



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 6, 2026 – 03:53 PM UTC

PDB ID : 6MVX / pdb_00006mvx
Title : NavAb Voltage-gated Sodium Channel, I217C, in Complex with Class 1C Anti-arrhythmic Flecainide
Authors : Lenaeus, M.J.; Catterall, W.A.
Deposited on : 2018-10-28
Resolution : 3.46 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

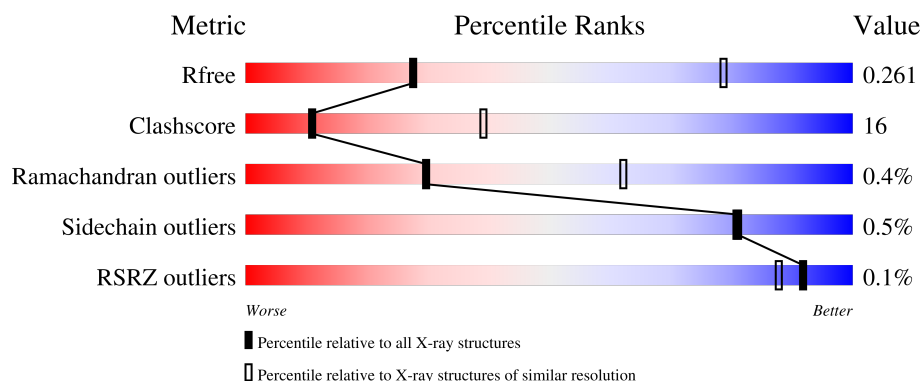
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 3.46 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	1070 (3.50-3.42)
Clashscore	190562	1128 (3.50-3.42)
Ramachandran outliers	187476	1101 (3.50-3.42)
Sidechain outliers	187428	1102 (3.50-3.42)
RSRZ outliers	180081	1070 (3.50-3.42)

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	285	50% 24% • 25%
1	B	285	50% 24% 26%
1	C	285	52% 22% 25%
1	D	285	48% 26% 27%

2 Entry composition

There are 3 unique types of molecules in this entry. The entry contains 6587 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 Ion transport protein.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	213	Total	C	N	O	S	0	0	0
			1632	1106	246	271	9			
1	B	211	Total	C	N	O	S	0	0	0
			1608	1091	244	265	8			
1	C	214	Total	C	N	O	S	0	0	0
			1647	1119	246	272	10			
1	D	209	Total	C	N	O	S	0	0	0
			1622	1101	242	269	10			

There are 76 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	983	MET	-	initiating methionine	UNP A8EVM5
A	984	ASP	-	expression tag	UNP A8EVM5
A	985	TYR	-	expression tag	UNP A8EVM5
A	986	LYS	-	expression tag	UNP A8EVM5
A	987	ASP	-	expression tag	UNP A8EVM5
A	988	ASP	-	expression tag	UNP A8EVM5
A	989	ASP	-	expression tag	UNP A8EVM5
A	990	ASP	-	expression tag	UNP A8EVM5
A	991	LYS	-	expression tag	UNP A8EVM5
A	992	GLY	-	expression tag	UNP A8EVM5
A	993	SER	-	expression tag	UNP A8EVM5
A	994	LEU	-	expression tag	UNP A8EVM5
A	995	VAL	-	expression tag	UNP A8EVM5
A	996	PRO	-	expression tag	UNP A8EVM5
A	997	ARG	-	expression tag	UNP A8EVM5
A	998	GLY	-	expression tag	UNP A8EVM5
A	999	SER	-	expression tag	UNP A8EVM5
A	1000	HIS	-	expression tag	UNP A8EVM5
A	1217	CYS	ILE	engineered mutation	UNP A8EVM5
B	1983	MET	-	initiating methionine	UNP A8EVM5
B	1984	ASP	-	expression tag	UNP A8EVM5

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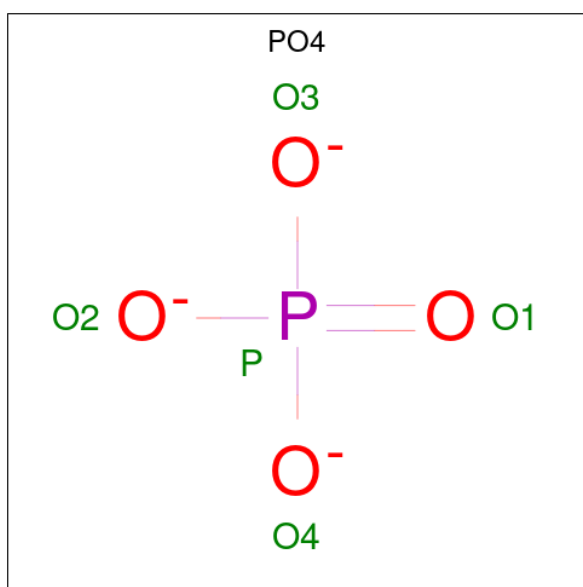
Chain	Residue	Modelled	Actual	Comment	Reference
B	1985	TYR	-	expression tag	UNP A8EVM5
B	1986	LYS	-	expression tag	UNP A8EVM5
B	1987	ASP	-	expression tag	UNP A8EVM5
B	1988	ASP	-	expression tag	UNP A8EVM5
B	1989	ASP	-	expression tag	UNP A8EVM5
B	1990	ASP	-	expression tag	UNP A8EVM5
B	1991	LYS	-	expression tag	UNP A8EVM5
B	1992	GLY	-	expression tag	UNP A8EVM5
B	1993	SER	-	expression tag	UNP A8EVM5
B	1994	LEU	-	expression tag	UNP A8EVM5
B	1995	VAL	-	expression tag	UNP A8EVM5
B	1996	PRO	-	expression tag	UNP A8EVM5
B	1997	ARG	-	expression tag	UNP A8EVM5
B	1998	GLY	-	expression tag	UNP A8EVM5
B	1999	SER	-	expression tag	UNP A8EVM5
B	2000	HIS	-	expression tag	UNP A8EVM5
B	2217	CYS	ILE	engineered mutation	UNP A8EVM5
C	983	MET	-	initiating methionine	UNP A8EVM5
C	984	ASP	-	expression tag	UNP A8EVM5
C	985	TYR	-	expression tag	UNP A8EVM5
C	986	LYS	-	expression tag	UNP A8EVM5
C	987	ASP	-	expression tag	UNP A8EVM5
C	988	ASP	-	expression tag	UNP A8EVM5
C	989	ASP	-	expression tag	UNP A8EVM5
C	990	ASP	-	expression tag	UNP A8EVM5
C	991	LYS	-	expression tag	UNP A8EVM5
C	992	GLY	-	expression tag	UNP A8EVM5
C	993	SER	-	expression tag	UNP A8EVM5
C	994	LEU	-	expression tag	UNP A8EVM5
C	995	VAL	-	expression tag	UNP A8EVM5
C	996	PRO	-	expression tag	UNP A8EVM5
C	997	ARG	-	expression tag	UNP A8EVM5
C	998	GLY	-	expression tag	UNP A8EVM5
C	999	SER	-	expression tag	UNP A8EVM5
C	1000	HIS	-	expression tag	UNP A8EVM5
C	1217	CYS	ILE	engineered mutation	UNP A8EVM5
D	1983	MET	-	initiating methionine	UNP A8EVM5
D	1984	ASP	-	expression tag	UNP A8EVM5
D	1985	TYR	-	expression tag	UNP A8EVM5
D	1986	LYS	-	expression tag	UNP A8EVM5
D	1987	ASP	-	expression tag	UNP A8EVM5
D	1988	ASP	-	expression tag	UNP A8EVM5

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Chain	Residue	Modelled	Actual	Comment	Reference
D	1989	ASP	-	expression tag	UNP A8EVM5
D	1990	ASP	-	expression tag	UNP A8EVM5
D	1991	LYS	-	expression tag	UNP A8EVM5
D	1992	GLY	-	expression tag	UNP A8EVM5
D	1993	SER	-	expression tag	UNP A8EVM5
D	1994	LEU	-	expression tag	UNP A8EVM5
D	1995	VAL	-	expression tag	UNP A8EVM5
D	1996	PRO	-	expression tag	UNP A8EVM5
D	1997	ARG	-	expression tag	UNP A8EVM5
D	1998	GLY	-	expression tag	UNP A8EVM5
D	1999	SER	-	expression tag	UNP A8EVM5
D	2000	HIS	-	expression tag	UNP A8EVM5
D	2217	CYS	ILE	engineered mutation	UNP A8EVM5

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



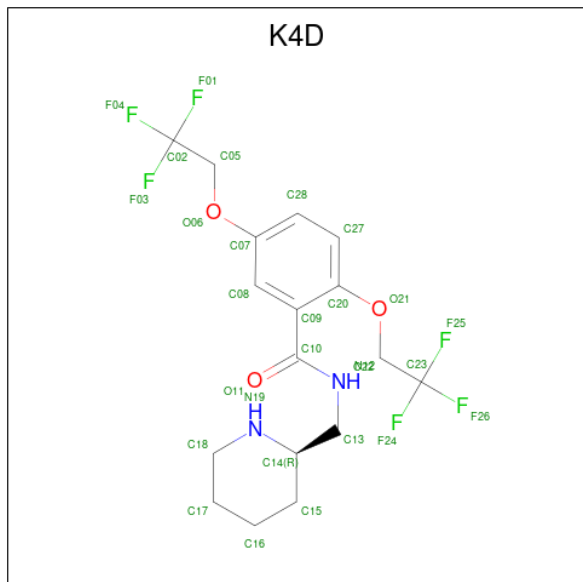
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
2	A	1	Total	O	P	0	0
			5	4	1		
2	A	1	Total	O	P	0	0
			5	4	1		
2	A	1	Total	O	P	0	0
			5	4	1		
2	B	1	Total	O	P	0	0
			5	4	1		
2	C	1	Total	O	P	0	0
			5	4	1		

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

- Molecule 3 is Flecainide (CCD ID: K4D) (formula: $C_{17}H_{20}F_6N_2O_3$) (labeled as "Ligand of Interest" by depositor).

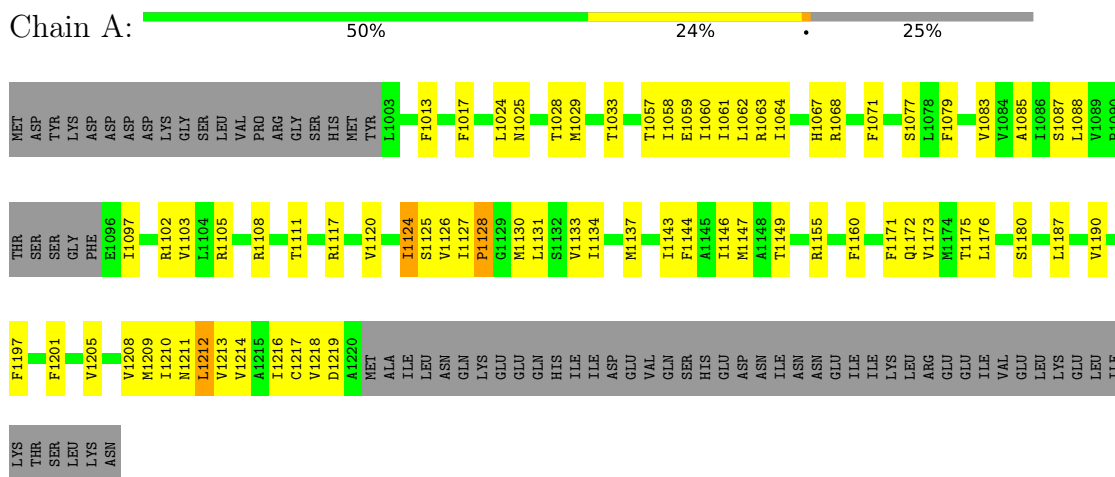


Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
3	A	1	Total	C	F	N	O	
			28	17	6	2	3	

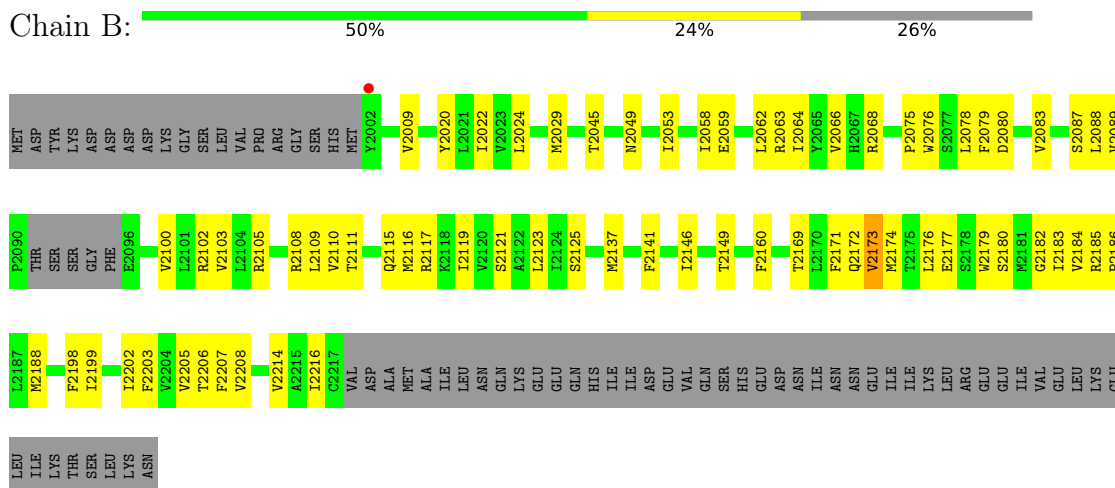
3 Residue-property plots [i](#)

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: Ion transport protein

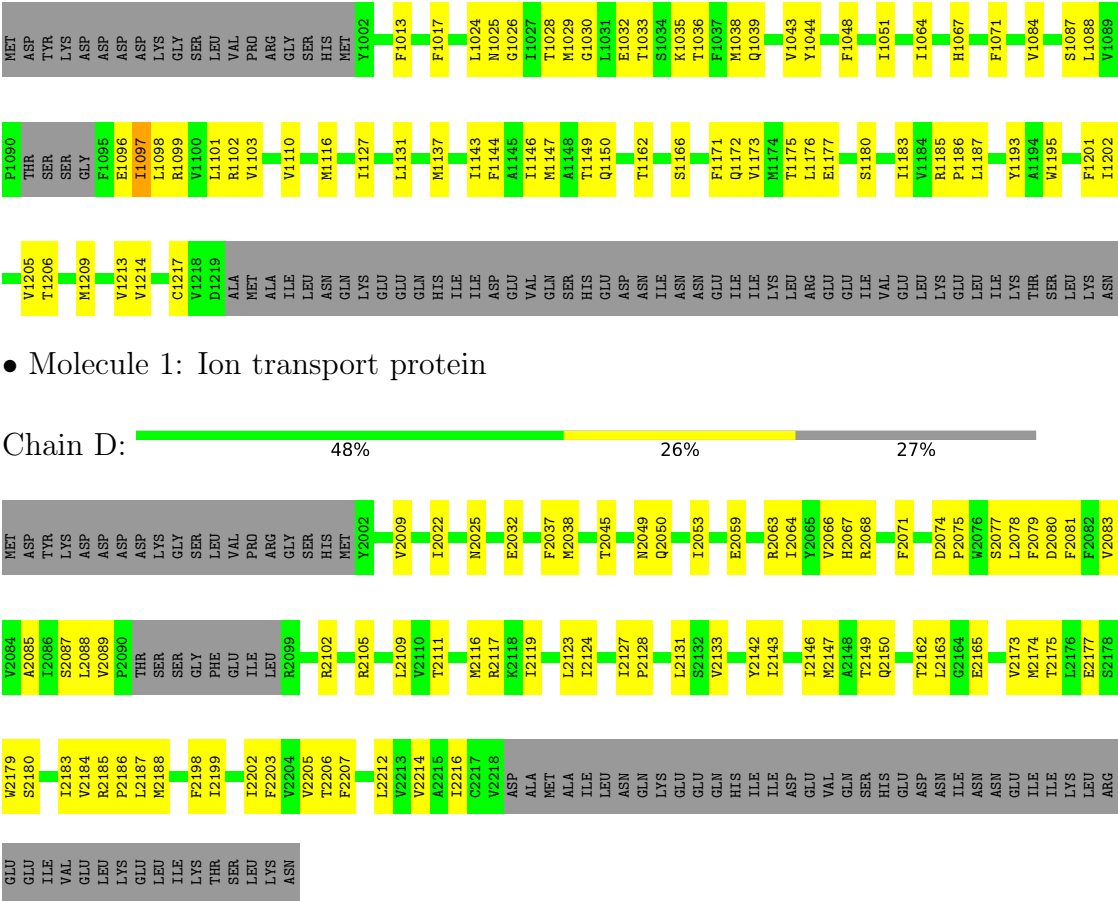


• Molecule 1: Ion transport protein



• Molecule 1: Ion transport protein





● Molecule 1: Ion transport protein



4 Data and refinement statistics

Property	Value	Source
Space group	C 2 2 21	Depositor
Cell constants a, b, c, α , β , γ	177.53Å 177.69Å 192.92Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	29.86 – 3.46 29.86 – 3.46	Depositor EDS
% Data completeness (in resolution range)	99.2 (29.86-3.46) 93.5 (29.86-3.46)	Depositor EDS
R_{merge}	0.16	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	0.94 (at 3.47Å)	Xtriage
Refinement program	PHENIX (1.11.1_2575: ???)	Depositor
R, R_{free}	0.230 , 0.263 0.231 , 0.261	Depositor DCC
R_{free} test set	1996 reflections (5.01%)	wwPDB-VP
Wilson B-factor (Å ²)	85.5	Xtriage
Anisotropy	0.429	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.27 , 83.3	EDS
L-test for twinning ²	$\langle L \rangle = 0.41$, $\langle L^2 \rangle = 0.24$	Xtriage
Estimated twinning fraction	0.418 for -k,-h,-l	Xtriage
F_o, F_c correlation	0.91	EDS
Total number of atoms	6587	wwPDB-VP
Average B, all atoms (Å ²)	117.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 12.39% 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

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: K4D, 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	0.45	0/1676	0.54	1/2294 (0.0%)
1	B	0.45	1/1650 (0.1%)	0.47	0/2259
1	C	0.17	0/1694	0.42	0/2317
1	D	0.17	0/1665	0.40	0/2275
All	All	0.34	1/6685 (0.0%)	0.46	1/9145 (0.0%)

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B	2173	VAL	CA-CB	-6.74	1.45	1.54

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	1218	VAL	N-CA-C	5.39	115.60	110.53

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	1632	0	1579	69	0
1	B	1608	0	1568	59	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	C	1647	0	1576	57	0
1	D	1622	0	1601	63	0
2	A	15	0	0	0	0
2	B	5	0	0	0	0
2	C	15	0	0	0	0
2	D	15	0	0	0	0
3	A	28	0	0	0	0
All	All	6587	0	6324	213	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 16.

All (213) 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:1216:ILE:HG22	1:B:2214:VAL:HG11	1.45	0.96
1:A:1126:VAL:HG11	1:A:1216:ILE:HG12	1.50	0.93
1:B:2169:THR:O	1:B:2173:VAL:HG23	1.67	0.93
1:A:1126:VAL:HG12	1:A:1126:VAL:O	1.75	0.86
1:C:1202:ILE:O	1:C:1206:THR:HG23	1.75	0.86
1:D:2203:PHE:O	1:D:2206:THR:HG22	1.75	0.86
1:A:1126:VAL:CG1	1:A:1216:ILE:HG12	2.05	0.85
1:C:1033:THR:CG2	1:D:2149:THR:HG21	2.09	0.82
1:A:1033:THR:CG2	1:B:2149:THR:HG21	2.11	0.79
1:C:1033:THR:HG23	1:D:2149:THR:HG21	1.69	0.72
1:B:2089:VAL:O	1:B:2102:ARG:NH2	2.22	0.72
1:B:2045:THR:O	1:B:2049:ASN:ND2	2.25	0.70
1:C:1137:MET:HE1	1:C:1205:VAL:HA	1.72	0.69
1:A:1033:THR:HG23	1:B:2149:THR:HG21	1.72	0.69
1:A:1172:GLN:NE2	1:B:2180:SER:OG	2.24	0.69
1:A:1210:ILE:O	1:A:1213:VAL:HB	1.91	0.69
1:A:1127:ILE:H	1:A:1128:PRO:CD	2.05	0.69
1:A:1033:THR:HG23	1:B:2149:THR:CG2	2.23	0.69
1:A:1127:ILE:N	1:A:1128:PRO:CD	2.55	0.68
1:A:1033:THR:HG21	1:B:2149:THR:HG21	1.76	0.68
1:D:2063:ARG:NH2	1:D:2077:SER:OG	2.26	0.67
1:A:1059:GLU:OE2	1:A:1108:ARG:NH2	2.28	0.66
1:B:2009:VAL:HG21	1:B:2066:VAL:HG21	1.77	0.66
1:B:2076:TRP:HH2	1:B:2121:SER:HB2	1.61	0.66
1:C:1146:ILE:O	1:C:1149:THR:HG22	1.95	0.65
1:A:1063:ARG:O	1:A:1067:HIS:ND1	2.22	0.64

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:1029:MET:HG2	1:C:1103:VAL:HG23	1.77	0.64
1:C:1033:THR:HG23	1:D:2149:THR:CG2	2.27	0.64
1:B:2203:PHE:O	1:B:2206:THR:HG22	1.98	0.64
1:A:1155:ARG:HD2	1:A:1190:VAL:HG11	1.80	0.64
1:C:1087:SER:HA	1:C:1102:ARG:HG2	1.78	0.64
1:B:2174:MET:HG3	1:B:2205:VAL:HG11	1.79	0.63
1:D:2053:ILE:HD11	1:D:2088:LEU:HD23	1.81	0.63
1:C:1098:LEU:HA	1:C:1101:LEU:HB2	1.81	0.63
1:B:2076:TRP:HB3	1:B:2111:THR:HG23	1.79	0.63
1:C:1084:VAL:O	1:C:1088:LEU:N	2.31	0.62
1:D:2009:VAL:HG21	1:D:2066:VAL:HG21	1.82	0.61
1:A:1085:ALA:HA	1:A:1088:LEU:HD12	1.83	0.61
1:A:1126:VAL:O	1:A:1126:VAL:CG1	2.47	0.61
1:B:2087:SER:HA	1:B:2102:ARG:HG2	1.82	0.61
1:C:1217:CYS:HA	1:D:2214:VAL:HG13	1.83	0.61
1:C:1033:THR:HG21	1:D:2149:THR:HG21	1.82	0.61
1:B:2172:GLN:NE2	1:B:2177:GLU:O	2.33	0.60
1:A:1146:ILE:O	1:A:1149:THR:HG22	2.01	0.60
1:B:2111:THR:O	1:B:2117:ARG:NE	2.33	0.60
1:B:2137:MET:HE1	1:B:2208:VAL:HG11	1.83	0.60
1:B:2079:PHE:O	1:B:2083:VAL:HG23	2.02	0.59
1:D:2143:ILE:O	1:D:2147:MET:HG3	2.03	0.59
1:D:2127:ILE:HG22	1:D:2131:LEU:HD21	1.85	0.59
1:A:1025:ASN:OD1	1:A:1105:ARG:NH1	2.31	0.59
1:A:1120:VAL:O	1:A:1124:ILE:HG13	2.03	0.58
1:B:2076:TRP:CH2	1:B:2121:SER:HB2	2.38	0.58
1:C:1127:ILE:O	1:C:1131:LEU:N	2.37	0.58
1:D:2174:MET:HG3	1:D:2205:VAL:HG11	1.86	0.58
1:C:1096:GLU:O	1:C:1099:ARG:N	2.35	0.58
1:B:2103:VAL:HG11	1:C:1147:MET:HG2	1.87	0.56
1:A:1067:HIS:HB2	1:A:1071:PHE:HB2	1.88	0.56
1:C:1202:ILE:O	1:C:1206:THR:CG2	2.52	0.56
1:D:2203:PHE:C	1:D:2206:THR:HG22	2.30	0.56
1:A:1216:ILE:CG2	1:B:2214:VAL:HG21	2.36	0.55
1:D:2203:PHE:HA	1:D:2206:THR:HG22	1.88	0.55
1:A:1127:ILE:H	1:A:1128:PRO:HD2	1.71	0.55
1:C:1162:THR:O	1:C:1166:SER:N	2.33	0.55
1:C:1026:GLY:O	1:C:1030:GLY:N	2.40	0.54
1:B:2171:PHE:C	1:B:2171:PHE:CD2	2.85	0.54
1:A:1087:SER:HA	1:A:1102:ARG:HG2	1.89	0.54
1:B:2053:ILE:HD11	1:B:2088:LEU:HD23	1.89	0.54

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:1029:MET:HE3	1:C:1103:VAL:HA	1.90	0.54
1:D:2071:PHE:CE1	1:D:2077:SER:HB3	2.42	0.54
1:A:1216:ILE:HG22	1:B:2214:VAL:CG1	2.30	0.54
1:C:1030:GLY:HA3	1:D:2142:TYR:OH	2.07	0.53
1:A:1111:THR:O	1:A:1117:ARG:NH2	2.42	0.53
1:C:1067:HIS:HB2	1:C:1071:PHE:HB2	1.90	0.53
1:A:1147:MET:HB2	1:A:1197:PHE:HE2	1.72	0.53
1:A:1172:GLN:HA	1:B:2179:TRP:HZ2	1.74	0.53
1:C:1127:ILE:HG22	1:C:1131:LEU:HG	1.91	0.53
1:B:2172:GLN:HG3	1:C:1180:SER:CB	2.39	0.52
1:B:2110:VAL:HG13	1:B:2116:MET:HB3	1.90	0.52
1:A:1071:PHE:CE1	1:A:1077:SER:HB3	2.45	0.52
1:C:1013:PHE:O	1:C:1017:PHE:N	2.36	0.52
1:A:1029:MET:HG2	1:A:1103:VAL:HG23	1.91	0.52
1:D:2079:PHE:O	1:D:2083:VAL:HG23	2.09	0.52
1:B:2119:ILE:O	1:B:2123:LEU:HG	2.09	0.52
1:D:2087:SER:HA	1:D:2102:ARG:HG2	1.93	0.51
1:C:1172:GLN:O	1:C:1175:THR:OG1	2.28	0.51
1:C:1043:VAL:HG13	1:C:1044:TYR:HD1	1.74	0.51
1:B:2022:ILE:HG21	1:B:2109:LEU:HB2	1.93	0.51
1:B:2206:THR:HG23	1:B:2207:PHE:N	2.26	0.51
1:C:1036:THR:HA	1:C:1039:GLN:NE2	2.26	0.51
1:D:2037:PHE:HE2	1:D:2045:THR:HG21	1.75	0.51
1:D:2025:ASN:OD1	1:D:2105:ARG:HD2	2.11	0.51
1:C:1096:GLU:O	1:C:1098:LEU:N	2.44	0.51
1:B:2075:PRO:HA	1:B:2078:LEU:HD12	1.94	0.50
1:A:1216:ILE:HG22	1:B:2214:VAL:HG21	1.94	0.50
1:B:2029:MET:HE1	1:B:2105:ARG:NH1	2.27	0.50
1:D:2025:ASN:OD1	1:D:2105:ARG:NH1	2.37	0.50
1:B:2080:ASP:HB3	1:B:2108:ARG:CZ	2.42	0.49
1:A:1143:ILE:O	1:A:1147:MET:HG3	2.11	0.49
1:B:2184:VAL:HG12	1:B:2188:MET:HE2	1.94	0.49
1:D:2045:THR:O	1:D:2049:ASN:ND2	2.45	0.49
1:D:2212:LEU:O	1:D:2216:ILE:HG13	2.13	0.48
1:B:2185:ARG:HB2	1:B:2186:PRO:HD3	1.96	0.48
1:A:1025:ASN:O	1:A:1028:THR:HG22	2.14	0.48
1:D:2119:ILE:O	1:D:2123:LEU:HG	2.13	0.48
1:D:2064:ILE:O	1:D:2068:ARG:N	2.34	0.48
1:C:1035:LYS:O	1:C:1039:GLN:HG3	2.14	0.48
1:B:2146:ILE:O	1:B:2149:THR:HG22	2.14	0.47
1:D:2075:PRO:O	1:D:2079:PHE:N	2.31	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:1013:PHE:O	1:A:1017:PHE:N	2.48	0.47
1:B:2177:GLU:OE2	1:C:1180:SER:HB3	2.14	0.47
1:D:2116:MET:O	1:D:2119:ILE:N	2.48	0.47
1:D:2022:ILE:HG21	1:D:2109:LEU:HB2	1.96	0.47
1:C:1143:ILE:O	1:C:1147:MET:HG3	2.15	0.47
1:A:1127:ILE:N	1:A:1128:PRO:HD2	2.29	0.47
1:D:2133:VAL:HG21	1:D:2212:LEU:HD21	1.95	0.47
1:A:1214:VAL:HG21	1:D:2216:ILE:HG22	1.96	0.47
1:D:2059:GLU:O	1:D:2063:ARG:HG3	2.15	0.47
1:A:1171:PHE:CE2	1:B:2199:ILE:HD12	2.50	0.47
1:C:1029:MET:HA	1:C:1032:GLU:HB2	1.96	0.47
1:D:2203:PHE:O	1:D:2206:THR:CG2	2.57	0.47
1:C:1024:LEU:HD12	1:C:1024:LEU:HA	1.75	0.46
1:D:2078:LEU:O	1:D:2081:PHE:HB3	2.15	0.46
1:C:1144:PHE:HE2	1:C:1201:PHE:HB2	1.81	0.46
1:C:1209:MET:O	1:C:1213:VAL:HG23	2.16	0.46
1:A:1064:ILE:HG12	1:A:1071:PHE:CD2	2.51	0.46
1:C:1098:LEU:O	1:C:1102:ARG:HG3	2.16	0.46
1:A:1173:VAL:O	1:A:1176:LEU:HD23	2.16	0.46
1:D:2203:PHE:CA	1:D:2206:THR:HG22	2.46	0.45
1:D:2173:VAL:HG13	1:D:2179:TRP:HB2	1.96	0.45
1:A:1025:ASN:OD1	1:A:1105:ARG:HD2	2.16	0.45
1:C:1205:VAL:O	1:C:1209:MET:HG2	2.17	0.45
1:D:2185:ARG:HB2	1:D:2186:PRO:HD3	1.98	0.45
1:C:1098:LEU:O	1:C:1102:ARG:N	2.49	0.45
1:C:1097:ILE:O	1:C:1101:LEU:N	2.40	0.44
1:C:1103:VAL:HG11	1:D:2147:MET:HG2	1.98	0.44
1:C:1033:THR:HG21	1:D:2163:LEU:HB2	1.99	0.44
1:C:1038:MET:HE2	1:C:1038:MET:HB3	1.94	0.44
1:D:2085:ALA:O	1:D:2089:VAL:HG23	2.17	0.44
1:A:1127:ILE:HB	1:A:1128:PRO:HD3	2.00	0.44
1:A:1033:THR:OG1	1:B:2146:ILE:HG23	2.18	0.44
1:A:1060:ILE:HD11	1:A:1071:PHE:HZ	1.83	0.44
1:B:2137:MET:CE	1:B:2208:VAL:HG11	2.46	0.44
1:A:1211:ASN:HD22	1:D:2123:LEU:HD22	1.82	0.44
1:B:2064:ILE:O	1:B:2068:ARG:N	2.35	0.44
1:B:2087:SER:HB3	1:B:2105:ARG:HH21	1.82	0.44
1:D:2080:ASP:OD2	1:D:2111:THR:HG21	2.17	0.44
1:D:2184:VAL:HG12	1:D:2188:MET:HE2	1.99	0.44
1:D:2111:THR:O	1:D:2117:ARG:NE	2.36	0.44
1:B:2059:GLU:O	1:B:2063:ARG:HG3	2.18	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:2100:VAL:HG22	1:C:1150:GLN:HG3	1.99	0.44
1:D:2183:ILE:O	1:D:2187:LEU:HD13	2.18	0.43
1:A:1097:ILE:H	1:A:1097:ILE:HG13	1.61	0.43
1:D:2067:HIS:HB2	1:D:2071:PHE:HB2	2.00	0.43
1:B:2173:VAL:HG13	1:B:2179:TRP:HB2	1.99	0.43
1:B:2121:SER:O	1:B:2125:SER:N	2.45	0.43
1:D:2198:PHE:O	1:D:2202:ILE:HG13	2.19	0.43
1:A:1137:MET:SD	1:A:1208:VAL:HG11	2.59	0.43
1:C:1025:ASN:HA	1:C:1028:THR:HB	2.00	0.43
1:C:1098:LEU:HD23	1:C:1101:LEU:HD12	2.01	0.43
1:D:2074:ASP:OD2	1:D:2077:SER:OG	2.26	0.43
1:D:2203:PHE:HA	1:D:2206:THR:CG2	2.49	0.43
1:D:2206:THR:HG23	1:D:2207:PHE:N	2.34	0.43
1:B:2160:PHE:CZ	1:B:2169:THR:HG21	2.54	0.42
1:B:2216:ILE:HG22	1:C:1214:VAL:HG11	2.01	0.42
1:C:1171:PHE:CE2	1:D:2199:ILE:HD12	2.54	0.42
1:D:2162:THR:H	1:D:2165:GLU:HB3	1.85	0.42
1:C:1028:THR:HG21	1:C:1048:PHE:CD2	2.54	0.42
1:B:2137:MET:HG3	1:B:2141:PHE:CD1	2.54	0.42
1:D:2124:ILE:O	1:D:2128:PRO:HD3	2.19	0.42
1:A:1210:ILE:O	1:A:1213:VAL:N	2.52	0.42
1:A:1033:THR:HG23	1:B:2149:THR:HG23	1.99	0.42
1:C:1048:PHE:HA	1:C:1051:ILE:HD12	2.00	0.42
1:A:1057:THR:O	1:A:1060:ILE:HG22	2.19	0.42
1:A:1024:LEU:HA	1:A:1024:LEU:HD12	1.77	0.42
1:D:2146:ILE:O	1:D:2149:THR:HG22	2.20	0.42
1:A:1125:SER:O	1:A:1128:PRO:HD2	2.20	0.41
1:D:2032:GLU:HA	1:D:2038:MET:HG3	2.02	0.41
1:B:2020:TYR:CZ	1:B:2024:LEU:HD22	2.56	0.41
1:B:2115:GLN:O	1:B:2119:ILE:HG12	2.19	0.41
1:C:1183:ILE:O	1:C:1187:LEU:HD13	2.20	0.41
1:A:1058:ILE:O	1:A:1062:LEU:HG	2.21	0.41
1:A:1127:ILE:H	1:A:1128:PRO:HD3	1.83	0.41
1:A:1131:LEU:HD23	1:A:1134:ILE:HD12	2.03	0.41
1:A:1137:MET:HE1	1:A:1205:VAL:HG22	2.02	0.41
1:A:1160:PHE:HE2	1:A:1187:LEU:HD11	1.85	0.41
1:A:1130:MET:O	1:A:1133:VAL:N	2.50	0.41
1:C:1193:TYR:HA	1:C:1195:TRP:CD1	2.56	0.41
1:A:1064:ILE:O	1:A:1068:ARG:N	2.29	0.41
1:A:1180:SER:HB3	1:D:2177:GLU:OE2	2.21	0.41
1:A:1211:ASN:HD22	1:D:2123:LEU:HD13	1.85	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:2198:PHE:O	1:B:2202:ILE:HD12	2.21	0.41
1:A:1144:PHE:HE2	1:A:1201:PHE:HB2	1.86	0.41
1:A:1205:VAL:O	1:A:1209:MET:HG2	2.20	0.41
1:A:1212:LEU:HA	1:A:1212:LEU:HD22	1.60	0.41
1:B:2206:THR:CG2	1:B:2207:PHE:N	2.84	0.41
1:C:1064:ILE:HG12	1:C:1071:PHE:CD2	2.56	0.41
1:C:1177:GLU:OE2	1:D:2180:SER:HB3	2.20	0.41
1:B:2058:ILE:O	1:B:2062:LEU:HG	2.21	0.40
1:C:1185:ARG:HB2	1:C:1186:PRO:HD3	2.03	0.40
1:C:1217:CYS:SG	1:D:2214:VAL:HG22	2.61	0.40
1:D:2146:ILE:O	1:D:2150:GLN:HG2	2.21	0.40
1:D:2179:TRP:O	1:D:2184:VAL:HG23	2.21	0.40
1:A:1025:ASN:HA	1:A:1028:THR:HG22	2.03	0.40
1:A:1079:PHE:CZ	1:A:1083:VAL:HG21	2.56	0.40
1:A:1079:PHE:O	1:A:1083:VAL:HG23	2.22	0.40
1:A:1176:LEU:HD13	1:D:2175:THR:HB	2.04	0.40
1:A:1057:THR:HG22	1:A:1061:ILE:HD11	2.04	0.40
1:A:1175:THR:HB	1:B:2176:LEU:HD13	2.02	0.40
1:B:2182:GLY:C	1:B:2183:ILE:HD12	2.46	0.40
1:C:1173:VAL:O	1:C:1176:LEU:HD23	2.20	0.40
1:D:2087:SER:OG	1:D:2105:ARG:NH2	2.30	0.40
1:C:1110:VAL:HG13	1:C:1116:MET:HB3	2.02	0.40
1:D:2050:GLN:HA	1:D:2053:ILE:HG22	2.03	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	209/285 (73%)	196 (94%)	11 (5%)	2 (1%)	12	44
1	B	207/285 (73%)	198 (96%)	9 (4%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	C	210/285 (74%)	199 (95%)	10 (5%)	1 (0%)	24	57
1	D	205/285 (72%)	196 (96%)	9 (4%)	0	100	100
All	All	831/1140 (73%)	789 (95%)	39 (5%)	3 (0%)	30	62

All (3) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	1219	ASP
1	C	1097	ILE
1	A	1128	PRO

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	164/264 (62%)	161 (98%)	3 (2%)	51	70
1	B	161/264 (61%)	161 (100%)	0	100	100
1	C	164/264 (62%)	164 (100%)	0	100	100
1	D	170/264 (64%)	170 (100%)	0	100	100
All	All	659/1056 (62%)	656 (100%)	3 (0%)	81	81

All (3) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	1124	ILE
1	A	1212	LEU
1	A	1217	CYS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (6) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	1172	GLN

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Mol	Chain	Res	Type
1	A	1211	ASN
1	B	2049	ASN
1	B	2050	GLN
1	B	2067	HIS
1	C	1039	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 ⓘ

11 ligands are modelled in this entry.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 2$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\# Z > 2$	Counts	RMSZ	$\# Z > 2$
2	PO4	A	1301	-	4,4,4	1.00	0	6,6,6	0.36	0
2	PO4	C	1303	-	4,4,4	0.95	0	6,6,6	0.48	0
2	PO4	C	1301	-	4,4,4	0.94	0	6,6,6	0.53	0
2	PO4	D	2303	-	4,4,4	0.98	0	6,6,6	0.42	0
2	PO4	A	1302	-	4,4,4	0.96	0	6,6,6	0.42	0
2	PO4	D	2301	-	4,4,4	0.95	0	6,6,6	0.45	0
2	PO4	D	2302	-	4,4,4	0.94	0	6,6,6	0.47	0
3	K4D	A	1304	-	29,29,29	1.68	6 (20%)	37,41,41	1.35	6 (16%)
2	PO4	C	1302	-	4,4,4	0.93	0	6,6,6	0.52	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
2	PO4	B	2301	-	4,4,4	0.94	0	6,6,6	0.46	0
2	PO4	A	1303	-	4,4,4	0.96	0	6,6,6	0.46	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
3	K4D	A	1304	-	-	9/21/29/29	1/2/2/2

All (6) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	A	1304	K4D	C10-N12	5.09	1.45	1.33
3	A	1304	K4D	O21-C20	3.60	1.44	1.37
3	A	1304	K4D	C16-C15	-3.08	1.45	1.53
3	A	1304	K4D	C13-C14	-2.55	1.47	1.55
3	A	1304	K4D	C09-C10	2.32	1.54	1.50
3	A	1304	K4D	C08-C07	2.18	1.42	1.39

All (6) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	A	1304	K4D	C20-C09-C10	-3.86	119.29	126.24
3	A	1304	K4D	C13-N12-C10	-2.99	117.04	122.54
3	A	1304	K4D	C09-C10-N12	2.68	122.52	117.32
3	A	1304	K4D	O11-C10-N12	-2.65	117.42	122.59
3	A	1304	K4D	O21-C20-C27	-2.59	118.30	123.95
3	A	1304	K4D	O21-C20-C09	2.14	121.67	116.97

There are no chirality outliers.

All (9) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	A	1304	K4D	N12-C13-C14-C15
3	A	1304	K4D	N12-C13-C14-N19
3	A	1304	K4D	O21-C22-C23-F26
3	A	1304	K4D	O21-C22-C23-F24
3	A	1304	K4D	O21-C22-C23-F25
3	A	1304	K4D	C09-C20-O21-C22

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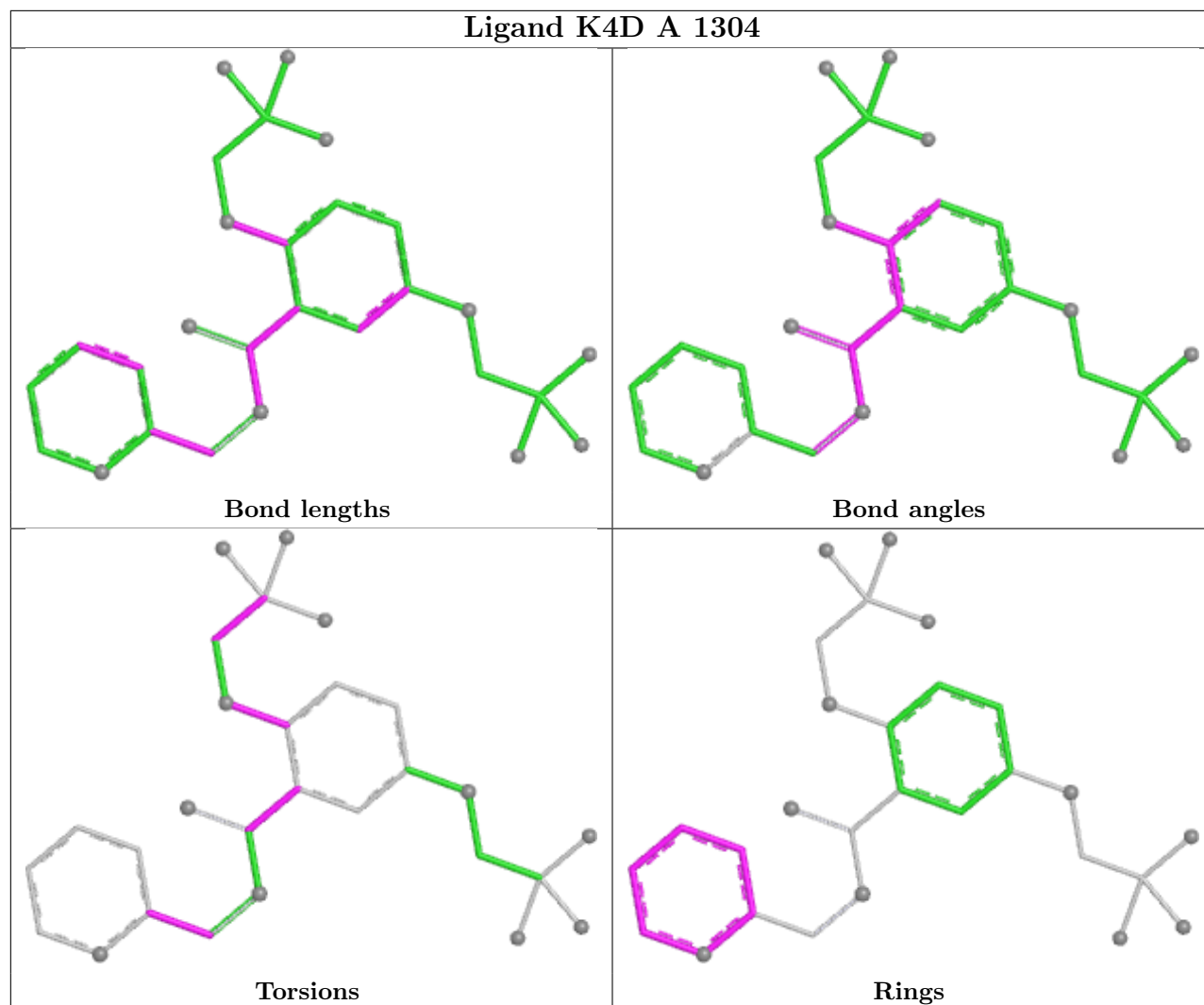
Mol	Chain	Res	Type	Atoms
3	A	1304	K4D	C27-C20-O21-C22
3	A	1304	K4D	C20-C09-C10-O11
3	A	1304	K4D	C20-C09-C10-N12

All (1) ring outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	A	1304	K4D	C14-C15-C16-C17-C18-N19

No monomer is involved in short contacts.

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 [i](#)

6.1 Protein, DNA and RNA chains [i](#)

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	213/285 (74%)	-1.00	0 100 100	48, 123, 194, 268	0
1	B	211/285 (74%)	-1.03	1 (0%) 87 70	53, 112, 181, 257	0
1	C	214/285 (75%)	-0.91	0 100 100	48, 126, 216, 330	0
1	D	209/285 (73%)	-1.01	0 100 100	49, 113, 156, 225	0
All	All	847/1140 (74%)	-0.99	1 (0%) 92 88	48, 114, 190, 330	0

All (1) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	2002	TYR	2.5

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

There are no non-standard protein/DNA/RNA residues in this entry.

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
2	PO4	A	1302	5/5	0.95	0.08	109,134,144,145	0

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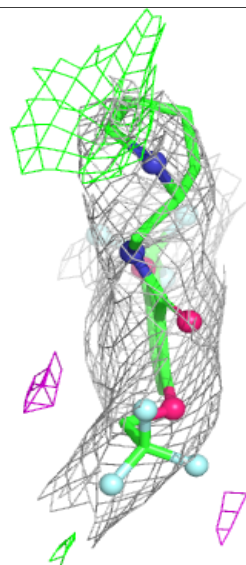
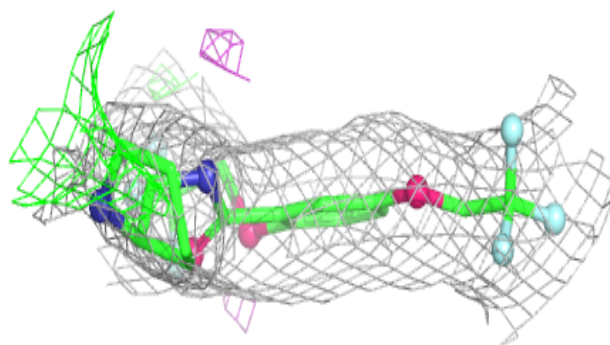
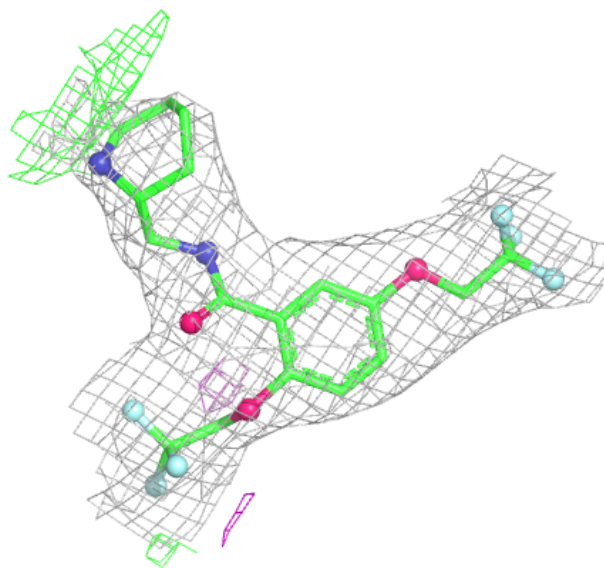
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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
2	PO4	B	2301	5/5	0.96	0.07	239,239,239,239	0
2	PO4	A	1303	5/5	0.97	0.07	244,245,246,249	0
2	PO4	D	2302	5/5	0.97	0.04	97,104,111,114	0
2	PO4	C	1302	5/5	0.98	0.05	112,113,114,114	0
2	PO4	C	1303	5/5	0.98	0.06	125,127,130,131	0
2	PO4	D	2301	5/5	0.98	0.06	131,140,153,155	0
2	PO4	C	1301	5/5	0.98	0.06	123,148,150,154	0
2	PO4	D	2303	5/5	0.98	0.06	106,112,115,117	0
2	PO4	A	1301	5/5	0.99	0.04	83,85,90,90	0
3	K4D	A	1304	28/28	0.99	0.08	109,118,138,143	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 K4D A 1304:

$2mF_o-DF_c$ (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.