



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 8, 2026 – 06:04 PM UTC

PDB ID : 1PVC / pdb_00001pvc
Title : REFINEMENT OF THE SABIN STRAIN OF TYPE 3 POLIOVIRUS AT 2.4
ANGSTROMS AND THE CRYSTAL STRUCTURES OF ITS VARIANTS
AT 2.9 ANGSTROMS RESOLUTION
Authors : Syed, R.; Filman, D.J.; Hogle, J.M.
Deposited on : 1995-03-30
Resolution : 2.40 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
Buster-report	:	wwPDB partial adaption of 1.1.7 (2018)
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

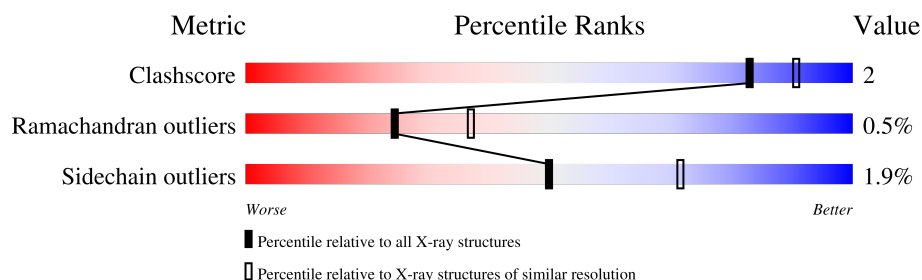
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.40 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	5391 (2.40-2.40)
Ramachandran outliers	187476	5320 (2.40-2.40)
Sidechain outliers	187428	5321 (2.40-2.40)

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	0	4	50% 25% 25%
2	1	301	78% 13% • 7%
3	2	271	87% 8% ...
4	3	238	87% 10% ..
5	4	68	69% 21% • 9%

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
6	SPH	1	1000	X	-	-	-

2 Entry composition

There are 8 unique types of molecules in this entry. The entry contains 7075 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 POLIOVIRUS TYPE 3, SABIN STRAIN.

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
1	0	4	Total	C	N	O	0	0	0
			30	19	4	7			

- Molecule 2 is a protein called POLIOVIRUS TYPE 3, SABIN STRAIN.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	1	279	Total	C	N	O	S	0	0	0
			2214	1408	383	416	7			

- Molecule 3 is a protein called POLIOVIRUS TYPE 3, SABIN STRAIN.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
3	2	266	Total	C	N	O	S	0	0	0
			2088	1330	354	392	12			

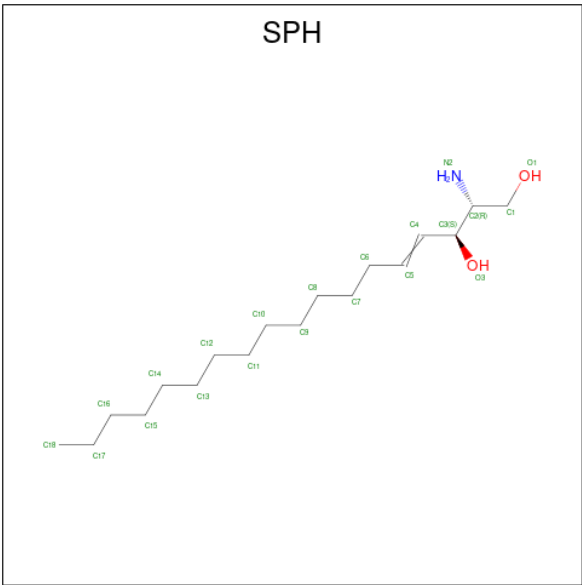
- Molecule 4 is a protein called POLIOVIRUS TYPE 3, SABIN STRAIN.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
4	3	235	Total	C	N	O	S	0	0	0
			1812	1150	296	348	18			

- Molecule 5 is a protein called POLIOVIRUS TYPE 3, SABIN STRAIN.

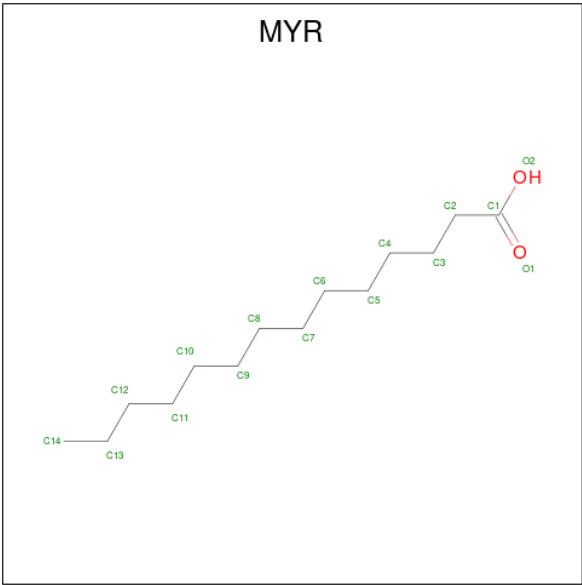
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
5	4	62	Total	C	N	O	0	0	0
			472	291	79	102			

- Molecule 6 is SPHINGOSINE (CCD ID: SPH) (formula: C₁₈H₃₇NO₂).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
6	1	1	Total	C	N	O	0	0
			21	18	1	2		

- Molecule 7 is MYRISTIC ACID (CCD ID: MYR) (formula: C₁₄H₂₈O₂).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
7	4	1	Total	C	O	0	0
			15	14	1		

- Molecule 8 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
8	1	143	Total 143	O 143	0	0
8	2	130	Total 130	O 130	0	0
8	3	119	Total 119	O 119	0	0
8	4	31	Total 31	O 31	0	0

3 Residue-property plots [i](#)

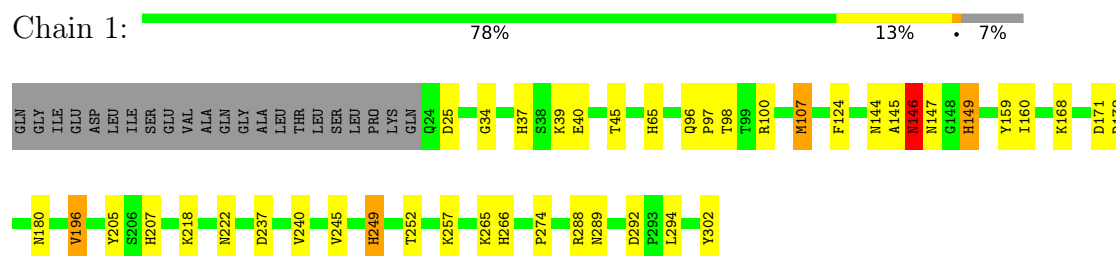
These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry. Residues are color-coded 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.

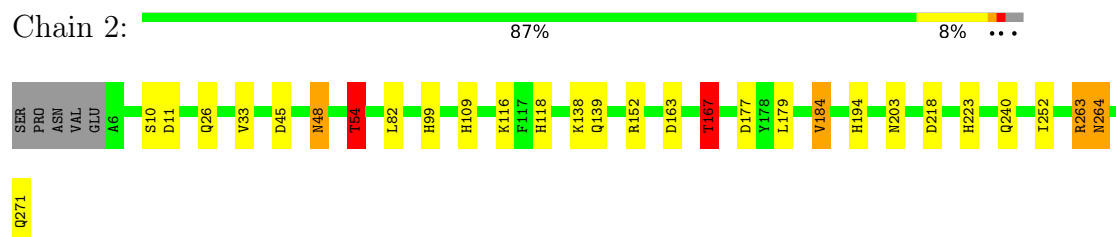
- Molecule 1: POLIOVIRUS TYPE 3, SABIN STRAIN



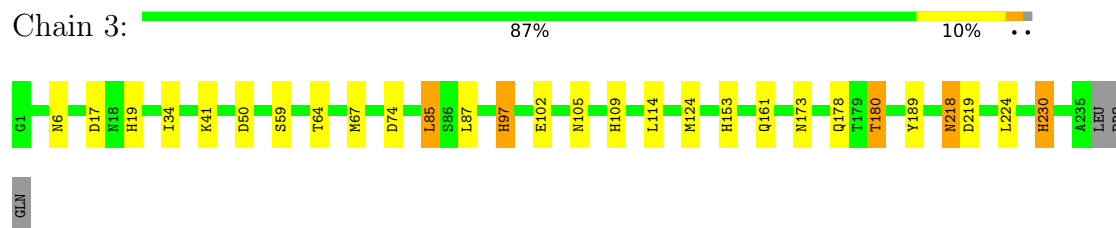
- Molecule 2: POLIOVirus TYPE 3, SABIN STRAIN



- Molecule 3: POLIOVirus TYPE 3, SABIN STRAIN



- Molecule 4: POLIOVirus TYPE 3, SABIN STRAIN



- Molecule 5: POLIOVirus TYPE 3, SABIN STRAIN

Chain 4:

69%

21%

• 9%



4 Data and refinement statistics

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

Property	Value	Source
Space group	I 2 2 2	Depositor
Cell constants a, b, c, α , β , γ	321.06 Å 358.62 Å 381.82 Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	10.00 – 2.40	Depositor
% Data completeness (in resolution range)	61.4 (10.00-2.40)	Depositor
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
Refinement program	X-PLOR	Depositor
R, R_{free}	0.205 , (Not available)	Depositor
Estimated twinning fraction	No twinning to report.	Xtriage
Total number of atoms	7075	wwPDB-VP
Average B, all atoms (Å ²)	11.0	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: SPH, MYR

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	0	1.54	0/29	2.07	2/38 (5.3%)
2	1	0.95	6/2278 (0.3%)	1.55	25/3111 (0.8%)
3	2	0.95	7/2146 (0.3%)	1.61	26/2926 (0.9%)
4	3	0.94	5/1857 (0.3%)	1.56	19/2533 (0.8%)
5	4	1.04	2/479 (0.4%)	1.66	6/647 (0.9%)
All	All	0.96	20/6789 (0.3%)	1.58	78/9255 (0.8%)

All (20) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	2	167	THR	CA-CB	7.30	1.65	1.53
2	1	65	HIS	CD2-NE2	-6.91	1.30	1.37
4	3	97	HIS	CD2-NE2	-6.85	1.30	1.37
3	2	99	HIS	CD2-NE2	-6.72	1.30	1.37
4	3	19	HIS	CD2-NE2	-6.67	1.30	1.37
2	1	37	HIS	CD2-NE2	-6.54	1.30	1.37
5	4	24	THR	CA-CB	6.53	1.63	1.53
4	3	153	HIS	CD2-NE2	-6.43	1.30	1.37
2	1	249	HIS	CD2-NE2	-6.33	1.30	1.37
4	3	230	HIS	CD2-NE2	-6.28	1.30	1.37
2	1	207	HIS	CD2-NE2	-6.20	1.31	1.37
3	2	223	HIS	CD2-NE2	-6.19	1.31	1.37
3	2	194	HIS	CD2-NE2	-6.10	1.31	1.37
3	2	223	HIS	CG-ND1	-6.04	1.31	1.38
2	1	266	HIS	CD2-NE2	-5.85	1.31	1.37
4	3	109	HIS	CD2-NE2	-5.84	1.31	1.37
3	2	118	HIS	CD2-NE2	-5.51	1.31	1.37
2	1	149	HIS	CD2-NE2	-5.47	1.31	1.37
5	4	13	HIS	CD2-NE2	-5.16	1.32	1.37
3	2	109	HIS	CD2-NE2	-5.03	1.32	1.37

All (78) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	1	149	HIS	CA-CB-CG	-11.61	102.19	113.80
4	3	218	ASN	CB-CG-ND2	8.83	129.64	116.40
5	4	69	ASN	OD1-CG-ND2	-8.62	113.98	122.60
4	3	218	ASN	OD1-CG-ND2	-8.49	114.11	122.60
1	0	9	GLU	CB-CG-CD	8.21	126.56	112.60
4	3	97	HIS	CB-CG-CD2	-8.12	120.64	131.20
2	1	172	ASP	CA-CB-CG	7.40	120.00	112.60
2	1	107	MET	CG-SD-CE	-7.34	84.74	100.90
4	3	50	ASP	CA-CB-CG	7.01	119.61	112.60
2	1	124	PHE	N-CA-C	-6.90	104.83	113.18
3	2	203	ASN	CA-CB-CG	6.88	119.48	112.60
4	3	19	HIS	CB-CG-CD2	-6.80	122.36	131.20
3	2	54	THR	CB-CA-C	-6.76	97.94	109.51
4	3	74	ASP	CA-CB-CG	6.59	119.19	112.60
2	1	160	ILE	CA-C-N	6.54	124.37	119.66
2	1	160	ILE	C-N-CA	6.54	124.37	119.66
3	2	11	ASP	CA-CB-CG	6.45	119.05	112.60
3	2	177	ASP	CA-CB-CG	6.40	119.00	112.60
3	2	218	ASP	CA-CB-CG	6.35	118.95	112.60
5	4	39	ASN	CB-CG-ND2	6.33	125.90	116.40
5	4	39	ASN	OD1-CG-ND2	-6.33	116.27	122.60
2	1	218	LYS	CB-CG-CD	-6.33	96.74	111.30
4	3	173	ASN	CA-CB-CG	6.25	118.85	112.60
4	3	17	ASP	CA-CB-CG	6.24	118.84	112.60
2	1	149	HIS	CB-CG-CD2	-6.10	123.27	131.20
3	2	118	HIS	CB-CG-CD2	-6.09	123.28	131.20
3	2	177	ASP	N-CA-C	6.06	117.55	111.07
4	3	6	ASN	CB-CG-ND2	5.98	125.36	116.40
4	3	85	LEU	N-CA-CB	-5.94	100.48	110.99
2	1	25	ASP	CA-CB-CG	5.93	118.53	112.60
2	1	171	ASP	CA-CB-CG	5.90	118.50	112.60
3	2	240	GLN	OE1-CD-NE2	-5.90	116.70	122.60
2	1	39	LYS	CA-CB-CG	-5.84	102.42	114.10
5	4	51	SER	N-CA-C	5.81	119.18	111.75
3	2	184	VAL	O-C-N	-5.77	116.91	122.97
3	2	138	LYS	CA-CB-CG	-5.76	102.57	114.10
3	2	263	ARG	CD-NE-CZ	-5.75	116.35	124.40
2	1	265	LYS	CG-CD-CE	-5.68	98.23	111.30
4	3	180	THR	N-CA-CB	5.64	118.11	110.38
3	2	48	ASN	OD1-CG-ND2	-5.62	116.98	122.60
2	1	257	LYS	CA-CB-CG	-5.57	102.95	114.10
2	1	65	HIS	CB-CG-CD2	-5.57	123.96	131.20

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	2	48	ASN	CB-CG-ND2	5.57	124.75	116.40
4	3	161	GLN	N-CA-C	-5.56	100.05	108.67
4	3	153	HIS	CB-CG-CD2	-5.53	124.01	131.20
3	2	194	HIS	CB-CG-CD2	-5.51	124.03	131.20
4	3	85	LEU	CA-CB-CG	5.51	135.58	116.30
4	3	219	ASP	CA-CB-CG	5.50	118.10	112.60
3	2	152	ARG	N-CA-CB	-5.44	101.84	110.28
3	2	54	THR	N-CA-CB	5.44	119.28	110.41
2	1	144	ASN	CA-C-O	5.42	126.55	120.70
3	2	109	HIS	CB-CG-CD2	-5.37	124.22	131.20
3	2	139	GLN	OE1-CD-NE2	-5.35	117.25	122.60
5	4	10	VAL	N-CA-C	5.35	115.96	108.89
2	1	222	ASN	OD1-CG-ND2	-5.33	117.27	122.60
2	1	34	GLY	CA-C-N	5.31	125.28	120.03
2	1	34	GLY	C-N-CA	5.31	125.28	120.03
4	3	105	ASN	OD1-CG-ND2	-5.31	117.29	122.60
3	2	264	ASN	CA-CB-CG	5.30	117.90	112.60
2	1	37	HIS	N-CA-C	-5.30	98.58	107.32
1	0	9	GLU	CA-CB-CG	5.26	124.61	114.10
2	1	288	ARG	CG-CD-NE	-5.22	100.52	112.00
2	1	146	ASN	CA-CB-CG	-5.19	107.41	112.60
3	2	33	VAL	N-CA-C	-5.19	99.68	107.37
3	2	48	ASN	CA-C-O	-5.18	113.06	120.16
3	2	163	ASP	CA-C-O	5.18	126.59	120.58
4	3	109	HIS	CA-CB-CG	5.18	118.98	113.80
5	4	13	HIS	CB-CG-CD2	-5.17	124.48	131.20
3	2	45	ASP	CA-CB-CG	5.16	117.76	112.60
2	1	168	LYS	CB-CG-CD	-5.12	99.53	111.30
2	1	45	THR	CA-CB-OG1	-5.09	101.96	109.60
3	2	26	GLN	OE1-CD-NE2	-5.08	117.53	122.60
3	2	271	GLN	OE1-CD-NE2	-5.08	117.53	122.60
2	1	245	VAL	N-CA-C	-5.05	101.31	108.58
2	1	292	ASP	CA-CB-CG	5.04	117.64	112.60
3	2	184	VAL	CA-C-O	-5.03	116.34	121.67
4	3	34	ILE	N-CA-C	-5.02	101.47	108.80
4	3	178	GLN	OE1-CD-NE2	-5.01	117.59	122.60

There are no chirality outliers.

There are no planarity outliers.

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	0	30	0	30	1	0
2	1	2214	0	2150	16	0
3	2	2088	0	2005	6	0
4	3	1812	0	1792	10	0
5	4	472	0	453	6	0
6	1	21	0	37	3	0
7	4	15	0	27	1	0
8	1	143	0	0	2	0
8	2	130	0	0	1	0
8	3	119	0	0	4	0
8	4	31	0	0	0	0
All	All	7075	0	6494	32	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 2.

All (32) 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)
4:3:97:HIS:ND1	8:3:239:HOH:O	1.75	1.15
4:3:102:GLU:OE2	8:3:239:HOH:O	1.83	0.95
2:1:146:ASN:HA	8:1:1003:HOH:O	1.79	0.82
4:3:230:HIS:ND1	8:3:239:HOH:O	1.95	0.80
2:1:294:LEU:HD13	4:3:67:MET:SD	2.39	0.63
4:3:97:HIS:CE1	8:3:239:HOH:O	2.37	0.58
2:1:40:GLU:HB3	5:4:64:THR:HB	1.87	0.57
2:1:98:THR:OG1	2:1:100:ARG:HG2	2.06	0.55
3:2:54:THR:HG21	8:2:337:HOH:O	2.06	0.55
2:1:205:TYR:HD1	6:1:1000:SPH:H11	1.73	0.52
2:1:205:TYR:CD1	6:1:1000:SPH:H11	2.45	0.51
4:3:87:LEU:HD11	4:3:114:LEU:HD12	1.93	0.49
3:2:116:LYS:HD3	4:3:124:MET:SD	2.52	0.48
4:3:41:LYS:HE3	5:4:46:TYR:HE1	1.78	0.48
4:3:64:THR:O	4:3:67:MET:HG2	2.14	0.48
2:1:274:PRO:HB2	3:2:184:VAL:HB	1.94	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:1:145:ALA:O	2:1:146:ASN:HB2	2.14	0.47
2:1:196:VAL:HG21	6:1:1000:SPH:H141	1.95	0.47
1:0:9:GLU:HA	5:4:5:VAL:O	2.15	0.46
2:1:147:ASN:O	2:1:252:THR:HB	2.15	0.46
5:4:7:SER:HA	5:4:26:ASN:HD22	1.80	0.46
2:1:146:ASN:OD1	2:1:149:HIS:HE1	1.99	0.45
5:4:10:VAL:HG21	5:4:25:ILE:HD12	1.99	0.45
2:1:249:HIS:HD2	8:1:1122:HOH:O	1.99	0.45
2:1:302:TYR:CE1	4:3:189:TYR:HB3	2.51	0.45
2:1:107:MET:HE2	2:1:240:VAL:HG21	1.98	0.44
3:2:82:LEU:HD21	3:2:252:ILE:HD13	1.99	0.44
5:4:32:TYR:HD1	7:4:1:MYR:H122	1.84	0.43
3:2:179:LEU:HA	3:2:184:VAL:O	2.20	0.42
3:2:263:ARG:HB2	3:2:264:ASN:H	1.76	0.41
2:1:96:GLN:HA	2:1:97:PRO:HD3	1.93	0.41
2:1:159:TYR:O	2:1:180:ASN:HB3	2.21	0.41

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	0	2/4 (50%)	2 (100%)	0	0	100	100
2	1	277/301 (92%)	264 (95%)	11 (4%)	2 (1%)	18	28
3	2	264/271 (97%)	251 (95%)	11 (4%)	2 (1%)	16	25
4	3	233/238 (98%)	227 (97%)	6 (3%)	0	100	100
5	4	58/68 (85%)	56 (97%)	2 (3%)	0	100	100
All	All	834/882 (95%)	800 (96%)	30 (4%)	4 (0%)	24	37

All (4) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
2	1	146	ASN
3	2	167	THR
3	2	48	ASN
2	1	237	ASP

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	0	4/4 (100%)	3 (75%)	1 (25%)	0	1
2	1	241/259 (93%)	238 (99%)	3 (1%)	63	81
3	2	224/229 (98%)	221 (99%)	3 (1%)	61	80
4	3	210/213 (99%)	205 (98%)	5 (2%)	43	65
5	4	53/56 (95%)	51 (96%)	2 (4%)	29	49
All	All	732/761 (96%)	718 (98%)	14 (2%)	50	71

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

Mol	Chain	Res	Type
1	0	7	ILE
2	1	146	ASN
2	1	196	VAL
2	1	289	ASN
3	2	10	SER
3	2	54	THR
3	2	167	THR
4	3	59	SER
4	3	85	LEU
4	3	180	THR
4	3	218	ASN
4	3	224	LEU
5	4	4	GLN
5	4	62	ILE

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (15) such sidechains are listed below:

Mol	Chain	Res	Type
2	1	146	ASN
2	1	147	ASN
2	1	149	HIS
2	1	153	GLN
2	1	249	HIS
3	2	95	ASN
3	2	119	GLN
3	2	139	GLN
3	2	260	ASN
4	3	6	ASN
4	3	19	HIS
4	3	56	ASN
4	3	140	GLN
5	4	8	GLN
5	4	26	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](#)

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
7	MYR	4	1	5	13,14,15	0.70	0	12,13,15	0.68	0
6	SPH	1	1000	-	19,20,20	1.09	1 (5%)	18,21,21	1.94	4 (22%)

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
7	MYR	4	1	5	-	1/12/12/13	-
6	SPH	1	1000	-	1/1/2/4	6/21/21/21	-

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
6	1	1000	SPH	C1-C2	3.25	1.57	1.52

All (4) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
6	1	1000	SPH	O3-C3-C2	-4.83	99.19	107.31
6	1	1000	SPH	C1-C2-C3	4.55	122.42	113.00
6	1	1000	SPH	O3-C3-C4	-3.32	102.28	110.88
6	1	1000	SPH	C9-C8-C7	-2.32	102.67	114.37

All (1) chirality outliers are listed below:

Mol	Chain	Res	Type	Atom
6	1	1000	SPH	C3

All (7) torsion outliers are listed below:

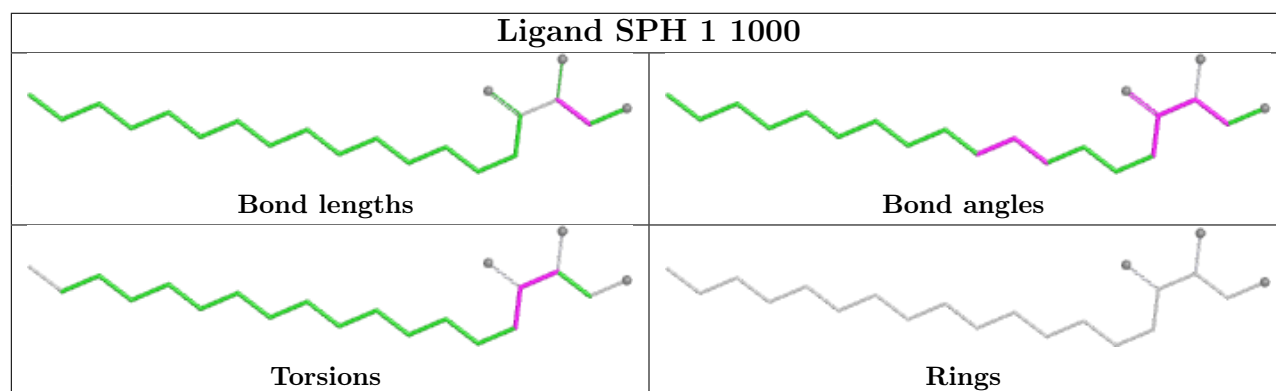
Mol	Chain	Res	Type	Atoms
6	1	1000	SPH	C1-C2-C3-O3
6	1	1000	SPH	C1-C2-C3-C4
6	1	1000	SPH	N2-C2-C3-O3
6	1	1000	SPH	N2-C2-C3-C4
6	1	1000	SPH	C2-C3-C4-C5
6	1	1000	SPH	O3-C3-C4-C5
7	4	1	MYR	C4-C5-C6-C7

There are no ring outliers.

2 monomers are involved in 4 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
7	4	1	MYR	1	0
6	1	1000	SPH	3	0

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less than 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.



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.