	1.99	0.71

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:119:ASN:C	1:B:119:ASN:HD22	2.01	0.69
1:A:125:ARG:HD2	1:A:127:ASP:OD2	1.93	0.69
1:C:52:LEU:HD13	1:C:57:LEU:HD11	1.77	0.66
1:C:217:ARG:HD3	5:C:752:HOH:O	1.95	0.65
3:A:301:9HX:H9	4:A:351:IMR:C1'	2.23	0.65
1:C:39:LEU:O	1:C:42:VAL:HG23	1.95	0.65
1:C:44:ALA:HB3	1:C:258:GLY:HA3	1.78	0.65
1:A:85:LEU:HD13	1:A:103:PRO:HB3	1.80	0.64
1:B:125:ARG:HD2	1:B:127:ASP:OD2	1.99	0.63
1:C:70:GLY:HA3	1:C:86:ALA:O	2.00	0.61
3:C:303:9HX:H9	5:C:754:HOH:O	2.00	0.61
1:B:10:GLU:OE2	1:B:14:ARG:HD3	2.00	0.61
1:A:119:ASN:C	1:A:119:ASN:HD22	2.10	0.60
1:B:52:LEU:CD1	1:B:57:LEU:HD11	2.32	0.59
1:B:72:LEU:HD21	1:B:83:LEU:HD22	1.84	0.59
1:A:34:LEU:CD1	1:A:42:VAL:HG22	2.36	0.56
1:A:217:ARG:HD3	5:A:518:HOH:O	2.05	0.56
1:A:133:PRO:HB3	1:A:257:MET:HE1	1.87	0.55
1:B:65:ALA:HB3	1:B:95:HIS:NE2	2.22	0.55
1:B:72:LEU:C	1:B:72:LEU:HD23	2.30	0.55
1:A:177:GLU:HG3	5:A:686:HOH:O	2.06	0.55
1:A:65:ALA:HB3	1:A:95:HIS:NE2	2.22	0.55
1:B:52:LEU:CD1	1:B:72:LEU:HB3	2.38	0.54
1:B:211:HIS:HE1	5:B:762:HOH:O	1.89	0.53
1:C:85:LEU:CD1	1:C:103:PRO:HB3	2.38	0.53
1:B:196:MET:HG3	1:C:200:LEU:HD22	1.90	0.53
1:A:96:ASP:OD2	1:A:98:ARG:HB2	2.09	0.52
1:C:34:LEU:CD1	1:C:42:VAL:HG22	2.39	0.52
1:A:159:ALA:HA	1:A:217:ARG:HD2	1.92	0.52
1:A:39:LEU:O	1:A:42:VAL:HG23	2.10	0.52
1:A:139:HIS:CD2	1:A:139:HIS:C	2.89	0.51
1:C:73:LEU:N	1:C:73:LEU:HD12	2.24	0.51
1:C:85:LEU:HD13	1:C:103:PRO:HB3	1.93	0.51
1:C:72:LEU:HD13	1:C:85:LEU:HG	1.92	0.50
1:C:125:ARG:HD2	1:C:127:ASP:OD2	2.12	0.49
1:B:119:ASN:C	1:B:119:ASN:ND2	2.69	0.49
1:C:119:ASN:C	1:C:119:ASN:ND2	2.68	0.49
1:C:184:PRO:HD2	5:C:547:HOH:O	2.14	0.48
1:A:207:MET:HB2	4:A:351:IMR:O2'	2.14	0.48
1:A:211:HIS:HE1	5:A:740:HOH:O	1.97	0.48
1:C:124:LEU:HD23	1:C:198:GLN:HG3	1.96	0.47

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:72:LEU:C	1:A:72:LEU:HD23	2.39	0.47
1:A:196:MET:HG3	1:B:200:LEU:HD22	1.97	0.47
1:C:139:HIS:CD2	1:C:139:HIS:C	2.91	0.47
1:C:211:HIS:HE1	5:C:731:HOH:O	1.98	0.47
1:C:39:LEU:N	1:C:40:PRO:HD2	2.30	0.47
1:B:38:TRP:CZ3	1:B:257:MET:HB3	2.50	0.46
1:B:40:PRO:HG2	1:B:254:ALA:HB2	1.96	0.46
1:B:52:LEU:HD11	1:B:72:LEU:HB3	1.97	0.46
1:C:92:TYR:HB2	1:C:186:PRO:HD3	1.98	0.46
1:B:92:TYR:HB2	1:B:186:PRO:HD3	1.97	0.46
1:A:119:ASN:C	1:A:119:ASN:ND2	2.73	0.46
1:B:89:ILE:HD11	1:B:99:TYR:HB3	1.97	0.46
1:B:63:PRO:HG2	1:B:64:THR:H	1.80	0.46
1:A:172:ASP:HB3	1:A:175:LEU:HG	1.98	0.46
1:B:159:ALA:HA	1:B:217:ARG:HD2	1.98	0.45
1:B:217:ARG:HD3	5:B:538:HOH:O	2.17	0.45
1:C:27:GLU:HB2	1:C:110:ALA:O	2.16	0.45
1:B:52:LEU:HD12	1:B:52:LEU:O	2.17	0.45
1:A:40:PRO:HG2	1:A:254:ALA:HB2	1.99	0.45
1:B:7:ASP:HB3	1:B:10:GLU:HB2	1.99	0.45
1:B:187:HIS:CE1	1:C:146:SER:HB2	2.51	0.45
1:A:9:ASP:HB3	1:A:13:ARG:HH22	1.81	0.44
1:C:102:HIS:HB3	1:C:103:PRO:HD3	1.98	0.44
1:A:73:LEU:HD12	1:A:73:LEU:N	2.32	0.44
1:B:52:LEU:HD11	1:B:57:LEU:HD11	1.97	0.44
1:C:253:SER:O	1:C:257:MET:HG2	2.19	0.43
1:B:89:ILE:CD1	1:B:99:TYR:HB3	2.49	0.43
1:B:139:HIS:CD2	1:B:139:HIS:C	2.96	0.43
1:C:60:PHE:HE2	1:C:85:LEU:HD21	1.82	0.43
1:A:190:THR:OG1	1:A:193:GLU:HG3	2.18	0.43
1:B:124:LEU:HD23	1:B:198:GLN:HG3	2.00	0.43
1:A:36:SER:HA	5:A:768:HOH:O	2.18	0.43
1:C:34:LEU:HD13	1:C:42:VAL:HG22	1.99	0.43
1:C:27:GLU:HA	5:C:747:HOH:O	2.18	0.43
1:C:72:LEU:CD1	1:C:85:LEU:HG	2.48	0.43
1:A:189:GLU:CD	1:A:189:GLU:N	2.77	0.42
1:A:98:ARG:HD2	5:A:664:HOH:O	2.18	0.42
1:A:147:PRO:HD3	1:A:211:HIS:HD2	1.84	0.42
1:A:217:ARG:NE	1:A:217:ARG:HA	2.35	0.42
1:A:162:PRO:HD2	5:A:510:HOH:O	2.20	0.42
1:B:163:ARG:HB2	5:B:566:HOH:O	2.20	0.42

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:25:ILE:HD12	1:A:81:ARG:NH1	2.34	0.42
1:B:194:ILE:HD12	1:B:233:ALA:HB1	2.01	0.42
1:A:52:LEU:HD12	1:A:52:LEU:O	2.18	0.41
1:B:172:ASP:HB3	1:B:175:LEU:HG	2.02	0.41
1:C:48:PRO:CG	1:C:73:LEU:HD23	2.49	0.41
1:B:154:VAL:HG21	1:B:218:ALA:HB2	2.02	0.41
1:C:73:LEU:HB2	1:C:84:VAL:HB	2.02	0.41
1:C:12:ALA:HB1	1:C:106:ALA:HA	2.02	0.41
1:A:125:ARG:NH2	1:A:177:GLU:O	2.43	0.41
1:A:222:GLU:HG3	5:A:657:HOH:O	2.20	0.41
1:A:147:PRO:HD3	1:A:211:HIS:CD2	2.56	0.41
1:A:196:MET:O	1:A:200:LEU:HG	2.20	0.41
1:B:52:LEU:HD12	1:B:72:LEU:HB3	2.02	0.41
1:C:48:PRO:HG3	1:C:73:LEU:HD23	2.03	0.41
1:B:52:LEU:HA	1:B:53:PRO:HD3	1.88	0.41
1:C:57:LEU:HA	1:C:58:PRO:HD3	1.97	0.41
1:C:159:ALA:HA	1:C:217:ARG:HD2	2.02	0.41
1:B:67:GLY:O	1:B:68:HIS:HB2	2.21	0.40
1:B:102:HIS:N	1:B:103:PRO:CD	2.85	0.40
1:B:189:GLU:CD	1:B:189:GLU:N	2.79	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	264/268 (98%)	257 (97%)	5 (2%)	2 (1%)	16	11
1	B	261/268 (97%)	249 (95%)	9 (3%)	3 (1%)	11	7
1	C	260/268 (97%)	251 (96%)	7 (3%)	2 (1%)	16	11
All	All	785/804 (98%)	757 (96%)	21 (3%)	7 (1%)	14	9

All (7) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	64	THR
1	B	64	THR
1	C	64	THR
1	B	68	HIS
1	C	68	HIS
1	A	68	HIS
1	B	63	PRO

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	192/193 (100%)	187 (97%)	5 (3%)	40	44
1	B	189/193 (98%)	183 (97%)	6 (3%)	34	35
1	C	188/193 (97%)	183 (97%)	5 (3%)	39	42
All	All	569/579 (98%)	553 (97%)	16 (3%)	38	41

All (16) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	88	ARG
1	A	89	ILE
1	A	119	ASN
1	A	139	HIS
1	A	166	GLU
1	B	45	LEU
1	B	52	LEU
1	B	88	ARG
1	B	119	ASN
1	B	139	HIS
1	B	166	GLU
1	C	52	LEU
1	C	81	ARG
1	C	85	LEU

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type
1	C	119	ASN
1	C	139	HIS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (12) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	90	HIS
1	A	119	ASN
1	A	198	GLN
1	A	211	HIS
1	B	68	HIS
1	B	119	ASN
1	B	198	GLN
1	B	211	HIS
1	C	119	ASN
1	C	170	GLN
1	C	198	GLN
1	C	211	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](#)

5 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
4	IMR	A	351	-	9,9,9	1.67	3 (33%)	7,12,12	2.05	2 (28%)
3	9HX	A	301	-	11,11,11	1.37	1 (9%)	10,15,15	1.41	1 (10%)
3	9HX	B	302	-	11,11,11	1.27	2 (18%)	10,15,15	1.41	1 (10%)
3	9HX	C	303	-	11,11,11	1.31	2 (18%)	10,15,15	1.42	1 (10%)
2	PO4	A	401	-	4,4,4	2.20	1 (25%)	6,6,6	1.95	3 (50%)

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
3	9HX	C	303	-	-	-	0/2/2/2
3	9HX	B	302	-	-	-	0/2/2/2
3	9HX	A	301	-	-	-	0/2/2/2
4	IMR	A	351	-	-	0/2/15/15	0/1/1/1

All (9) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	401	PO4	P-O1	4.13	1.60	1.50
3	A	301	9HX	C9-C4	-3.42	1.37	1.45
4	A	351	IMR	C2'-C3'	-3.20	1.48	1.53
3	C	303	9HX	C9-C4	-3.12	1.38	1.45
3	B	302	9HX	C9-C4	-2.70	1.39	1.45
4	A	351	IMR	C3'-C4'	-2.31	1.51	1.53
3	C	303	9HX	C2-N1	2.03	1.39	1.35
4	A	351	IMR	C4'-N4'	-2.01	1.44	1.47
3	B	302	9HX	C2-N1	2.01	1.39	1.35

All (8) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	A	351	IMR	C1'-C2'-C3'	4.28	107.90	103.40
3	B	302	9HX	N1-C2-N3	-3.33	121.67	125.50
3	A	301	9HX	N1-C2-N3	-3.27	121.73	125.50
3	C	303	9HX	N1-C2-N3	-3.27	121.73	125.50

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	401	PO4	O3-P-O1	-2.90	100.68	110.95
4	A	351	IMR	O3'-C3'-C4'	-2.80	105.42	112.92
2	A	401	PO4	O4-P-O1	-2.41	102.43	110.95
2	A	401	PO4	O4-P-O2	2.03	114.22	107.91

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

3 monomers are involved in 4 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	A	351	IMR	3	0
3	A	301	9HX	2	0
3	C	303	9HX	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.