



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 9, 2026 – 03:10 AM UTC

PDB ID : 4PA9 / pdb_00004pa9
Title : Structure of NavMS in complex with channel blocking compound
Authors : Naylor, C.E.; Bagneris, C.; Wallace, B.A.
Deposited on : 2014-04-07
Resolution : 3.43 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

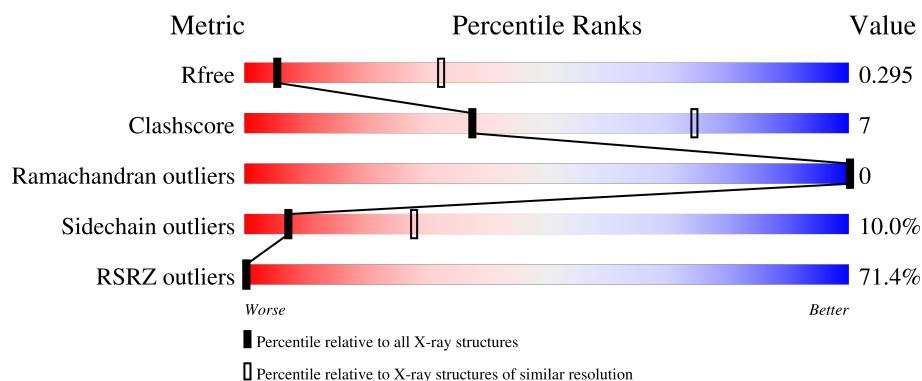
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 3.43 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	1736 (3.50-3.38)
Clashscore	190562	1808 (3.50-3.38)
Ramachandran outliers	187476	1776 (3.50-3.38)
Sidechain outliers	187428	1777 (3.50-3.38)
RSRZ outliers	180081	1736 (3.50-3.38)

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	149	44% 44% 15% • 38%
1	B	149	44% 46% 12% • 40%
1	C	149	44% 43% 17% • 39%
1	D	149	42% 41% 17% • 39%

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
3	12P	C	302	-	-	-	X

2 Entry composition

There are 5 unique types of molecules in this entry. The entry contains 3030 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.

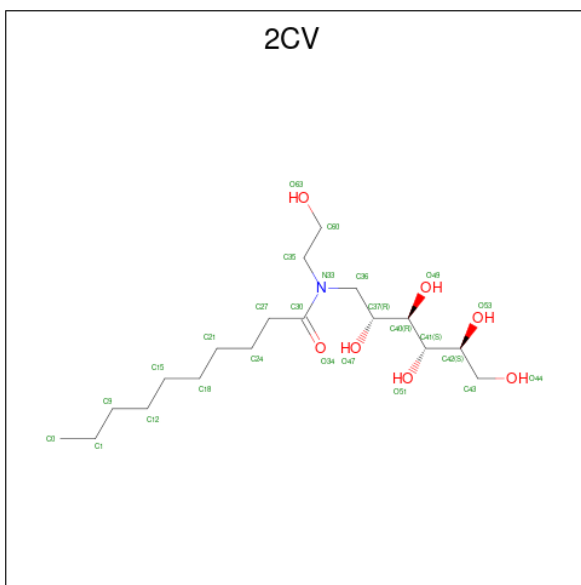
- Molecule 1 is a protein called Ion transport protein.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	92	Total	C	N	O	S	0	0	0
			718	488	106	119	5			
1	B	90	Total	C	N	O	S	0	0	0
			711	483	104	119	5			
1	C	91	Total	C	N	O	S	0	0	0
			715	485	105	120	5			
1	D	91	Total	C	N	O	S	0	0	0
			712	482	105	120	5			

There are 16 discrepancies between the modelled and reference sequences:

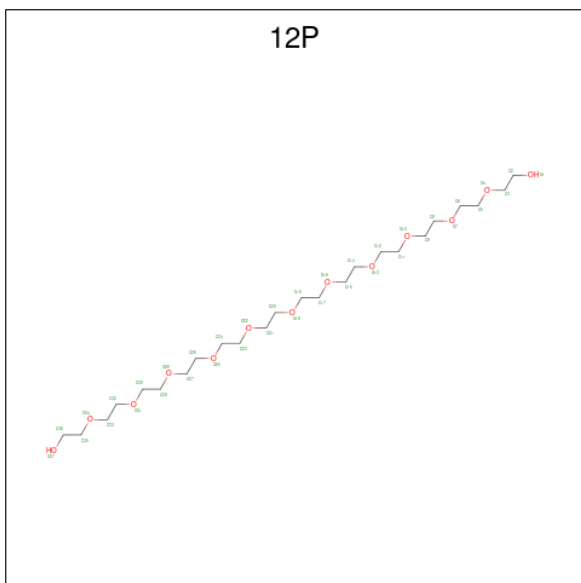
Chain	Residue	Modelled	Actual	Comment	Reference
A	126	GLY	-	expression tag	UNP A0L5S6
A	127	SER	-	expression tag	UNP A0L5S6
A	128	HIS	-	expression tag	UNP A0L5S6
A	129	MET	-	expression tag	UNP A0L5S6
B	126	GLY	-	expression tag	UNP A0L5S6
B	127	SER	-	expression tag	UNP A0L5S6
B	128	HIS	-	expression tag	UNP A0L5S6
B	129	MET	-	expression tag	UNP A0L5S6
C	126	GLY	-	expression tag	UNP A0L5S6
C	127	SER	-	expression tag	UNP A0L5S6
C	128	HIS	-	expression tag	UNP A0L5S6
C	129	MET	-	expression tag	UNP A0L5S6
D	126	GLY	-	expression tag	UNP A0L5S6
D	127	SER	-	expression tag	UNP A0L5S6
D	128	HIS	-	expression tag	UNP A0L5S6
D	129	MET	-	expression tag	UNP A0L5S6

- Molecule 2 is HEGA-10 (CCD ID: 2CV) (formula: C₁₈H₃₇NO₇).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
2	A	1	Total 26	C 18	N 1	O 7	0	0
2	B	1	Total 26	C 18	N 1	O 7	0	0
2	C	1	Total 26	C 18	N 1	O 7	0	0
2	D	1	Total 26	C 18	N 1	O 7	0	0

- Molecule 3 is DODECAETHYLENE GLYCOL (CCD ID: 12P) (formula: $\text{C}_{24}\text{H}_{50}\text{O}_{13}$).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	A	1	Total	C	O	0	0
			16	10	6		
3	B	1	Total	C	O	0	0
			16	10	6		
3	C	1	Total	C	O	0	0
			16	10	6		

- Molecule 4 is BROMIDE ION (CCD ID: BR) (formula: Br).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	B	1	Total	Br	0	1
			2	2		
4	C	1	Total	Br	0	1
			2	2		

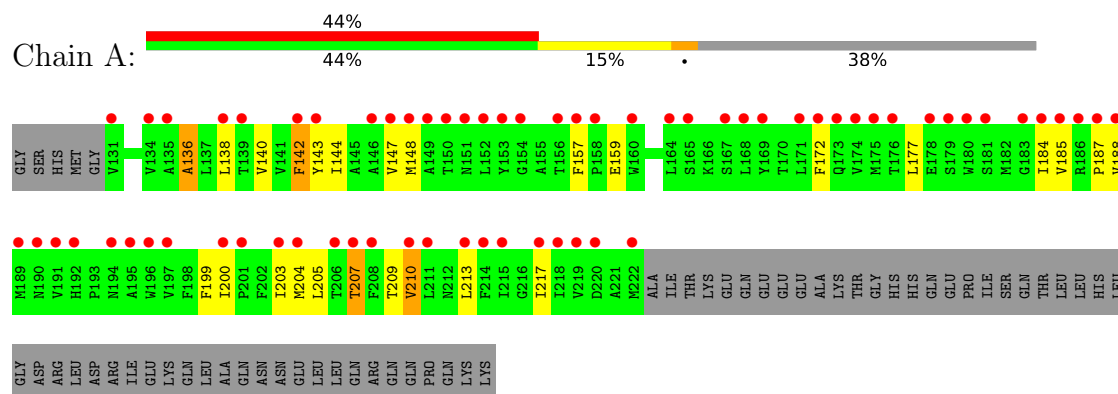
- Molecule 5 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	7	Total	O	0	0
			7	7		
5	B	7	Total	O	0	0
			7	7		
5	C	2	Total	O	0	0
			2	2		
5	D	2	Total	O	0	0
			2	2		

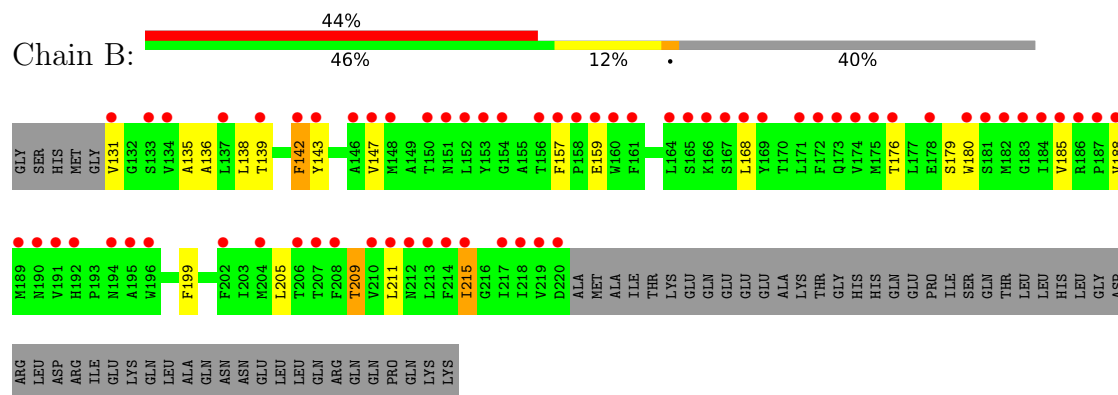
3 Residue-property plots

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

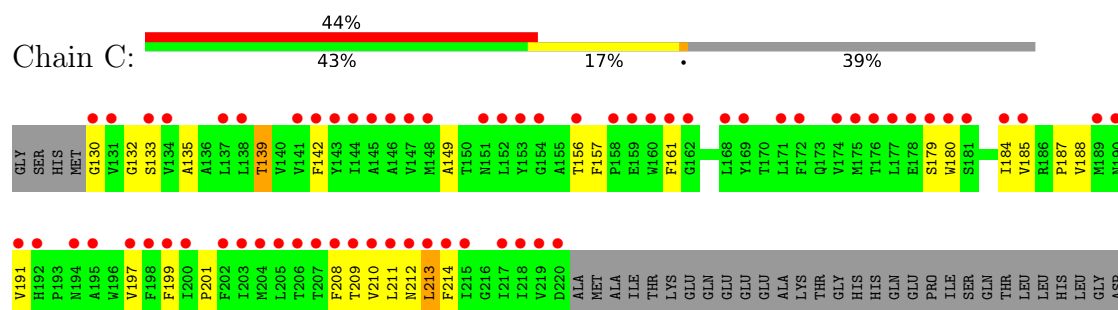
• Molecule 1: Ion transport protein



• Molecule 1: Ion transport protein



• Molecule 1: Ion transport protein



ARG
LEU
ASP
ARG
ILE
GLU
LYS
GLN
LEU
ALA
GLN
ASN
GLU
LEU
LEU
GLN
ARG
GLN
GLN
PRO
GLN
LYS
LYS

● Molecule 1: Ion transport protein



GLY	SER	HIS	MET	V130	G131	G132	S133	V134	A135	A136	L137	L138	T139	V140	V141	F142	Y143	I144	A145	A146	V147	M148	A149	T150	M151	L152	Y153	G154	A155	T156	F157	F158	E159	W160	F161	G162	D163	K166	Y169	T170	L171	F172	Q173	V174	M175	T176	L177	E178	S179	W180	S181	M182	G183	I184	V185	R186	P187
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Y188	M189	M190	V191	F198	F199	I200	F201	F202	I203	M204	I205	T206	T207	F208	T209	V210	L211	M212	L213	F214	I215	G216	I217	I218	D219	D220	ALA	MET	ALA	ILE	THR	LYS	GLU	GLN	GLU	GLU	GLU	ALA	LYS	THR	GLY	HIS	HIS	GLN	PRO	ILE	SER	GLN	THR	LEU	LEU	HIS	LEU	GLY	ASP	ARG	LEU
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ASP
ARG
ILE
GLU
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LEU
ALA
GLN
ASN
GLU
LEU
LEU
GLN
ARG
GLN
GLN
PRO
GLN
LYS
LYS

4 Data and refinement statistics

Property	Value	Source
Space group	C 2 2 21	Depositor
Cell constants a, b, c, α , β , γ	80.32Å 330.55Å 80.25Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	45.42 – 3.43 45.42 – 3.43	Depositor EDS
% Data completeness (in resolution range)	99.5 (45.42-3.43) 99.4 (45.42-3.43)	Depositor EDS
R_{merge}	0.44	Depositor
R_{sym}	0.08	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.65 (at 3.40Å)	Xtriage
Refinement program	BUSTER 2.10.0	Depositor
R, R_{free}	0.287 , 0.294 0.284 , 0.295	Depositor DCC
R_{free} test set	772 reflections (1.73%)	wwPDB-VP
Wilson B-factor (Å ²)	43.0	Xtriage
Anisotropy	1.753	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.33 , 89.2	EDS
L-test for twinning ²	$\langle L \rangle = 0.43$, $\langle L^2 \rangle = 0.26$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.87	EDS
Total number of atoms	3030	wwPDB-VP
Average B, all atoms (Å ²)	61.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The analyses of the Patterson function reveals a significant off-origin peak that is 52.26 % of the origin peak, indicating pseudo-translational symmetry. The chance of finding a peak of this or larger height randomly in a structure without pseudo-translational symmetry is equal to 4.9874e-05. The detected translational NCS is most likely also responsible for the elevated intensity ratio.*

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: 12P, BR, 2CV

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	0.83	0/740	1.26	4/1015 (0.4%)
1	B	0.85	0/733	1.25	4/1005 (0.4%)
1	C	0.77	0/737	1.27	6/1010 (0.6%)
1	D	0.79	0/734	1.31	4/1006 (0.4%)
All	All	0.81	0/2944	1.27	18/4036 (0.4%)

There are no bond length outliers.

All (18) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	C	199	PHE	N-CA-C	8.19	120.28	111.36
1	D	199	PHE	N-CA-C	8.18	120.28	111.36
1	D	208	PHE	N-CA-C	-8.13	102.12	112.93
1	C	208	PHE	N-CA-C	-7.92	103.44	113.43
1	C	185	VAL	N-CA-C	7.41	117.54	110.42
1	D	185	VAL	N-CA-C	7.19	117.32	110.42
1	A	185	VAL	N-CA-C	6.66	117.42	110.62
1	B	185	VAL	N-CA-C	6.52	117.27	110.62
1	A	199	PHE	N-CA-C	6.00	117.48	111.07
1	B	199	PHE	N-CA-C	5.87	117.35	111.07
1	A	172	PHE	N-CA-C	-5.49	105.38	111.36
1	B	136	ALA	N-CA-C	-5.49	104.82	112.45
1	B	180	TRP	N-CA-C	5.44	117.21	111.28
1	C	191	VAL	N-CA-C	-5.23	107.72	112.12
1	D	191	VAL	N-CA-C	-5.21	107.75	112.12
1	A	136	ALA	N-CA-C	-5.18	105.25	112.45
1	C	132	GLY	CA-C-N	5.06	127.31	120.38
1	C	132	GLY	C-N-CA	5.06	127.31	120.38

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	718	0	726	12	0
1	B	711	0	721	9	0
1	C	715	0	724	11	0
1	D	712	0	715	13	0
2	A	26	0	37	1	0
2	B	26	0	37	0	0
2	C	26	0	37	1	0
2	D	26	0	37	1	0
3	A	16	0	21	0	0
3	B	16	0	21	0	0
3	C	16	0	21	1	0
4	B	2	0	0	0	0
4	C	2	0	0	0	0
5	A	7	0	0	0	0
5	B	7	0	0	0	0
5	C	2	0	0	0	1
5	D	2	0	0	0	0
All	All	3030	0	3097	43	1

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 7.

All (43) 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:B:205:LEU:O	1:B:209:THR:OG1	2.08	0.71
1:A:200:ILE:HG22	1:A:204:MET:HE2	1.76	0.67
1:D:131:VAL:HG11	1:D:217:ILE:HG13	1.77	0.67
1:B:143:TYR:O	1:B:147:VAL:HG23	1.99	0.62
1:B:211:LEU:O	1:B:215:ILE:HG13	2.01	0.60
1:C:201:PRO:HB2	3:C:302:12P:H141	1.84	0.60
1:A:143:TYR:O	1:A:147:VAL:HG23	2.02	0.59

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:205:LEU:O	1:A:209:THR:OG1	2.17	0.58
1:A:203:ILE:O	1:A:207:THR:HB	2.04	0.57
1:D:136:ALA:O	1:D:140:VAL:HG23	2.06	0.55
1:B:142:PHE:HD2	1:B:168:LEU:HD12	1.72	0.55
1:B:135:ALA:O	1:B:139:THR:OG1	2.24	0.55
2:C:301:2CV:H40	1:D:166:LYS:HG2	1.89	0.54
1:A:177:LEU:HD13	1:B:176:THR:HB	1.91	0.52
1:A:144:ILE:O	1:A:148:MET:HG3	2.10	0.51
1:C:210:VAL:HA	1:C:213:LEU:HD23	1.92	0.51
1:D:200:ILE:HG22	1:D:204:MET:HE2	1.92	0.51
1:A:213:LEU:O	1:A:217:ILE:HG13	2.12	0.50
1:D:140:VAL:O	1:D:144:ILE:HG13	2.12	0.50
1:C:130:GLY:O	1:C:133:SER:OG	2.30	0.49
1:A:138:LEU:HD21	1:A:210:VAL:HG23	1.95	0.48
1:A:136:ALA:O	1:A:140:VAL:HG23	2.14	0.48
1:D:216:GLY:O	1:D:220:ASP:HB2	2.16	0.46
1:A:157:PHE:CZ	1:A:188:VAL:HA	2.51	0.45
1:C:135:ALA:O	1:C:139:THR:OG1	2.35	0.45
1:B:138:LEU:HD13	1:B:209:THR:HB	1.99	0.44
1:B:138:LEU:O	1:B:142:PHE:HB2	2.17	0.44
1:D:189:MET:HE3	2:D:300:2CV:H432	1.99	0.44
1:A:138:LEU:O	1:A:142:PHE:HB2	2.17	0.44
1:D:144:ILE:O	1:D:148:MET:HG2	2.18	0.43
1:D:184:ILE:O	1:D:187:PRO:HD2	2.17	0.43
1:D:184:ILE:C	1:D:187:PRO:HD2	2.43	0.43
1:C:184:ILE:C	1:C:187:PRO:HD2	2.44	0.42
2:A:301:2CV:O51	2:A:301:2CV:O47	2.38	0.42
1:C:179:SER:HA	1:D:178:GLU:OE1	2.18	0.42
1:B:157:PHE:CZ	1:B:188:VAL:HA	2.55	0.41
1:A:184:ILE:O	1:A:187:PRO:HD2	2.20	0.41
1:C:184:ILE:O	1:C:187:PRO:HD2	2.20	0.41
1:C:149:ALA:HB1	1:C:161:PHE:CD1	2.56	0.41
1:C:157:PHE:CZ	1:C:188:VAL:HA	2.56	0.41
1:C:197:VAL:O	1:C:201:PRO:HG2	2.20	0.40
1:C:180:TRP:CD1	1:D:178:GLU:HG3	2.56	0.40
1:D:149:ALA:HB1	1:D:161:PHE:CD1	2.57	0.40

All (1) symmetry-related close contacts are listed below. The label for Atom-2 includes the symmetry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
5:C:401:HOH:O	5:C:401:HOH:O[3_455]	0.94	1.26

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	90/149 (60%)	85 (94%)	5 (6%)	0	100	100
1	B	88/149 (59%)	83 (94%)	5 (6%)	0	100	100
1	C	89/149 (60%)	87 (98%)	2 (2%)	0	100	100
1	D	89/149 (60%)	88 (99%)	1 (1%)	0	100	100
All	All	356/596 (60%)	343 (96%)	13 (4%)	0	100	100

There are no Ramachandran outliers to report.

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	77/129 (60%)	73 (95%)	4 (5%)	21	48
1	B	78/129 (60%)	72 (92%)	6 (8%)	12	38
1	C	78/129 (60%)	70 (90%)	8 (10%)	7	27
1	D	77/129 (60%)	64 (83%)	13 (17%)	2	11
All	All	310/516 (60%)	279 (90%)	31 (10%)	7	28

All (31) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	142	PHE
1	A	159	GLU
1	A	207	THR
1	A	210	VAL
1	B	131	VAL
1	B	142	PHE
1	B	159	GLU
1	B	179	SER
1	B	209	THR
1	B	215	ILE
1	C	139	THR
1	C	142	PHE
1	C	156	THR
1	C	209	THR
1	C	211	LEU
1	C	212	ASN
1	C	213	LEU
1	C	214	PHE
1	D	131	VAL
1	D	133	SER
1	D	137	LEU
1	D	141	VAL
1	D	142	PHE
1	D	156	THR
1	D	174	VAL
1	D	184	ILE
1	D	200	ILE
1	D	210	VAL
1	D	211	LEU
1	D	215	ILE
1	D	217	ILE

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (4) such sidechains are listed below:

Mol	Chain	Res	Type
1	B	194	ASN
1	C	190	ASN
1	C	194	ASN
1	C	212	ASN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates ⓘ

There are no oligosaccharides in this entry.

5.6 Ligand geometry ⓘ

Of 11 ligands modelled in this entry, 4 are monoatomic - leaving 7 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	$\# Z > 2$
3	12P	C	302	-	15,15,36	0.26	0	14,14,35	0.23	0
3	12P	B	503	-	15,15,36	0.23	0	14,14,35	0.17	0
2	2CV	A	301	-	25,25,25	0.23	0	29,30,30	0.91	3 (10%)
3	12P	A	302	-	15,15,36	0.28	0	14,14,35	0.19	0
2	2CV	C	301	-	25,25,25	0.30	0	29,30,30	1.11	2 (6%)
2	2CV	B	502	-	25,25,25	0.21	0	29,30,30	0.93	2 (6%)
2	2CV	D	300	-	25,25,25	0.38	0	29,30,30	0.81	1 (3%)

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	12P	C	302	-	-	6/13/13/34	-
3	12P	B	503	-	-	8/13/13/34	-

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	2CV	A	301	-	-	14/34/34/34	-
3	12P	A	302	-	-	4/13/13/34	-
2	2CV	C	301	-	-	3/34/34/34	-
2	2CV	B	502	-	-	14/34/34/34	-
2	2CV	D	300	-	-	7/34/34/34	-

There are no bond length outliers.

All (8) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	C	301	2CV	C36-C37-C40	4.12	120.82	109.66
2	C	301	2CV	C35-N33-C36	3.38	119.97	116.14
2	B	502	2CV	O47-C37-C40	2.74	115.67	109.25
2	D	300	2CV	C36-C37-C40	2.69	116.94	109.66
2	A	301	2CV	O47-C37-C40	2.44	114.96	109.25
2	B	502	2CV	C37-C40-C41	2.35	116.09	112.48
2	A	301	2CV	C37-C40-C41	2.21	115.87	112.48
2	A	301	2CV	O53-C42-C41	2.15	114.29	109.25

There are no chirality outliers.

All (56) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	301	2CV	N33-C36-C37-C40
2	A	301	2CV	N33-C36-C37-O47
2	A	301	2CV	C36-C37-C40-C41
2	A	301	2CV	C36-C37-C40-O49
2	A	301	2CV	C37-C40-C41-C42
2	A	301	2CV	C37-C40-C41-O51
2	A	301	2CV	O49-C40-C41-C42
2	A	301	2CV	O49-C40-C41-O51
2	B	502	2CV	N33-C36-C37-C40
2	B	502	2CV	N33-C36-C37-O47
2	B	502	2CV	C36-C37-C40-C41
2	B	502	2CV	C36-C37-C40-O49
2	B	502	2CV	C37-C40-C41-C42
2	B	502	2CV	C37-C40-C41-O51
2	B	502	2CV	O49-C40-C41-C42
2	B	502	2CV	O49-C40-C41-O51
2	D	300	2CV	C40-C41-C42-O53

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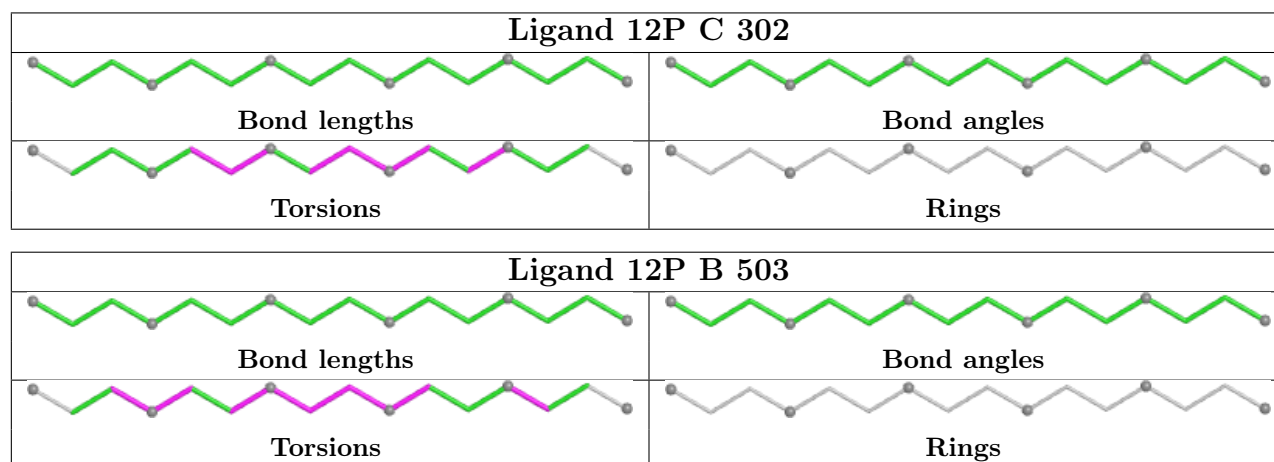
Mol	Chain	Res	Type	Atoms
2	D	300	2CV	O51-C41-C42-O53
2	D	300	2CV	O53-C42-C43-O44
2	D	300	2CV	C41-C42-C43-O44
2	A	301	2CV	C40-C41-C42-O53
2	B	502	2CV	C40-C41-C42-O53
2	D	300	2CV	O51-C41-C42-C43
2	D	300	2CV	C40-C41-C42-C43
2	A	301	2CV	O51-C41-C42-O53
2	A	301	2CV	C40-C41-C42-C43
2	B	502	2CV	C40-C41-C42-C43
2	A	301	2CV	O47-C37-C40-O49
2	B	502	2CV	O47-C37-C40-O49
2	B	502	2CV	O53-C42-C43-O44
3	A	302	12P	O10-C11-C12-O13
2	A	301	2CV	O51-C41-C42-C43
2	B	502	2CV	O51-C41-C42-O53
2	C	301	2CV	O47-C37-C40-C41
2	B	502	2CV	O51-C41-C42-C43
3	C	302	12P	O7-C8-C9-O10
2	A	301	2CV	O47-C37-C40-C41
3	B	503	12P	C12-C11-O10-C9
3	B	503	12P	C8-C9-O10-C11
3	B	503	12P	C5-C6-O7-C8
3	C	302	12P	C8-C9-O10-C11
3	C	302	12P	C5-C6-O7-C8
3	C	302	12P	C11-C12-O13-C14
3	B	503	12P	C6-C5-O4-C3
3	A	302	12P	C8-C9-O10-C11
3	B	503	12P	C9-C8-O7-C6
3	C	302	12P	C12-C11-O10-C9
3	A	302	12P	C15-C14-O13-C12
3	B	503	12P	C15-C14-O13-C12
2	C	301	2CV	O47-C37-C40-O49
3	B	503	12P	C2-C3-O4-C5
2	C	301	2CV	C40-C41-C42-O53
3	A	302	12P	O4-C5-C6-O7
2	D	300	2CV	N33-C36-C37-O47
3	B	503	12P	O7-C8-C9-O10
3	C	302	12P	O4-C5-C6-O7

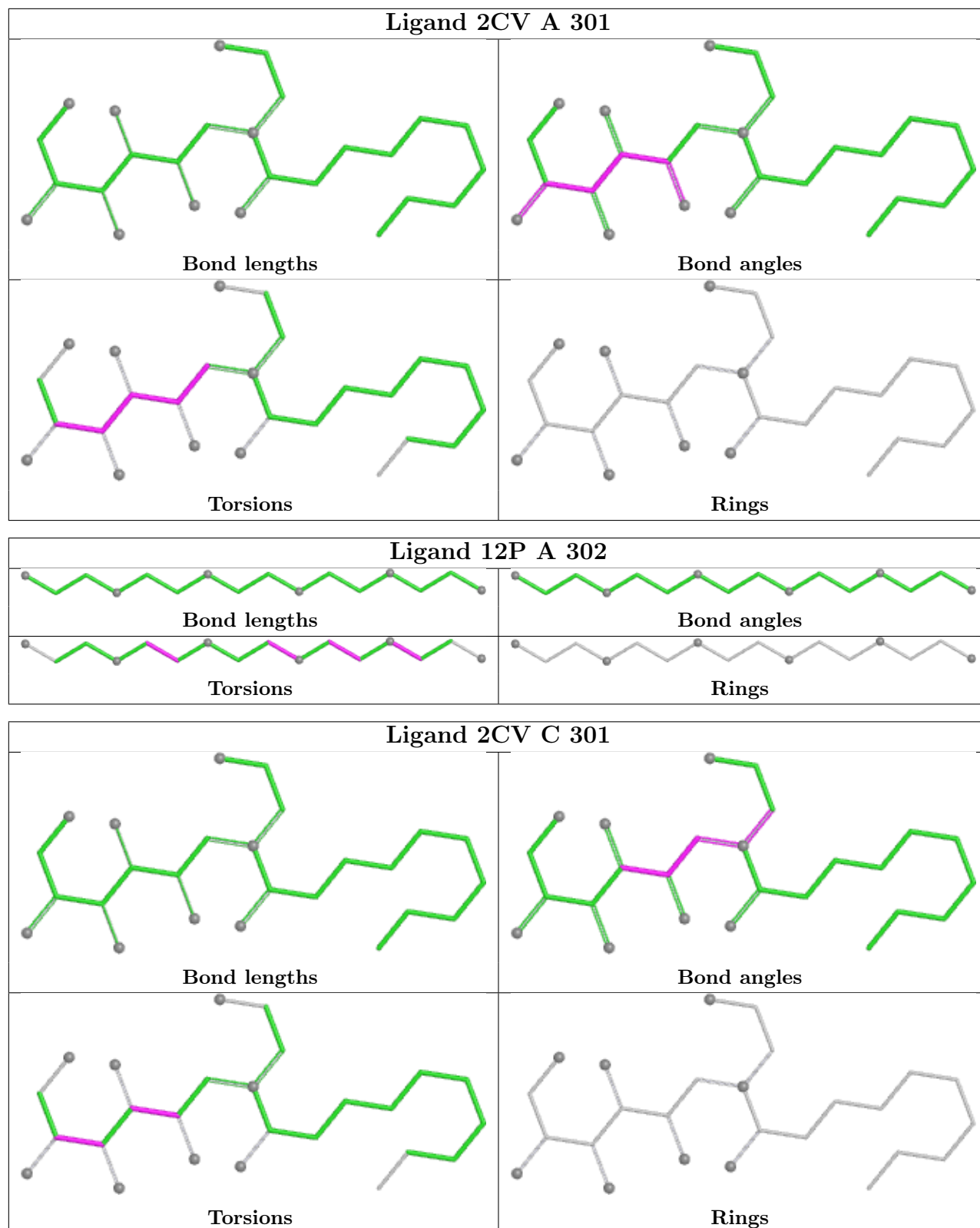
There are no ring outliers.

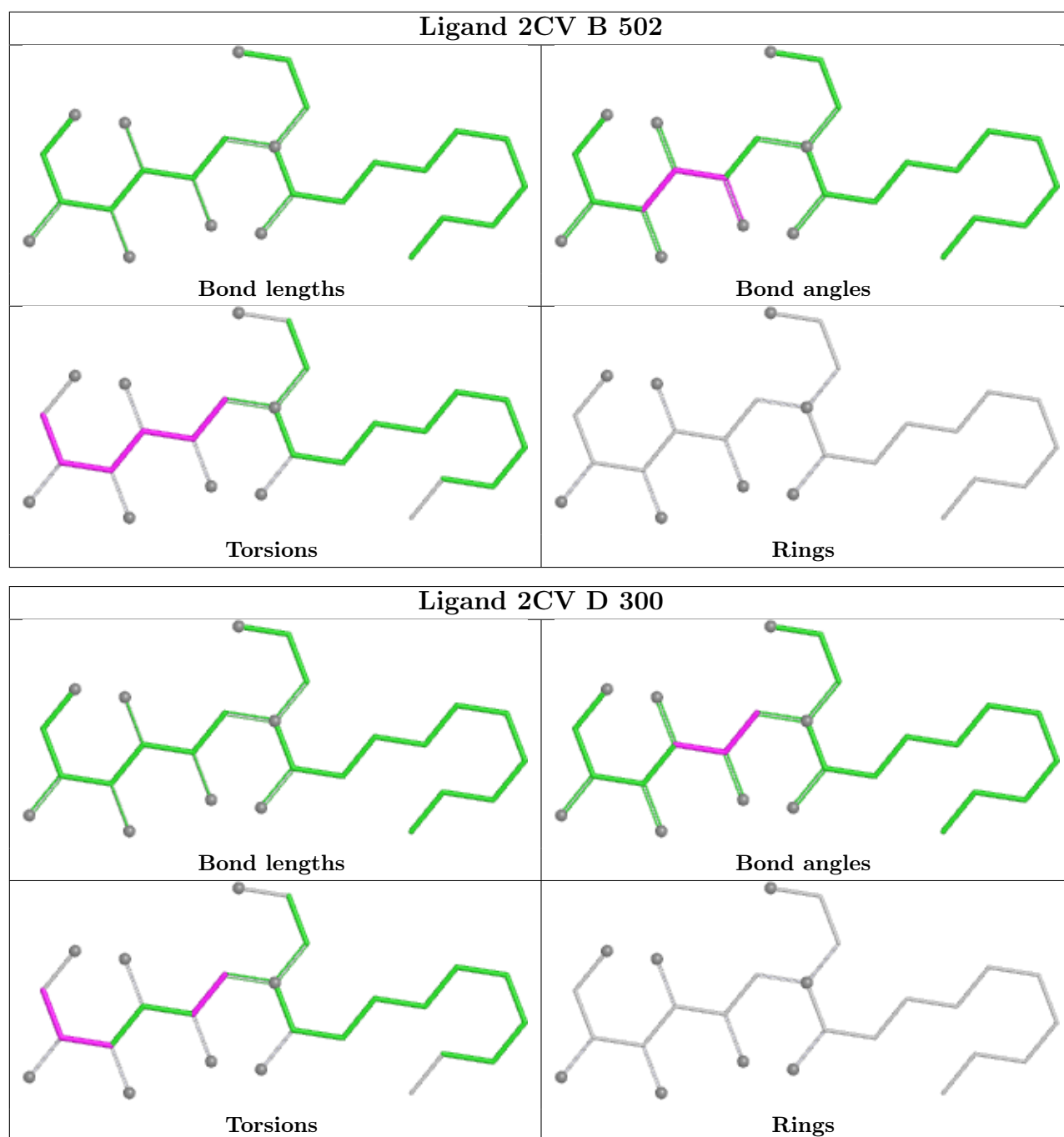
4 monomers are involved in 4 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	C	302	12P	1	0
2	A	301	2CV	1	0
2	C	301	2CV	1	0
2	D	300	2CV	1	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

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	92/149 (61%)	2.79	66 (71%) 0 0	26, 43, 146, 189	0
1	B	90/149 (60%)	2.77	65 (72%) 0 0	26, 46, 140, 200	0
1	C	91/149 (61%)	2.99	66 (72%) 0 0	28, 48, 135, 185	0
1	D	91/149 (61%)	3.01	63 (69%) 0 0	28, 47, 134, 181	0
All	All	364/596 (61%)	2.89	260 (71%) 0 0	26, 46, 138, 200	0

All (260) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	D	214	PHE	13.1
1	C	214	PHE	10.9
1	D	210	VAL	8.4
1	C	210	VAL	7.4
1	D	215	ILE	7.0
1	C	207	THR	6.9
1	D	207	THR	6.4
1	D	211	LEU	6.0
1	B	208	PHE	5.6
1	D	143	TYR	5.6
1	C	198	PHE	5.5
1	B	160	TRP	5.5
1	A	222	MET	5.3
1	B	167	SER	5.3
1	A	208	PHE	5.2
1	C	213	LEU	5.2
1	C	215	ILE	5.2
1	D	218	ILE	5.2
1	C	143	TYR	5.2
1	C	218	ILE	5.1
1	C	203	ILE	5.1

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Mol	Chain	Res	Type	RSRZ
1	B	214	PHE	5.0
1	A	160	TRP	5.0
1	D	130	GLY	5.0
1	A	207	THR	4.9
1	A	219	VAL	4.9
1	B	211	LEU	4.8
1	D	138	LEU	4.8
1	B	218	ILE	4.8
1	A	148	MET	4.8
1	B	169	TYR	4.8
1	A	218	ILE	4.8
1	C	151	ASN	4.7
1	A	131	VAL	4.7
1	A	215	ILE	4.7
1	A	211	LEU	4.7
1	D	137	LEU	4.6
1	C	137	LEU	4.6
1	D	209	THR	4.6
1	D	213	LEU	4.6
1	A	188	VAL	4.6
1	B	159	GLU	4.6
1	A	167	SER	4.5
1	B	131	VAL	4.5
1	C	130	GLY	4.4
1	C	209	THR	4.4
1	C	211	LEU	4.4
1	C	159	GLU	4.4
1	B	219	VAL	4.4
1	A	183	GLY	4.4
1	A	197	VAL	4.4
1	B	157	PHE	4.3
1	B	165	SER	4.3
1	B	168	LEU	4.3
1	D	219	VAL	4.3
1	A	214	PHE	4.3
1	D	172	PHE	4.3
1	B	181	SER	4.3
1	C	217	ILE	4.2
1	B	134	VAL	4.2
1	B	215	ILE	4.2
1	D	134	VAL	4.2
1	B	151	ASN	4.2

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Mol	Chain	Res	Type	RSRZ
1	B	184	ILE	4.2
1	D	169	TYR	4.2
1	C	175	MET	4.2
1	D	175	MET	4.1
1	D	198	PHE	4.1
1	D	212	ASN	4.1
1	C	174	VAL	4.1
1	B	143	TYR	4.1
1	A	157	PHE	4.0
1	A	143	TYR	4.0
1	A	151	ASN	4.0
1	A	204	MET	4.0
1	B	188	VAL	3.9
1	A	184	ILE	3.9
1	A	180	TRP	3.9
1	A	168	LEU	3.9
1	C	212	ASN	3.9
1	B	172	PHE	3.9
1	B	207	THR	3.8
1	D	159	GLU	3.8
1	A	196	TRP	3.8
1	B	148	MET	3.8
1	C	169	TYR	3.8
1	C	202	PHE	3.8
1	A	201	PRO	3.7
1	D	158	PRO	3.7
1	C	219	VAL	3.7
1	A	217	ILE	3.7
1	D	190	ASN	3.7
1	B	195	ALA	3.7
1	B	217	ILE	3.7
1	B	183	GLY	3.7
1	D	179	SER	3.6
1	A	174	VAL	3.6
1	C	194	ASN	3.6
1	D	217	ILE	3.6
1	C	205	LEU	3.6
1	A	181	SER	3.6
1	B	220	ASP	3.6
1	A	187	PRO	3.5
1	A	169	TYR	3.5
1	D	180	TRP	3.5

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Mol	Chain	Res	Type	RSRZ
1	A	189	MET	3.5
1	D	176	THR	3.5
1	C	158	PRO	3.5
1	C	206	THR	3.4
1	D	135	ALA	3.4
1	B	180	TRP	3.4
1	A	191	VAL	3.4
1	D	147	VAL	3.4
1	D	133	SER	3.4
1	C	197	VAL	3.4
1	C	184	ILE	3.4
1	D	174	VAL	3.3
1	B	192	HIS	3.3
1	C	180	TRP	3.3
1	C	200	ILE	3.3
1	C	154	GLY	3.3
1	B	156	THR	3.2
1	D	204	MET	3.2
1	C	141	VAL	3.2
1	A	139	THR	3.2
1	D	184	ILE	3.2
1	B	158	PRO	3.2
1	A	152	LEU	3.2
1	D	148	MET	3.2
1	C	178	GLU	3.2
1	A	190	ASN	3.2
1	C	134	VAL	3.2
1	C	133	SER	3.2
1	B	153	TYR	3.1
1	D	203	ILE	3.1
1	A	165	SER	3.1
1	C	172	PHE	3.1
1	D	151	ASN	3.1
1	B	187	PRO	3.1
1	B	189	MET	3.1
1	C	190	ASN	3.0
1	C	162	GLY	3.0
1	C	156	THR	3.0
1	A	149	ALA	3.0
1	A	194	ASN	3.0
1	A	185	VAL	3.0
1	B	191	VAL	3.0

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Mol	Chain	Res	Type	RSRZ
1	D	202	PHE	3.0
1	C	146	ALA	3.0
1	D	200	ILE	3.0
1	A	158	PRO	3.0
1	C	131	VAL	3.0
1	D	131	VAL	3.0
1	A	153	TYR	2.9
1	B	174	VAL	2.9
1	B	190	ASN	2.9
1	B	147	VAL	2.9
1	C	147	VAL	2.9
1	C	176	THR	2.9
1	A	135	ALA	2.9
1	B	178	GLU	2.9
1	D	208	PHE	2.9
1	D	183	GLY	2.8
1	D	216	GLY	2.8
1	A	164	LEU	2.8
1	C	144	ILE	2.8
1	A	220	ASP	2.8
1	B	171	LEU	2.8
1	C	148	MET	2.8
1	D	206	THR	2.8
1	D	220	ASP	2.8
1	D	152	LEU	2.8
1	A	156	THR	2.7
1	A	178	GLU	2.7
1	D	144	ILE	2.7
1	B	150	THR	2.7
1	C	189	MET	2.7
1	B	137	LEU	2.7
1	C	208	PHE	2.7
1	B	176	THR	2.7
1	A	142	PHE	2.7
1	C	204	MET	2.7
1	A	134	VAL	2.7
1	B	164	LEU	2.7
1	D	189	MET	2.7
1	A	186	ARG	2.7
1	B	206	THR	2.7
1	C	179	SER	2.6
1	C	199	PHE	2.6

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Mol	Chain	Res	Type	RSRZ
1	D	170	THR	2.6
1	C	195	ALA	2.6
1	A	192	HIS	2.6
1	B	202	PHE	2.6
1	A	146	ALA	2.6
1	D	146	ALA	2.6
1	A	171	LEU	2.6
1	D	178	GLU	2.6
1	A	176	THR	2.6
1	A	206	THR	2.6
1	B	204	MET	2.6
1	C	191	VAL	2.6
1	B	175	MET	2.5
1	D	201	PRO	2.5
1	B	186	ARG	2.5
1	C	168	LEU	2.5
1	B	182	MET	2.5
1	C	171	LEU	2.5
1	A	195	ALA	2.5
1	D	154	GLY	2.5
1	D	161	PHE	2.4
1	D	142	PHE	2.4
1	D	205	LEU	2.4
1	A	179	SER	2.4
1	C	152	LEU	2.4
1	C	160	TRP	2.4
1	A	173	GLN	2.4
1	A	175	MET	2.4
1	B	173	GLN	2.4
1	B	185	VAL	2.4
1	C	145	ALA	2.4
1	B	152	LEU	2.4
1	C	138	LEU	2.4
1	C	181	SER	2.4
1	A	147	VAL	2.4
1	D	141	VAL	2.4
1	B	139	THR	2.3
1	D	156	THR	2.3
1	B	142	PHE	2.3
1	B	161	PHE	2.3
1	C	185	VAL	2.3
1	D	185	VAL	2.3

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Mol	Chain	Res	Type	RSRZ
1	C	192	HIS	2.3
1	D	177	LEU	2.3
1	C	220	ASP	2.3
1	B	133	SER	2.3
1	B	146	ALA	2.2
1	B	210	VAL	2.2
1	B	212	ASN	2.2
1	C	142	PHE	2.2
1	D	181	SER	2.2
1	D	171	LEU	2.2
1	B	213	LEU	2.2
1	D	149	ALA	2.2
1	D	160	TRP	2.2
1	A	150	THR	2.2
1	A	203	ILE	2.2
1	C	161	PHE	2.1
1	A	172	PHE	2.1
1	A	138	LEU	2.1
1	B	194	ASN	2.1
1	B	166	LYS	2.1
1	C	177	LEU	2.1
1	A	213	LEU	2.1
1	C	153	TYR	2.1
1	B	196	TRP	2.0
1	A	154	GLY	2.0
1	A	200	ILE	2.0
1	D	163	ASP	2.0
1	B	154	GLY	2.0
1	A	210	VAL	2.0

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

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

6.3 Carbohydrates ⓘ

There are no oligosaccharides in this entry.

6.4 Ligands

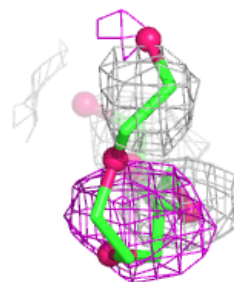
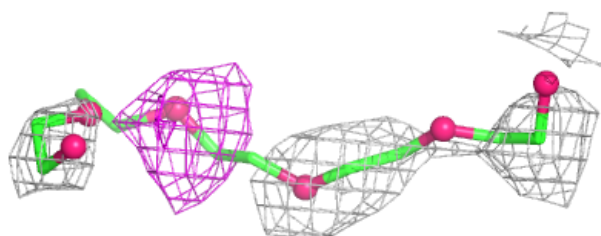
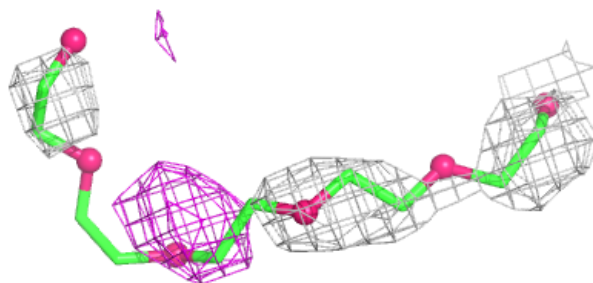
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists 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	12P	C	302	16/37	0.56	0.46	64,73,82,82	0
2	2CV	B	502	26/26	0.68	0.33	40,83,98,99	0
2	2CV	C	301	26/26	0.68	0.36	57,89,113,115	0
2	2CV	A	301	26/26	0.68	0.40	54,93,101,102	0
2	2CV	D	300	26/26	0.72	0.29	50,68,83,83	0
3	12P	A	302	16/37	0.76	0.28	67,73,79,80	0
3	12P	B	503	16/37	0.83	0.26	64,68,80,81	0
4	BR	C	303[A]	1/1	0.89	0.34	35,35,35,35	1
4	BR	C	303[B]	1/1	0.89	0.34	37,37,37,37	1
4	BR	B	501[A]	1/1	0.96	0.44	34,34,34,34	1
4	BR	B	501[B]	1/1	0.96	0.44	33,33,33,33	1

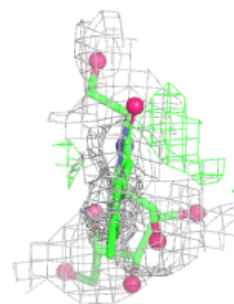
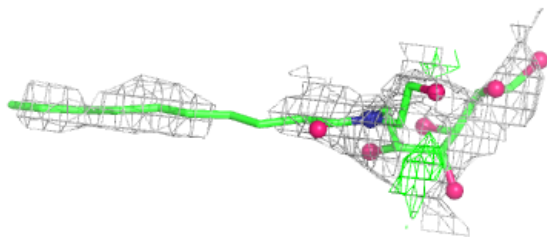
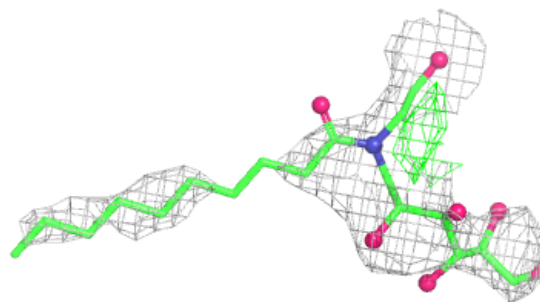
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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

Electron density around 12P C 302:

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

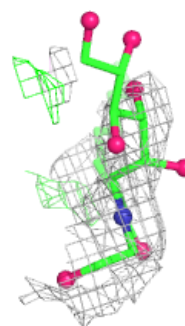
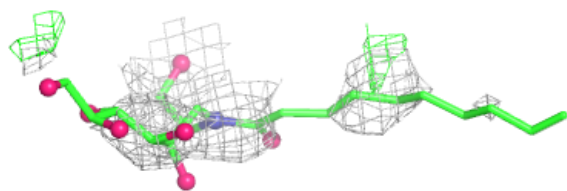
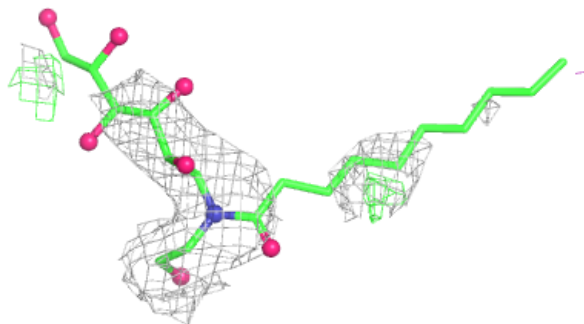
**Electron density around 2CV B 502:**

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

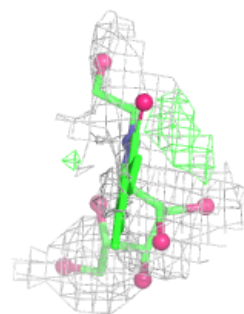
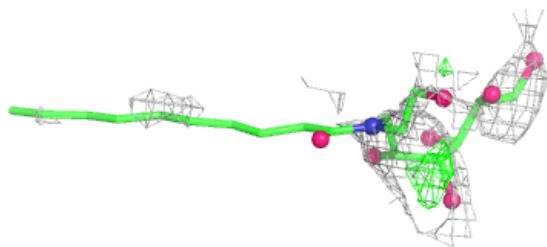
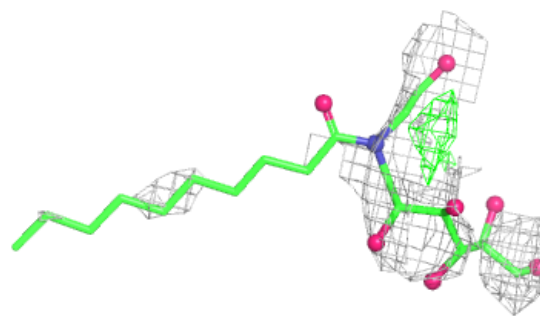


Electron density around 2CV C 301:

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

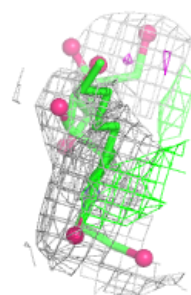
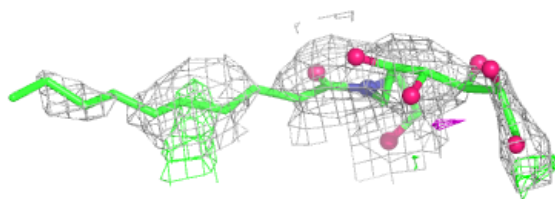
**Electron density around 2CV A 301:**

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

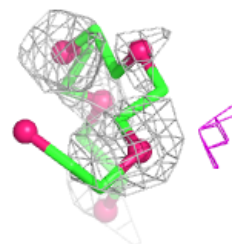
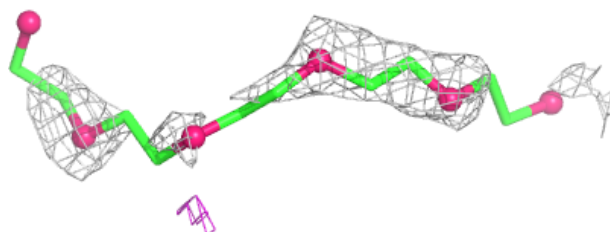
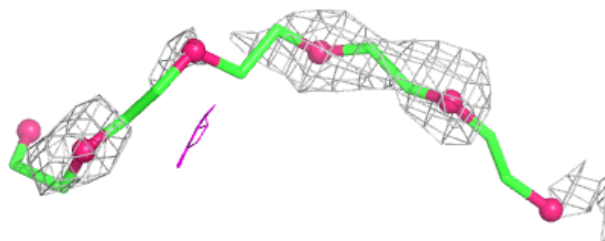


Electron density around 2CV D 300:

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

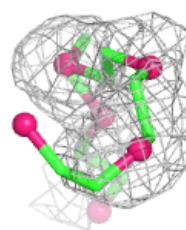
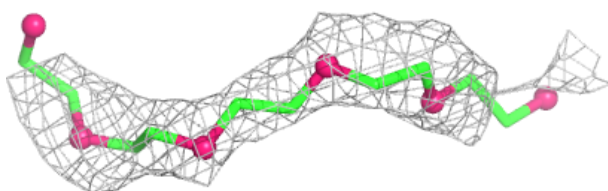
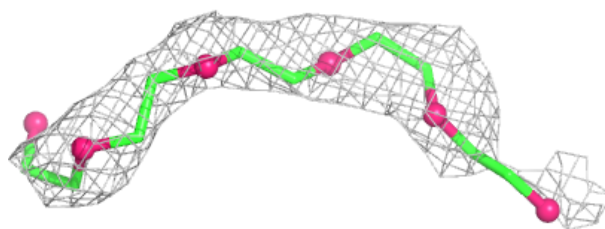
**Electron density around 12P A 302:**

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



Electron density around 12P B 503:

$2mF_o - DF_c$ (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.