



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 5, 2026 – 02:50 PM UTC

PDB ID : 3BHV / pdb_00003bhv
Title : Structure of phosphorylated Thr160 CDK2/cyclin A in complex with the inhibitor variolin B
Authors : Echalier, A.; Bettayeb, K.; Ferandin, Y.; Lozach, O.; Clement, M.; Valette, A.; Liger, F.; Marquet, B.; Morris, J.C.; Endicott, J.A.; Joseph, B.; Meijer, L.
Deposited on : 2007-11-29
Resolution : 2.10 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)	:	2.0
EDS	:	3.0
Buster-report	:	wwPDB partial adaption of 1.1.7 (2018)
Percentile statistics	:	20250101.v01 (using entries in the PDB archive January 1st 2025)
CCP4	:	9.0.010 (Gargrove)
Density-Fitness	:	1.0.12
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.49

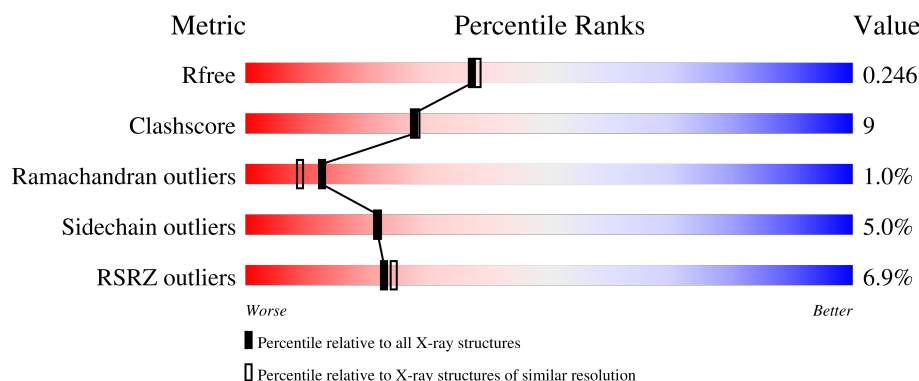
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.10 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))
R_{free}	180053	6658 (2.10-2.10)
Clashscore	190562	7164 (2.10-2.10)
Ramachandran outliers	187476	7099 (2.10-2.10)
Sidechain outliers	187428	7100 (2.10-2.10)
RSRZ outliers	180081	6662 (2.10-2.10)

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 $\leq 5\%$. The upper red bar (where present) indicates the fraction of residues that have poor fit to the electron density. The numeric value is given above the bar.

Mol	Chain	Length	Quality of chain
1	A	300	6% 77% 18% ..
1	C	300	6% 70% 18% .. 9%
2	B	262	3% 85% 14% .
2	D	262	11% 89% 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
5	SGM	B	2	-	X	X	-
5	SGM	B	3	-	X	X	-

2 Entry composition

There are 6 unique types of molecules in this entry. The entry contains 9822 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 Cell division protein kinase 2.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
1	A	298	Total	C	N	O	P	S	0	7	0
			2435	1580	413	432	1	9			
1	C	272	Total	C	N	O	P	S	0	1	0
			2186	1417	374	387	1	7			

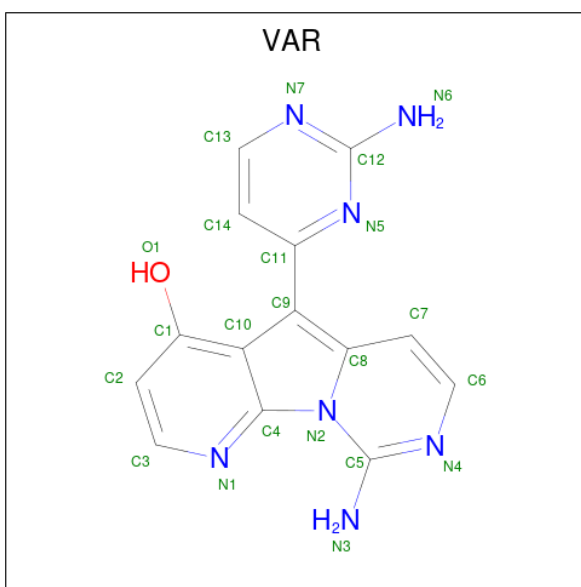
There are 4 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-1	GLY	-	expression tag	UNP P24941
A	0	SER	-	expression tag	UNP P24941
C	-1	GLY	-	expression tag	UNP P24941
C	0	SER	-	expression tag	UNP P24941

- Molecule 2 is a protein called Cyclin-A2.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
2	B	262	Total	C	N	O	S		0	3	0
			2130	1379	346	395	10				
2	D	262	Total	C	N	O	S		0	1	0
			2118	1371	344	393	10				

- Molecule 3 is 9-amino-5-(2-aminopyrimidin-4-yl)pyrido[3',2':4,5]pyrrolo[1,2-c]pyrimidin-4-ol (CCD ID: VAR) (formula: C₁₄H₁₁N₇O).

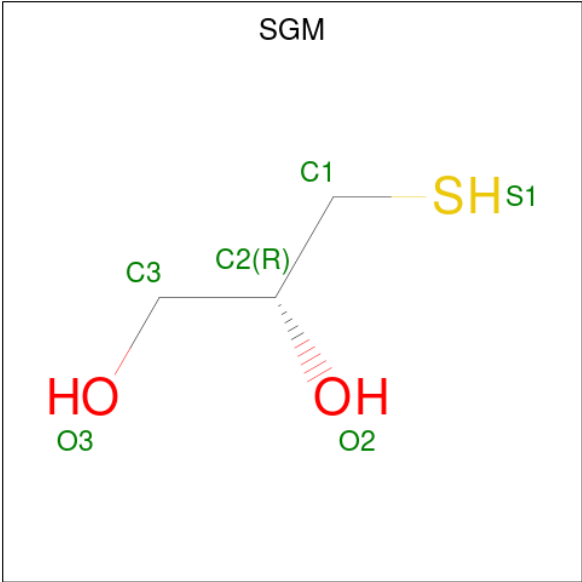


Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
3	A	1	Total	C	N	O	0	0
			22	14	7	1		
3	C	1	Total	C	N	O	0	0
			22	14	7	1		

- Molecule 4 is MAGNESIUM ION (CCD ID: MG) (formula: Mg).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	B	1	Total	Mg	0	0
			1	1		
4	D	1	Total	Mg	0	0
			1	1		

- Molecule 5 is MONOTHIOGLYCEROL (CCD ID: SGM) (formula: C₃H₈O₂S).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
5	B	1	Total	C	O	S	0	0
			6	3	2	1		
5	B	1	Total	C	O	S	0	0
			6	3	2	1		
5	D	1	Total	C	O	S	0	0
			6	3	2	1		

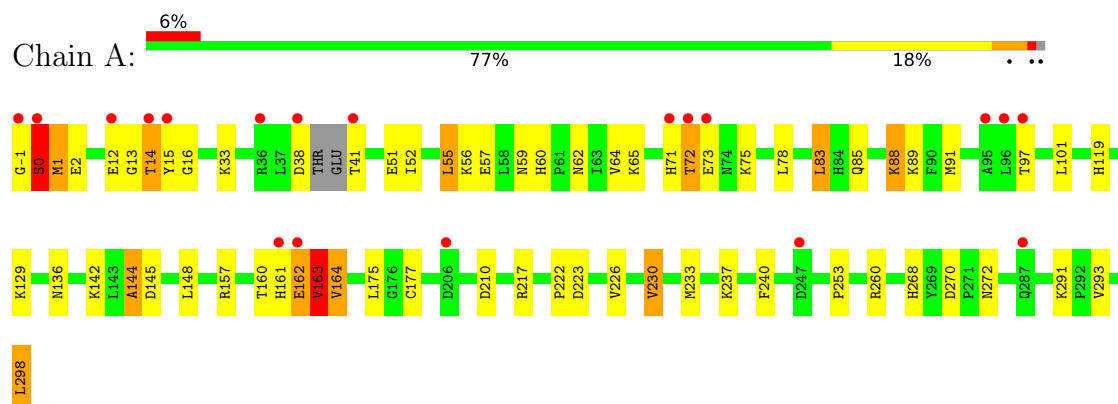
- Molecule 6 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	A	296	Total	O	0	0
			296	296		
6	B	244	Total	O	0	0
			244	244		
6	C	175	Total	O	0	0
			175	175		
6	D	174	Total	O	0	0
			174	174		

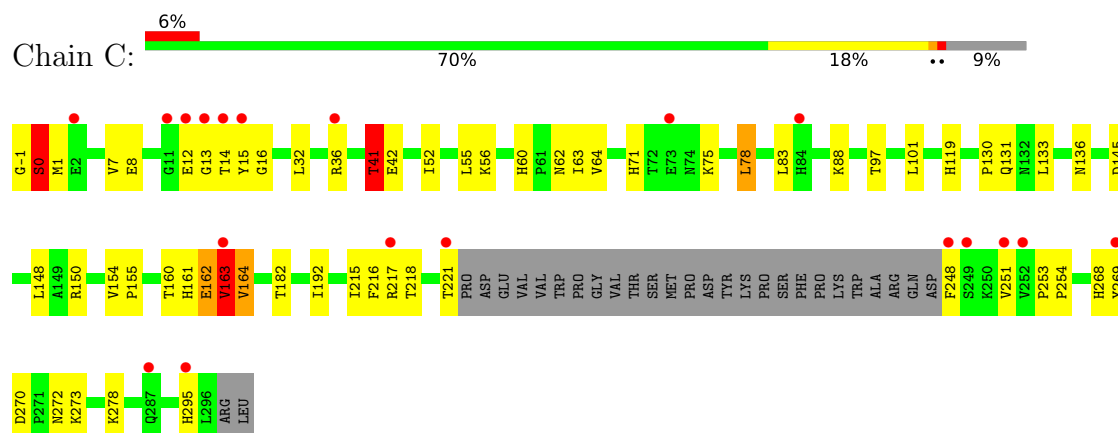
3 Residue-property plots [i](#)

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 and electron density. 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. A red dot above a residue indicates a poor fit to the electron density ($RSRZ > 2$). 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.

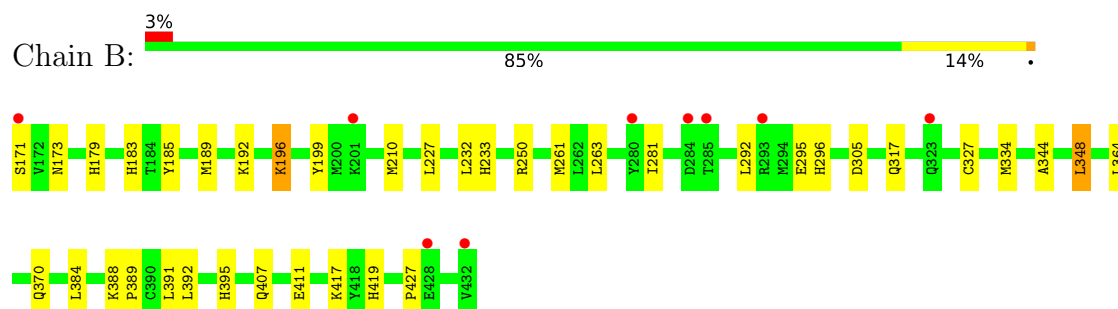
• Molecule 1: Cell division protein kinase 2



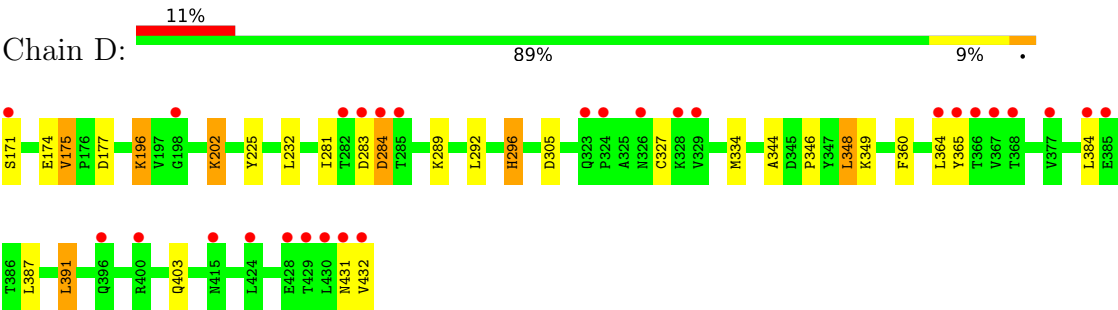
• Molecule 1: Cell division protein kinase 2



• Molecule 2: Cyclin-A2



● Molecule 2: Cyclin-A2



4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	74.16Å 133.97Å 147.88Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	20.00 – 2.10 20.00 – 2.10	Depositor EDS
% Data completeness (in resolution range)	99.7 (20.00-2.10) 99.6 (20.00-2.10)	Depositor EDS
R_{merge}	0.07	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.72 (at 2.09Å)	Xtriage
Refinement program	REFMAC 5.2.0019	Depositor
R, R_{free}	0.182 , 0.229 (Not available) , 0.246	Depositor DCC
R_{free} test set	4327 reflections (5.00%)	wwPDB-VP
Wilson B-factor (Å ²)	28.9	Xtriage
Anisotropy	0.130	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.39 , 52.4	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.32$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.95	EDS
Total number of atoms	9822	wwPDB-VP
Average B, all atoms (Å ²)	36.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.35% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

²Theoretical values of $\langle |L| \rangle$, $\langle L^2 \rangle$ for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

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: MG, SGM, TPO, VAR

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	0.84	5/2494 (0.2%)	0.94	7/3381 (0.2%)
1	C	0.72	3/2227 (0.1%)	0.88	3/3013 (0.1%)
2	B	0.71	1/2190 (0.0%)	0.87	0/2978
2	D	0.62	0/2171	0.93	4/2952 (0.1%)
All	All	0.73	9/9082 (0.1%)	0.91	14/12324 (0.1%)

All (9) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	144	ALA	CA-CB	-7.07	1.41	1.54
1	C	63	ILE	C-O	-6.43	1.17	1.24
1	A	210	ASP	C-O	-6.17	1.17	1.24
1	C	64	VAL	C-O	-6.10	1.18	1.24
1	A	164	VAL	C-O	-6.02	1.17	1.24
1	A	217	ARG	C-O	-5.56	1.16	1.24
1	C	164	VAL	C-O	-5.31	1.17	1.24
1	A	217	ARG	CZ-NH2	-5.18	1.26	1.33
2	B	173	ASN	C-O	-5.11	1.17	1.24

All (14) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	D	174	GLU	N-CA-C	12.50	128.46	111.71
1	A	163	VAL	N-CA-C	11.47	133.20	109.34
1	C	163	VAL	N-CA-C	8.03	126.04	109.34
1	A	162	GLU	CA-C-N	6.51	133.69	121.97
1	A	162	GLU	C-N-CA	6.51	133.69	121.97
2	D	175	VAL	N-CA-C	-6.20	93.64	111.00
1	A	230	VAL	N-CA-C	6.09	117.56	110.62
2	D	174	GLU	CA-C-N	5.70	131.96	121.70

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	D	174	GLU	C-N-CA	5.70	131.96	121.70
1	C	41	THR	CB-CA-C	-5.55	99.38	110.42
1	A	129	LYS	N-CA-C	-5.44	101.94	108.25
1	A	142	LYS	N-CA-C	5.37	118.19	109.06
1	C	253	PRO	N-CA-C	5.32	117.19	110.70
1	A	253	PRO	N-CA-C	5.05	116.86	110.70

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	A	2435	0	2479	62	0
1	C	2186	0	2246	44	0
2	B	2130	0	2146	28	0
2	D	2118	0	2135	21	0
3	A	22	0	11	5	0
3	C	22	0	11	2	0
4	B	1	0	0	0	0
4	D	1	0	0	0	0
5	B	12	0	16	17	0
5	D	6	0	7	1	0
6	A	296	0	0	14	0
6	B	244	0	0	5	0
6	C	175	0	0	10	0
6	D	174	0	0	3	0
All	All	9822	0	9051	162	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 (162) 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:C:15:TYR:HB2	1:C:16:GLY:CA	1.78	1.10
1:C:15:TYR:HB2	1:C:16:GLY:HA3	1.31	1.09
1:A:13[B]:GLY:O	1:A:14[B]:THR:OG1	1.74	1.05
5:B:2:SGM:C1	5:B:2:SGM:C2	2.35	1.04
5:B:2:SGM:C1	5:B:2:SGM:S1	2.49	1.00
5:B:2:SGM:C2	5:B:2:SGM:C3	2.42	0.96
5:B:3:SGM:C1	5:B:3:SGM:S1	2.53	0.96
3:A:299:VAR:H7	6:A:531:HOH:O	1.67	0.95
1:C:71:HIS:HD2	2:D:296:HIS:HE1	1.02	0.94
1:C:71:HIS:HD2	2:D:296:HIS:CE1	1.88	0.92
1:A:175:LEU:HD13	1:A:233:MET:CE	2.02	0.89
5:B:3:SGM:C1	5:B:3:SGM:C2	2.52	0.87
1:A:230:VAL:HG23	1:A:233:MET:HE2	1.58	0.85
1:A:161:HIS:HD2	6:A:355:HOH:O	1.60	0.84
2:D:305:ASP:HB3	5:D:1:SGM:H12	1.59	0.84
1:C:71:HIS:CD2	2:D:296:HIS:HE1	1.93	0.83
3:A:299:VAR:O1	3:A:299:VAR:H14	1.79	0.82
1:A:272:ASN:OD1	2:B:171:SER:HB3	1.80	0.82
2:B:327:CYS:SG	5:B:3:SGM:S1	2.64	0.80
1:C:15:TYR:CB	1:C:16:GLY:HA3	1.99	0.79
5:B:3:SGM:C2	5:B:3:SGM:C3	2.61	0.79
1:A:230:VAL:HG23	1:A:233:MET:CE	2.12	0.79
1:A:230:VAL:CG2	1:A:233:MET:HE2	2.14	0.77
6:A:530:HOH:O	2:B:171:SER:HB2	1.85	0.77
1:C:41:THR:HG23	6:C:433:HOH:O	1.84	0.76
1:A:60:HIS:HD2	1:A:62:ASN:H	1.34	0.74
1:A:13[B]:GLY:C	1:A:14[B]:THR:OG1	2.31	0.73
1:C:15:TYR:HB2	1:C:16:GLY:HA2	1.69	0.73
1:A:12:GLU:HG2	1:A:13[B]:GLY:HA3	1.70	0.73
1:A:15[B]:TYR:CD1	1:A:16[B]:GLY:N	2.57	0.72
1:C:60:HIS:HD2	1:C:62:ASN:H	1.33	0.72
1:C:60:HIS:CD2	1:C:62:ASN:H	2.08	0.71
2:B:192:LYS:O	5:B:2:SGM:H31	1.91	0.70
1:A:175:LEU:HD13	1:A:233:MET:HE1	1.74	0.70
1:A:13[A]:GLY:HA3	1:A:16[A]:GLY:O	1.92	0.69
3:A:299:VAR:N5	6:A:531:HOH:O	2.26	0.69
1:A:175:LEU:HD13	1:A:233:MET:HE3	1.73	0.68
5:B:2:SGM:C1	5:B:2:SGM:C3	2.71	0.68
2:B:183:HIS:HB2	2:B:317:GLN:HE22	1.58	0.67
2:B:344:ALA:HB1	2:B:348:LEU:HD22	1.77	0.67
1:A:60:HIS:CD2	1:A:62:ASN:H	2.14	0.66
2:B:305:ASP:OD2	5:B:2:SGM:H2	1.96	0.66

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:-1:GLY:CA	1:A:0:SER:CB	2.74	0.65
1:C:15:TYR:CB	1:C:16:GLY:CA	2.59	0.64
1:C:161:HIS:O	1:C:162:GLU:C	2.38	0.62
1:C:1:MET:HE1	1:C:32:LEU:HD13	1.82	0.62
1:A:71:HIS:NE2	2:B:296:HIS:CE1	2.68	0.62
1:A:-1:GLY:HA3	1:A:0:SER:CB	2.30	0.61
1:C:268:HIS:HD2	1:C:270:ASP:H	1.47	0.61
2:B:233:HIS:HD2	6:B:443:HOH:O	1.84	0.61
1:C:71:HIS:CD2	2:D:296:HIS:CE1	2.78	0.61
1:C:278:LYS:HE3	2:D:177:ASP:O	2.00	0.61
1:A:72:THR:HG22	1:A:73:GLU:H	1.66	0.61
1:A:72:THR:HB	6:A:467:HOH:O	2.01	0.60
1:A:260:ARG:HD3	6:A:336:HOH:O	2.00	0.60
1:C:218:THR:HG23	1:C:251:VAL:HG21	1.85	0.59
1:A:-1:GLY:HA3	1:A:0:SER:HB2	1.84	0.58
2:D:344:ALA:HB1	2:D:348:LEU:HD22	1.85	0.58
1:A:272:ASN:CG	2:B:171:SER:HB3	2.28	0.58
1:A:83:LEU:HD23	1:A:136:ASN:HB3	1.85	0.57
5:B:2:SGM:C3	5:B:2:SGM:H12	2.35	0.57
1:C:133:LEU:HD11	1:C:192:ILE:HD13	1.85	0.57
2:B:189:MET:CE	5:B:2:SGM:O2	2.52	0.56
1:A:64:VAL:HB	6:A:311:HOH:O	2.06	0.56
2:B:210:MET:HE1	2:B:250:ARG:CB	2.36	0.56
1:A:12:GLU:CG	1:A:13[B]:GLY:HA3	2.36	0.56
2:B:395:HIS:HE1	2:B:427:PRO:O	1.89	0.56
2:B:183:HIS:HD2	6:B:554:HOH:O	1.87	0.56
1:C:272:ASN:OD1	2:D:171:SER:N	2.40	0.55
1:A:175:LEU:CD1	1:A:233:MET:HE1	2.37	0.54
1:C:119:HIS:HD2	6:C:563:HOH:O	1.89	0.54
2:D:346:PRO:O	2:D:349:LYS:HG2	2.08	0.54
1:C:295:HIS:H	1:C:295:HIS:CD2	2.24	0.54
5:B:2:SGM:H31	5:B:2:SGM:H12	1.90	0.53
1:A:15[B]:TYR:OH	3:A:299:VAR:H13	2.07	0.53
2:B:196:LYS:HG3	2:B:199:TYR:HB3	1.91	0.52
1:A:38:ASP:O	1:A:41:THR:N	2.42	0.52
1:A:119:HIS:HD2	6:B:543:HOH:O	1.93	0.52
1:A:-1:GLY:HA2	1:A:0:SER:OG	2.10	0.51
1:A:268:HIS:HD2	1:A:270:ASP:H	1.58	0.51
1:C:52:ILE:O	1:C:56:LYS:HG2	2.11	0.51
2:B:388:LYS:HB3	2:B:389:PRO:HD3	1.92	0.51
2:B:388:LYS:HE2	2:B:392:LEU:HD11	1.92	0.51

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:D:202:LYS:NZ	6:D:635:HOH:O	2.42	0.51
2:D:387:LEU:O	2:D:391:LEU:HB2	2.11	0.51
1:C:83:LEU:HD23	1:C:136:ASN:HB3	1.93	0.50
1:A:-1:GLY:CA	1:A:0:SER:OG	2.59	0.50
1:C:7:VAL:HG12	1:C:8:GLU:HG2	1.92	0.50
1:A:59[A]:ASN:HD21	1:A:65:LYS:HE3	1.76	0.50
1:C:0:SER:HA	6:C:420:HOH:O	2.11	0.50
1:C:161:HIS:O	1:C:162:GLU:O	2.29	0.50
2:D:283:ASP:O	2:D:284:ASP:CB	2.59	0.50
1:A:52:ILE:O	1:A:56:LYS:HG2	2.12	0.50
1:A:13[B]:GLY:HA2	1:A:16[B]:GLY:O	2.12	0.49
1:A:161:HIS:O	1:A:161:HIS:CG	2.64	0.49
1:A:223:ASP:H	1:A:226:VAL:HG12	1.76	0.49
5:B:2:SGM:C2	5:B:2:SGM:O2	2.61	0.49
2:B:179[A]:HIS:CE1	6:B:490:HOH:O	2.66	0.49
1:C:13:GLY:C	1:C:15:TYR:H	2.21	0.49
1:A:60:HIS:HE1	6:A:443:HOH:O	1.96	0.49
1:A:64:VAL:HG21	1:A:144:ALA:HB2	1.96	0.47
5:B:3:SGM:S1	5:B:3:SGM:C2	3.02	0.47
1:C:36:ARG:HH11	1:C:75:LYS:HE3	1.80	0.47
1:C:216:PHE:HB3	1:C:221:THR:HG23	1.97	0.47
5:B:3:SGM:C2	5:B:3:SGM:O2	2.63	0.46
1:C:-1:GLY:O	1:C:0:SER:O	2.32	0.46
2:D:283:ASP:O	2:D:284:ASP:HB3	2.15	0.46
1:A:175:LEU:CD1	1:A:233:MET:CE	2.84	0.46
3:C:299:VAR:H14	3:C:299:VAR:O1	2.16	0.46
2:D:365:TYR:OH	2:D:431:ASN:OD1	2.34	0.46
1:C:36:ARG:NH1	1:C:75:LYS:HE3	2.31	0.45
1:C:161:HIS:HD2	6:C:374:HOH:O	1.98	0.45
1:A:85:GLN:HG2	1:A:298:LEU:HG	1.97	0.45
1:C:248:PHE:N	6:C:348:HOH:O	2.50	0.45
1:A:237:LYS:HD3	1:A:240:PHE:CE1	2.51	0.45
2:B:407:GLN:O	2:B:411:GLU:HG2	2.16	0.45
1:A:13[A]:GLY:CA	1:A:16[A]:GLY:O	2.64	0.45
2:B:305:ASP:CG	5:B:2:SGM:H2	2.42	0.45
2:D:360:PHE:O	2:D:364:LEU:HB2	2.17	0.45
1:A:88:LYS:HE3	6:A:378:HOH:O	2.17	0.44
1:C:254:PRO:HA	6:C:459:HOH:O	2.16	0.44
1:C:270:ASP:HB3	1:C:273:LYS:HB2	2.00	0.44
3:C:299:VAR:N5	3:C:299:VAR:H7	2.32	0.44
1:A:162:GLU:HG2	1:A:163:VAL:H	1.82	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
6:C:434:HOH:O	2:D:296:HIS:HD2	2.00	0.44
1:A:15[B]:TYR:CD1	1:A:33:LYS:HE3	2.53	0.44
1:A:57:GLU:HB3	2:B:185:TYR:OH	2.18	0.44
2:D:196:LYS:HE3	6:D:688:HOH:O	2.17	0.43
2:B:196:LYS:CG	2:B:199:TYR:HB3	2.48	0.43
1:A:51:GLU:O	1:A:55:LEU:HB2	2.19	0.43
2:B:210:MET:HE1	2:B:250:ARG:HB2	2.01	0.43
2:B:327:CYS:HB3	2:B:419:HIS:CE1	2.54	0.43
6:C:434:HOH:O	2:D:296:HIS:CD2	2.72	0.43
1:C:88:LYS:HB2	1:C:130:PRO:HB2	2.00	0.43
1:C:119:HIS:CD2	1:C:182:THR:HB	2.54	0.43
1:A:230:VAL:HG23	1:A:233:MET:HE1	1.94	0.43
2:B:364:LEU:HG	2:B:370:GLN:HB2	2.01	0.43
2:D:225:TYR:HE2	2:D:281:ILE:HG21	1.83	0.43
1:C:41:THR:HB	1:C:42:GLU:H	1.38	0.42
2:D:327:CYS:HB2	6:D:683:HOH:O	2.18	0.42
1:A:12:GLU:HA	1:A:13[A]:GLY:HA3	1.85	0.42
1:A:0:SER:HB3	1:A:1:MET:H	1.45	0.42
1:A:177[B]:CYS:SG	1:A:233:MET:SD	3.18	0.42
1:C:12:GLU:HG2	1:C:16:GLY:O	2.19	0.42
1:A:88:LYS:HA	1:A:91:MET:CE	2.51	0.41
1:A:157:ARG:HD3	6:A:483:HOH:O	2.19	0.41
2:B:227:LEU:HD12	2:B:261:MET:HE3	2.02	0.41
2:B:263:LEU:HD21	2:B:295:GLU:HG3	2.02	0.41
1:A:222:PRO:HA	1:A:226:VAL:HG11	2.03	0.41
1:C:161:HIS:CE1	6:C:360:HOH:O	2.72	0.41
1:A:291:LYS:NZ	6:A:375:HOH:O	2.53	0.41
2:B:171:SER:HB2	6:B:592:HOH:O	2.20	0.41
1:C:215:ILE:HG22	1:C:269:TYR:HE1	1.85	0.41
1:A:162:GLU:HA	6:A:525:HOH:O	2.19	0.41
1:A:161:HIS:CD2	6:A:355:HOH:O	2.49	0.41
1:A:162:GLU:HG2	1:A:163:VAL:N	2.36	0.41
1:C:41:THR:HG21	6:C:407:HOH:O	2.19	0.41
1:C:154:VAL:HA	1:C:155:PRO:HA	1.97	0.41
1:C:52:ILE:HD11	1:C:78:LEU:HD21	2.03	0.40
1:A:89:LYS:HE2	6:A:534:HOH:O	2.20	0.40
1:A:64:VAL:HG11	3:A:299:VAR:HN3	1.87	0.40
2:D:334:MET:HA	2:D:334:MET:HE2	2.04	0.40

There are no symmetry-related clashes.

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	300/300 (100%)	289 (96%)	5 (2%)	6 (2%)	6	2
1	C	268/300 (89%)	255 (95%)	8 (3%)	5 (2%)	6	3
2	B	263/262 (100%)	261 (99%)	2 (1%)	0	100	100
2	D	261/262 (100%)	256 (98%)	4 (2%)	1 (0%)	30	28
All	All	1092/1124 (97%)	1061 (97%)	19 (2%)	12 (1%)	12	8

All (12) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	0	SER
1	A	163	VAL
1	C	0	SER
1	C	162	GLU
1	C	163	VAL
1	A	14[A]	THR
1	A	14[B]	THR
1	A	164	VAL
2	D	284	ASP
1	C	164	VAL
1	C	145	ASP
1	A	145	ASP

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	266/263 (101%)	251 (94%)	15 (6%)	19	18
1	C	238/263 (90%)	226 (95%)	12 (5%)	22	22
2	B	238/235 (101%)	229 (96%)	9 (4%)	29	32
2	D	236/235 (100%)	224 (95%)	12 (5%)	21	21
All	All	978/996 (98%)	930 (95%)	48 (5%)	22	22

All (48) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	0	SER
1	A	1	MET
1	A	2	GLU
1	A	55	LEU
1	A	72	THR
1	A	75	LYS
1	A	78	LEU
1	A	83	LEU
1	A	88	LYS
1	A	97	THR
1	A	101	LEU
1	A	148	LEU
1	A	163	VAL
1	A	293	VAL
1	A	298	LEU
2	B	196	LYS
2	B	232	LEU
2	B	281	ILE
2	B	292	LEU
2	B	334	MET
2	B	348	LEU
2	B	384	LEU
2	B	391	LEU
2	B	417	LYS
1	C	0	SER
1	C	14	THR
1	C	41	THR
1	C	55	LEU
1	C	78	LEU
1	C	97	THR
1	C	101	LEU
1	C	131	GLN
1	C	148	LEU

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Mol	Chain	Res	Type
1	C	150	ARG
1	C	163	VAL
1	C	217	ARG
2	D	175	VAL
2	D	196	LYS
2	D	202	LYS
2	D	232	LEU
2	D	289	LYS
2	D	292	LEU
2	D	296	HIS
2	D	348	LEU
2	D	384	LEU
2	D	391	LEU
2	D	403	GLN
2	D	432	VAL

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (31) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	60	HIS
1	A	85	GLN
1	A	119	HIS
1	A	161	HIS
1	A	246	GLN
1	A	268	HIS
2	B	183	HIS
2	B	228	GLN
2	B	233	HIS
2	B	254	GLN
2	B	296	HIS
2	B	317	GLN
2	B	395	HIS
2	B	403	GLN
2	B	431	ASN
1	C	60	HIS
1	C	71	HIS
1	C	74	ASN
1	C	84	HIS
1	C	85	GLN
1	C	119	HIS
1	C	265	GLN
1	C	268	HIS

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Mol	Chain	Res	Type
1	C	295	HIS
2	D	173	ASN
2	D	233	HIS
2	D	254	GLN
2	D	296	HIS
2	D	312	ASN
2	D	317	GLN
2	D	396	GLN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

5.4 Non-standard residues in protein, DNA, RNA chains ⓘ

2 non-standard protein/DNA/RNA residues 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$
1	TPO	C	160	1	8,10,11	2.20	4 (50%)	10,14,16	1.02	1 (10%)
1	TPO	A	160	1	8,10,11	2.47	3 (37%)	10,14,16	0.87	0

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
1	TPO	C	160	1	-	1/9/11/13	-
1	TPO	A	160	1	-	1/9/11/13	-

All (7) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	160	TPO	P-O1P	-4.29	1.37	1.50
1	A	160	TPO	P-O2P	-3.93	1.40	1.54
1	C	160	TPO	P-O2P	-3.30	1.42	1.54
1	C	160	TPO	P-O3P	-3.13	1.43	1.54
1	C	160	TPO	P-O1P	-3.02	1.41	1.50
1	A	160	TPO	P-O3P	-2.93	1.43	1.54
1	C	160	TPO	P-OG1	-2.79	1.54	1.59

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	C	160	TPO	O-C-CA	-2.16	119.21	124.77

There are no chirality outliers.

All (2) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
1	A	160	TPO	O-C-CA-CB
1	C	160	TPO	O-C-CA-CB

There are no ring outliers.

No monomer is involved in short contacts.

5.5 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

Of 7 ligands modelled in this entry, 2 are monoatomic - leaving 5 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
5	SGM	B	2	-	5,5,5	32.53	5 (100%)	5,5,5	7.64	4 (80%)
5	SGM	B	3	-	5,5,5	35.11	5 (100%)	5,5,5	10.95	5 (100%)
3	VAR	C	299	-	24,25,25	2.42	5 (20%)	28,37,37	3.24	10 (35%)
5	SGM	D	1	-	5,5,5	0.49	0	5,5,5	0.43	0
3	VAR	A	299	-	24,25,25	2.39	5 (20%)	28,37,37	3.05	14 (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
5	SGM	B	2	-	-	3/4/4/4	-
5	SGM	B	3	-	-	2/4/4/4	-
3	VAR	C	299	-	-	2/4/4/4	0/4/4/4
5	SGM	D	1	-	-	0/4/4/4	-
3	VAR	A	299	-	-	2/4/4/4	0/4/4/4

All (20) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
5	B	3	SGM	O2-C2	41.42	2.63	1.43
5	B	2	SGM	O2-C2	40.56	2.61	1.43
5	B	3	SGM	C1-S1	35.16	2.53	1.81
5	B	3	SGM	O3-C3	34.84	2.88	1.42
5	B	2	SGM	O3-C3	34.65	2.87	1.42
5	B	3	SGM	C1-C2	34.21	2.52	1.51
5	B	2	SGM	C1-S1	32.89	2.49	1.81
5	B	3	SGM	C3-C2	28.78	2.61	1.51
5	B	2	SGM	C1-C2	28.27	2.35	1.51
5	B	2	SGM	C3-C2	23.76	2.42	1.51
3	A	299	VAR	C9-C8	6.79	1.50	1.38
3	C	299	VAR	C9-C8	6.77	1.50	1.38
3	A	299	VAR	C10-C4	5.79	1.48	1.40
3	C	299	VAR	C10-C4	5.61	1.48	1.40
3	C	299	VAR	C10-C1	5.23	1.49	1.41
3	A	299	VAR	C10-C1	4.83	1.49	1.41
3	C	299	VAR	C8-N2	-3.52	1.34	1.40
3	A	299	VAR	C4-N2	-2.99	1.35	1.39
3	A	299	VAR	C8-N2	-2.97	1.35	1.40
3	C	299	VAR	C4-N2	-2.75	1.35	1.39

All (33) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	B	3	SGM	C2-C1-S1	-14.69	73.39	114.43
5	B	2	SGM	C1-C2-C3	-13.37	69.14	111.94
5	B	3	SGM	C1-C2-C3	-12.20	72.89	111.94
5	B	3	SGM	O3-C3-C2	-10.50	63.11	110.38
5	B	3	SGM	O2-C2-C1	-9.11	79.76	108.96
3	C	299	VAR	C10-C4-N1	-7.73	118.76	126.97
3	C	299	VAR	C4-C10-C9	-7.43	100.92	107.32
5	B	2	SGM	O3-C3-C2	-7.41	77.02	110.38
3	A	299	VAR	C10-C4-N1	-7.33	119.19	126.97
5	B	2	SGM	C2-C1-S1	-6.76	95.56	114.43
5	B	3	SGM	O2-C2-C3	-6.44	82.51	109.18
3	A	299	VAR	C4-C10-C9	-6.40	101.80	107.32
3	C	299	VAR	C11-N5-C12	6.20	120.94	116.37
3	C	299	VAR	N7-C12-N5	-5.40	119.69	125.70
3	A	299	VAR	C11-N5-C12	5.27	120.26	116.37
3	C	299	VAR	N6-C12-N7	5.17	122.75	117.40
3	C	299	VAR	C13-N7-C12	5.03	121.21	116.21
3	A	299	VAR	C13-N7-C12	4.43	120.62	116.21
3	A	299	VAR	N7-C12-N5	-4.37	120.83	125.70
3	A	299	VAR	C13-C14-C11	4.03	119.50	117.02
3	C	299	VAR	C7-C6-N4	-3.87	119.77	125.01
3	A	299	VAR	C14-C13-N7	-3.78	119.34	123.97
3	A	299	VAR	C7-C6-N4	-3.72	119.98	125.01
3	A	299	VAR	C9-C11-N5	3.51	120.46	116.81
3	C	299	VAR	C14-C13-N7	-3.41	119.80	123.97
5	B	2	SGM	O2-C2-C1	-3.00	99.35	108.96
3	A	299	VAR	C14-C11-N5	-2.97	119.46	122.92
3	A	299	VAR	C2-C1-C10	-2.68	116.73	120.15
3	C	299	VAR	C2-C1-C10	-2.67	116.74	120.15
3	C	299	VAR	C3-N1-C4	2.56	120.84	115.05
3	A	299	VAR	N6-C12-N7	2.32	119.80	117.40
3	A	299	VAR	C3-N1-C4	2.09	119.79	115.05
3	A	299	VAR	C6-N4-C5	2.01	120.90	116.25

There are no chirality outliers.

All (9) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	A	299	VAR	C14-C11-C9-C10
3	C	299	VAR	C14-C11-C9-C10
5	B	2	SGM	S1-C1-C2-C3

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Mol	Chain	Res	Type	Atoms
5	B	3	SGM	S1-C1-C2-C3
5	B	3	SGM	O2-C2-C3-O3
5	B	2	SGM	C1-C2-C3-O3
3	A	299	VAR	N5-C11-C9-C10
5	B	2	SGM	S1-C1-C2-O2
3	C	299	VAR	N5-C11-C9-C10

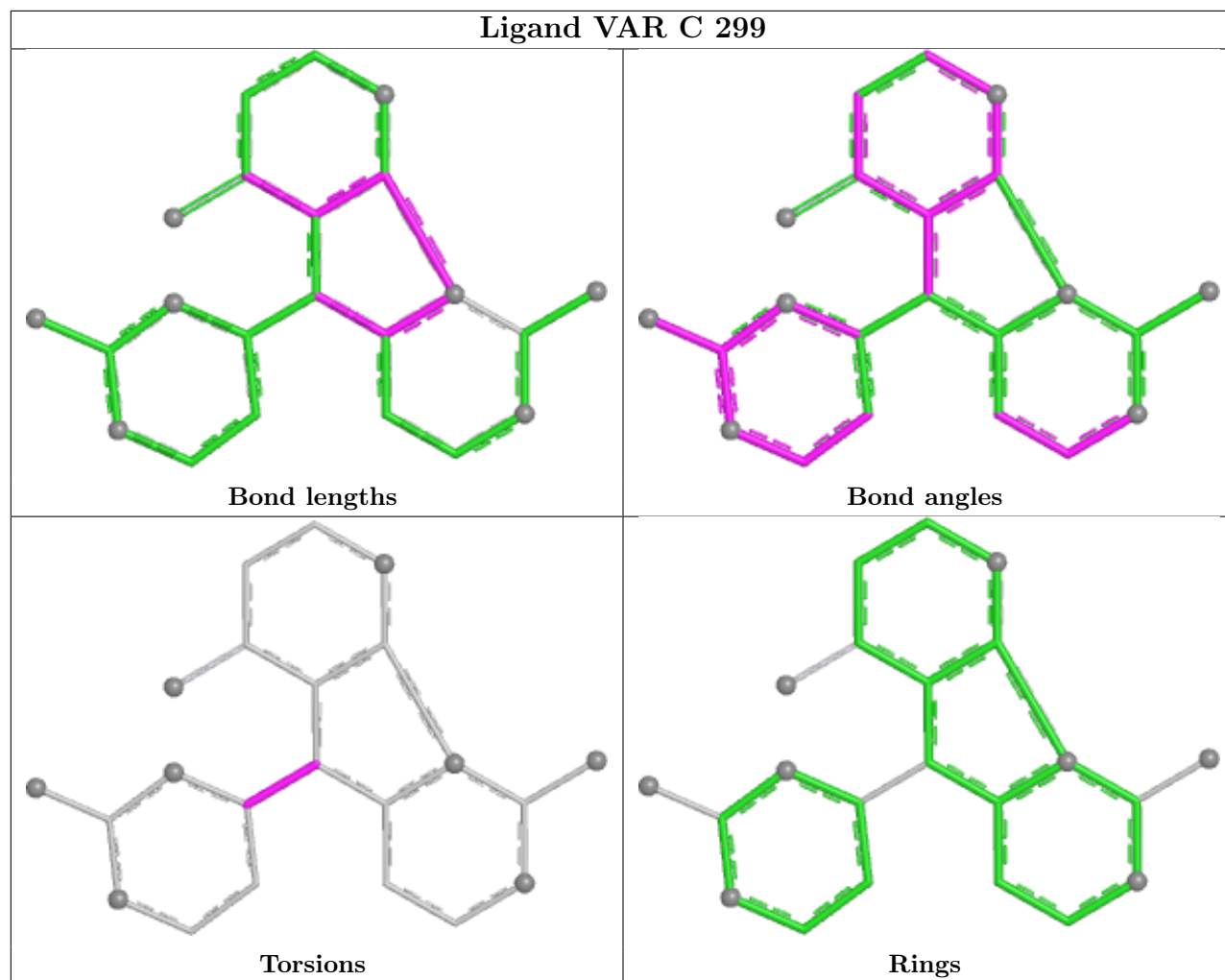
There are no ring outliers.

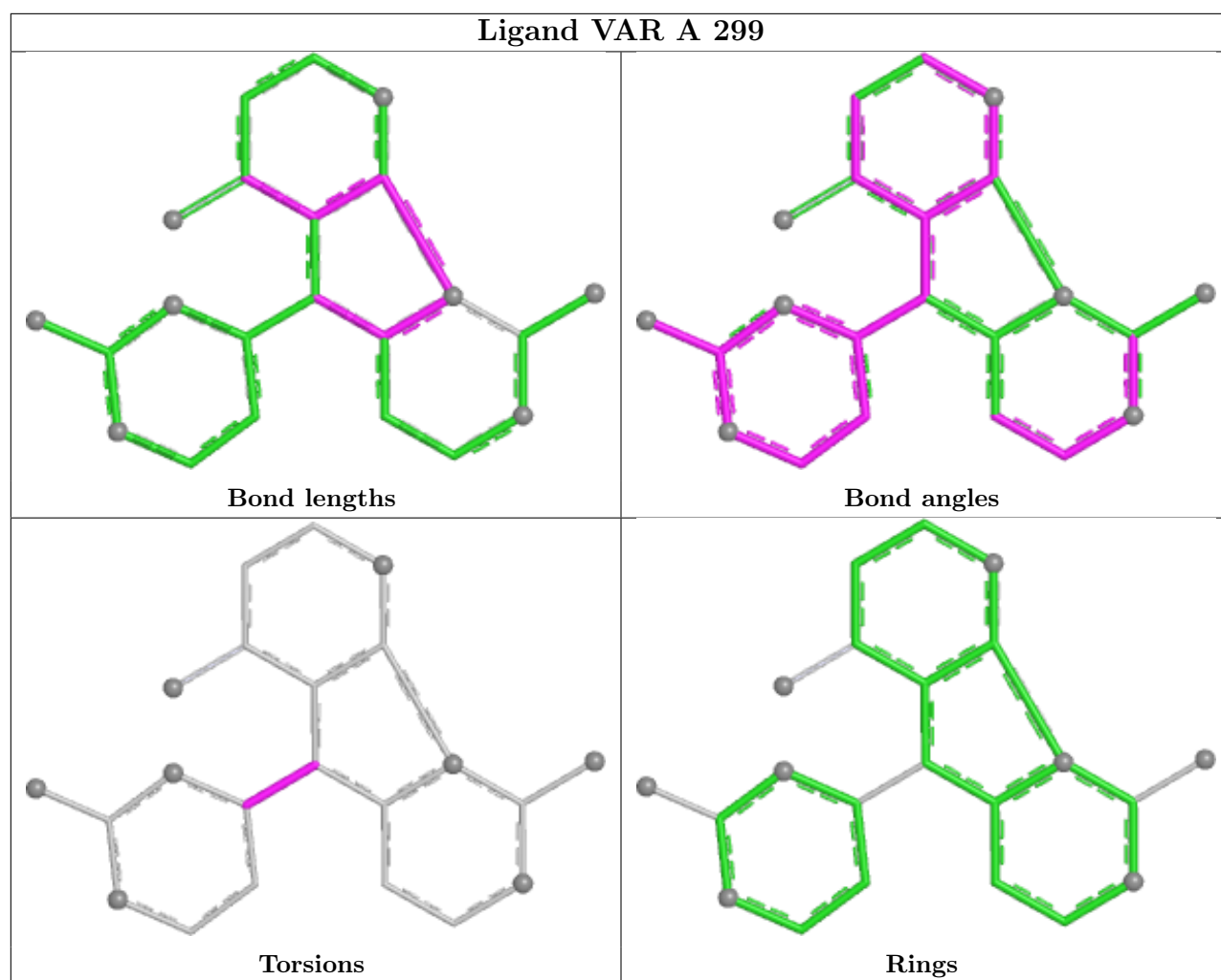
5 monomers are involved in 25 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
5	B	2	SGM	11	0
5	B	3	SGM	6	0
3	C	299	VAR	2	0
5	D	1	SGM	1	0
3	A	299	VAR	5	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.

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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 ⓘ

In the following table, the column labelled ‘#RSRZ> 2’ contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 95th percentile and maximum values of the occupancy-weighted average B-factor per residue. The column labelled ‘Q< 0.9’ lists the number of (and percentage) of residues with an average occupancy less than 0.9.

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2		OWAB(Å ²)	Q<0.9
1	A	297/300 (99%)	0.10	19 (6%)	25 27	15, 28, 51, 62	7 (2%)
1	C	271/300 (90%)	0.50	19 (7%)	22 24	22, 38, 61, 87	1 (0%)
2	B	262/262 (100%)	0.09	9 (3%)	48 50	13, 32, 43, 55	3 (1%)
2	D	262/262 (100%)	0.70	28 (10%)	11 11	20, 39, 58, 75	1 (0%)
All	All	1092/1124 (97%)	0.34	75 (6%)	23 24	13, 35, 55, 87	12 (1%)

All (75) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
2	D	171	SER	8.8
2	B	171	SER	6.9
2	D	432	VAL	5.9
1	C	248	PHE	5.8
1	A	15[A]	TYR	5.4
2	B	432	VAL	5.2
1	A	96	LEU	4.9
1	C	249	SER	4.5
2	D	284	ASP	3.9
1	A	0	SER	3.9
1	C	251	VAL	3.8
1	A	162	GLU	3.8
2	D	324	PRO	3.5
1	C	15	TYR	3.5
1	C	287	GLN	3.5
2	D	283	ASP	3.4
2	D	323	GLN	3.4
1	A	71	HIS	3.4
1	C	269	TYR	3.3
1	C	13	GLY	3.2
2	D	365	TYR	3.1

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Mol	Chain	Res	Type	RSRZ
2	D	429	THR	3.1
2	B	428	GLU	3.1
1	A	-1	GLY	3.1
1	C	221	THR	3.1
2	D	428	GLU	3.0
1	C	295	HIS	2.9
1	C	163	VAL	2.9
2	B	201	LYS	2.9
1	A	41	THR	2.9
1	C	252	VAL	2.8
1	A	97	THR	2.8
2	D	415	ASN	2.7
1	A	73	GLU	2.6
1	C	11	GLY	2.6
1	A	161	HIS	2.6
2	D	285	THR	2.6
2	D	431	ASN	2.5
2	D	385	GLU	2.4
2	B	280	TYR	2.4
1	C	84	HIS	2.4
1	C	12	GLU	2.4
2	D	329	VAL	2.4
1	A	36	ARG	2.4
1	A	72	THR	2.4
2	B	284	ASP	2.4
2	B	293	ARG	2.4
1	C	14	THR	2.4
2	B	285	THR	2.4
2	D	282	THR	2.4
2	D	384	LEU	2.3
2	D	328	LYS	2.3
1	A	287	GLN	2.3
2	D	364	LEU	2.3
2	D	424	LEU	2.3
2	D	326	ASN	2.3
1	C	36	ARG	2.3
2	D	430	LEU	2.3
1	A	14[A]	THR	2.3
2	D	377	VAL	2.2
1	C	2	GLU	2.2
2	D	400	ARG	2.2
2	B	323	GLN	2.2

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Mol	Chain	Res	Type	RSRZ
1	C	73	GLU	2.1
2	D	368	THR	2.1
2	D	396	GLN	2.1
1	A	12	GLU	2.1
1	A	206[A]	ASP	2.1
2	D	198	GLY	2.1
2	D	367	VAL	2.1
1	A	95	ALA	2.1
1	A	38	ASP	2.0
1	C	217	ARG	2.0
2	D	366	THR	2.0
1	A	247	ASP	2.0

6.2 Non-standard residues in protein, DNA, RNA chains [i](#)

In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
1	TPO	A	160	11/12	0.97	0.07	24,28,30,31	0
1	TPO	C	160	11/12	0.97	0.07	35,38,41,41	0

6.3 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

6.4 Ligands [i](#)

In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

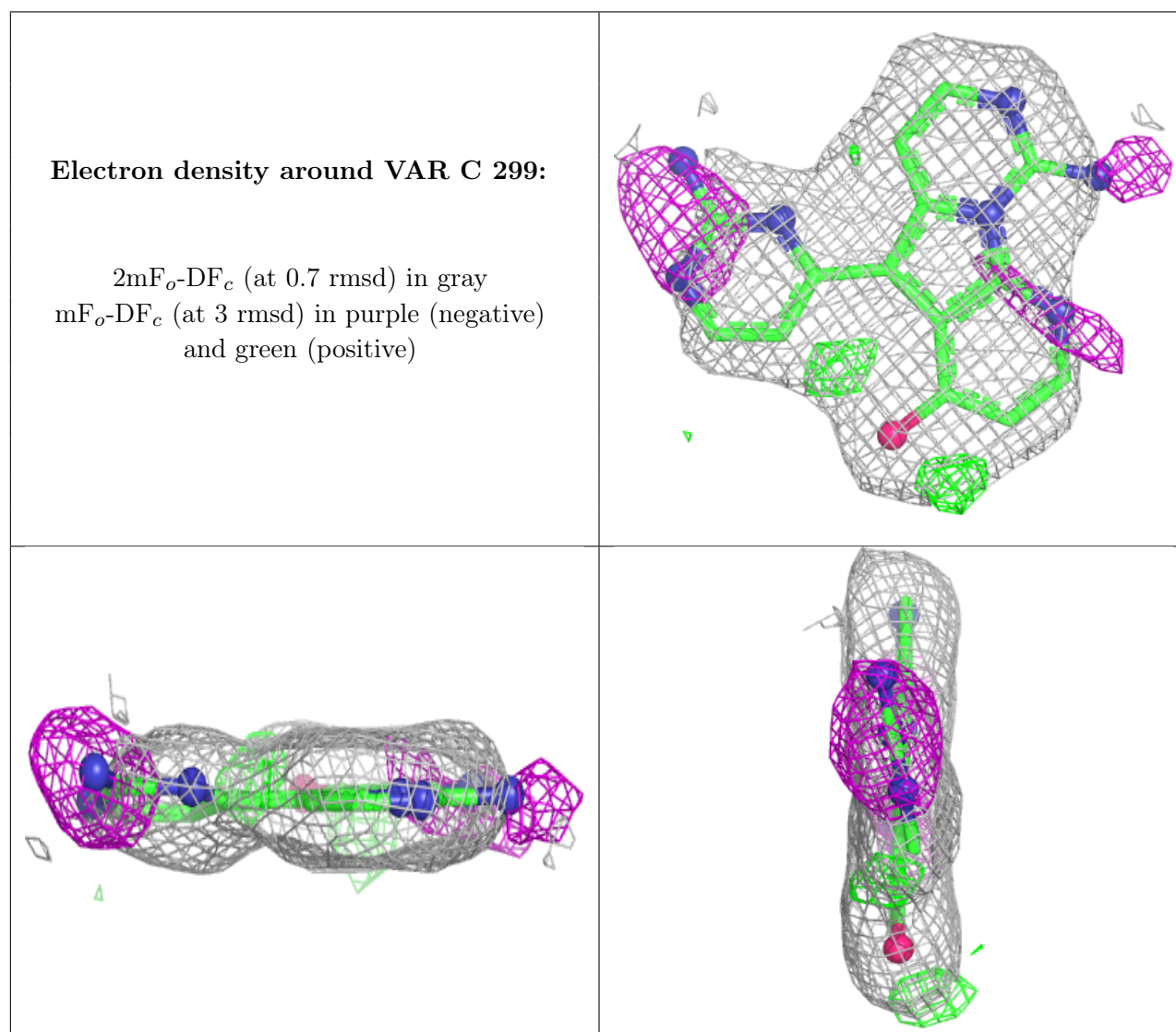
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
3	VAR	C	299	22/22	0.72	0.17	46,47,50,50	0
5	SGM	B	3	6/6	0.72	0.32	78,80,80,80	0
5	SGM	B	2	6/6	0.76	0.29	44,47,50,55	0
3	VAR	A	299	22/22	0.76	0.14	34,34,40,40	0

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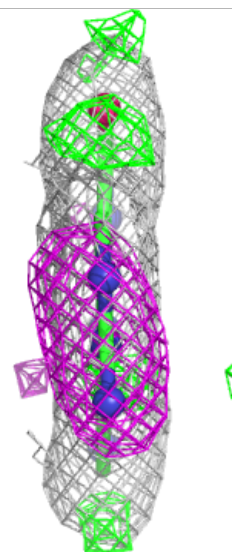
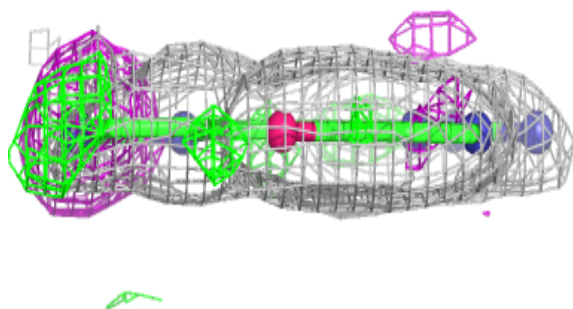
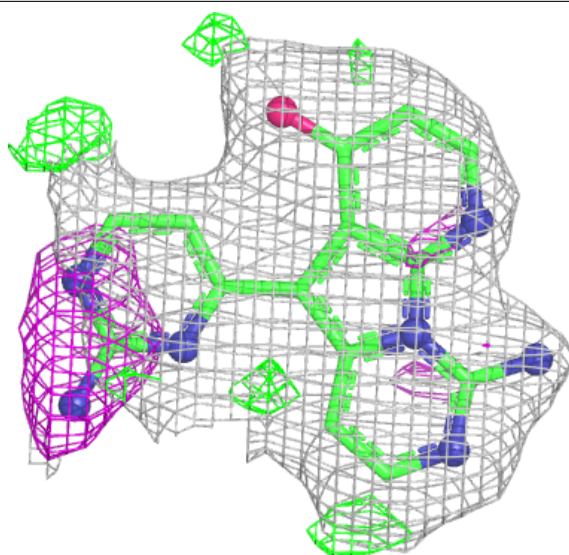
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
5	SGM	D	1	6/6	0.93	0.12	44,51,52,54	0
4	MG	D	2	1/1	0.97	0.15	31,31,31,31	0
4	MG	B	1	1/1	0.98	0.07	38,38,38,38	0

The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation to approximate a three-dimensional view.



Electron density around VAR A 299:

$2mF_o-DF_c$ (at 0.7 rmsd) in gray
 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)



6.5 Other polymers [i](#)

There are no such residues in this entry.