



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 8, 2026 – 08:08 AM UTC

PDB ID : 7B4C / pdb_00007b4c
Title : Structural basis of reactivation of oncogenic p53 mutants by a small molecule: methylene quinuclidinone (MQ). Human p53DBD-R273C mutant bound to MQ: R273C-MQ (II)
Authors : Degtjarik, O.; Rozenberg, H.; Shakked, Z.
Deposited on : 2020-12-02
Resolution : 1.71 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

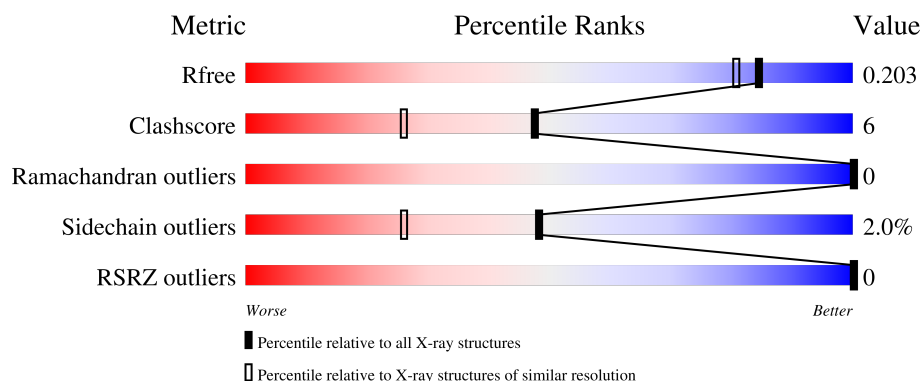
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.71 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	1039 (1.72-1.72)
Clashscore	190562	1049 (1.72-1.72)
Ramachandran outliers	187476	1041 (1.72-1.72)
Sidechain outliers	187428	1041 (1.72-1.72)
RSRZ outliers	180081	1039 (1.72-1.72)

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	200	 80% 14% . .
1	B	200	 82% 12% . 5%
1	C	200	 82% 14% .
1	D	200	 84% 11% . .

2 Entry composition

There are 7 unique types of molecules in this entry. The entry contains 6995 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 Cellular tumor antigen p53.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	191	Total	C	N	O	S	0	16	0
			1590	979	288	303	20			
1	B	190	Total	C	N	O	S	0	14	0
			1560	960	282	294	24			
1	C	191	Total	C	N	O	S	0	17	0
			1598	984	292	299	23			
1	D	193	Total	C	N	O	S	0	16	0
			1595	983	293	297	22			

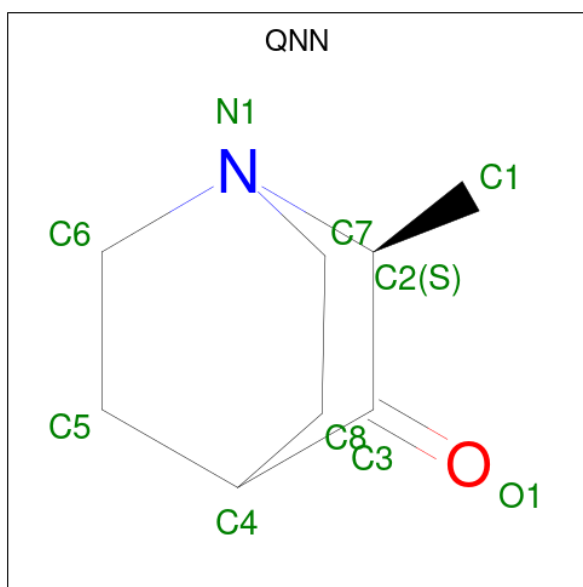
There are 4 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	273	CYS	ARG	engineered mutation	UNP P04637
B	273	CYS	ARG	engineered mutation	UNP P04637
C	273	CYS	ARG	engineered mutation	UNP P04637
D	273	CYS	ARG	engineered mutation	UNP P04637

- Molecule 2 is ZINC ION (CCD ID: ZN) (formula: Zn).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	1	Total	Zn	0	0
			1	1		
2	B	1	Total	Zn	0	0
			1	1		
2	C	1	Total	Zn	0	0
			1	1		
2	D	1	Total	Zn	0	0
			1	1		

- Molecule 3 is (2 {S})-2-methyl-1-azabicyclo[2.2.2]octan-3-one (CCD ID: QNN) (formula: C₈H₁₃NO) (labeled as "Ligand of Interest" by depositor).



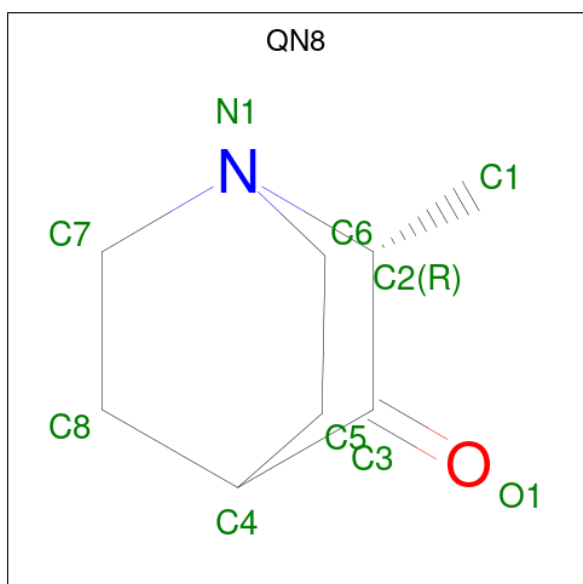
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
3	A	1	Total	C	N	O	0	1
			10	8	1	1		
3	B	1	Total	C	N	O	0	1
			10	8	1	1		
3	B	1	Total	C	N	O	0	1
			10	8	1	1		
3	C	1	Total	C	N	O	0	1
			10	8	1	1		
3	C	1	Total	C	N	O	0	1
			10	8	1	1		
3	D	1	Total	C	N	O	0	1
			10	8	1	1		

- Molecule 4 is 1,2-ETHANEDIOL (CCD ID: EDO) (formula: C₂H₆O₂).



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

- Molecule 5 is (2 {R})-2-methyl-1-azabicyclo[2.2.2]octan-3-one (CCD ID: QN8) (formula: C₈H₁₃NO) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
5	B	1	Total	C	N	O	0	1
			10	8	1	1		

- Molecule 6 is DI(HYDROXYETHYL)ETHER (CCD ID: PEG) (formula: $C_4H_{10}O_3$).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
6	D	1	Total	C	O	0	0
			7	4	3		
6	D	1	Total	C	O	0	0
			7	4	3		

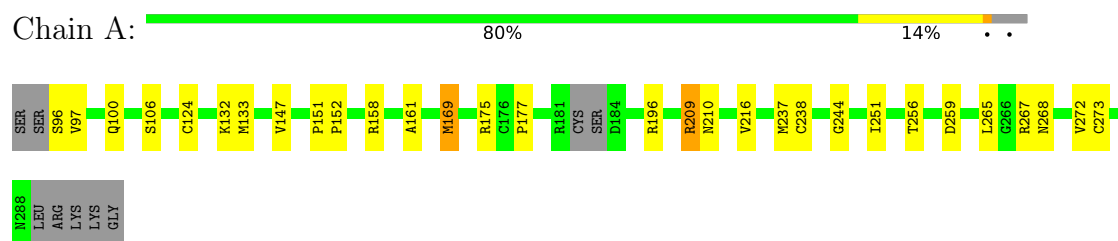
- Molecule 7 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
7	A	148	Total	O	0	2
			149	149		
7	B	135	Total	O	0	3
			136	136		
7	C	137	Total	O	0	0
			137	137		
7	D	124	Total	O	0	3
			126	126		

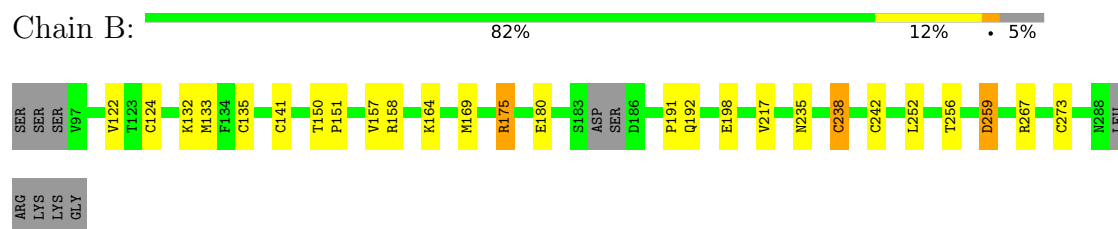
3 Residue-property plots [i](#)

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.

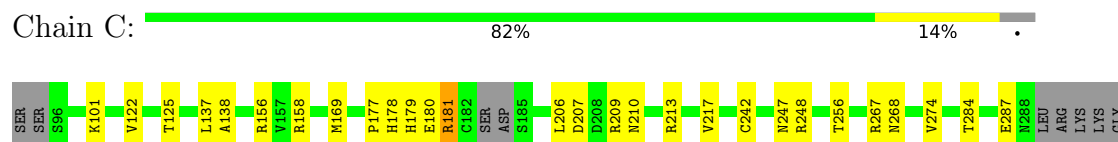
- Molecule 1: Cellular tumor antigen p53



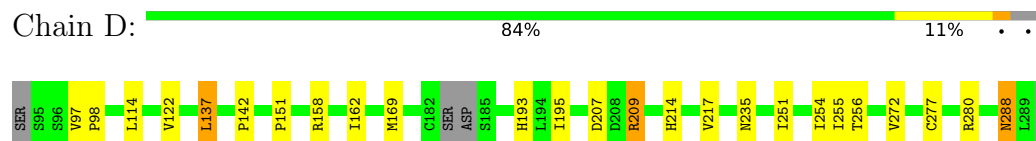
- Molecule 1: Cellular tumor antigen p53



- Molecule 1: Cellular tumor antigen p53



- Molecule 1: Cellular tumor antigen p53



4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	68.88Å 71.08Å 84.92Å 90.00° 90.03° 90.00°	Depositor
Resolution (Å)	42.75 – 1.71 42.75 – 1.71	Depositor EDS
% Data completeness (in resolution range)	98.2 (42.75-1.71) 97.7 (42.75-1.71)	Depositor EDS
R_{merge}	0.08	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.48 (at 1.71Å)	Xtriage
Refinement program	REFMAC 5.8.0266	Depositor
R, R_{free}	0.149 , 0.182 (Not available) , 0.203	Depositor DCC
R_{free} test set	4333 reflections (4.89%)	wwPDB-VP
Wilson B-factor (Å ²)	21.8	Xtriage
Anisotropy	0.901	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.31 , 21.5	EDS
L-test for twinning ²	$\langle L \rangle = 0.40$, $\langle L^2 \rangle = 0.23$	Xtriage
Estimated twinning fraction	0.064 for -k,-h,-l 0.059 for k,h,-l 0.366 for h,-k,-l	Xtriage
Reported twinning fraction	0.640 for H, K, L 0.360 for -h,-k,l	Depositor
Outliers	0 of 87211 reflections	Xtriage
F_o, F_c correlation	0.98	EDS
Total number of atoms	6995	wwPDB-VP
Average B, all atoms (Å ²)	33.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 10.30% 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: QN8, ZN, EDO, QNN, PEG

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	1.30	7/1630 (0.4%)	1.23	4/2215 (0.2%)
1	B	1.27	5/1597 (0.3%)	1.32	5/2170 (0.2%)
1	C	1.19	3/1634 (0.2%)	1.20	2/2214 (0.1%)
1	D	1.22	4/1635 (0.2%)	1.27	4/2221 (0.2%)
All	All	1.25	19/6496 (0.3%)	1.26	15/8820 (0.2%)

All (19) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	147	VAL	C-O	6.80	1.30	1.24
1	B	267	ARG	C-O	6.68	1.31	1.23
1	B	135	CYS	C-O	-6.41	1.15	1.23
1	C	206	LEU	C-O	6.37	1.31	1.23
1	A	216	VAL	C-O	6.02	1.30	1.24
1	D	195	ILE	C-O	5.80	1.31	1.24
1	B	259	ASP	C-O	5.71	1.31	1.23
1	A	161	ALA	C-O	5.68	1.30	1.23
1	A	268	ASN	C-O	5.67	1.30	1.23
1	B	175	ARG	C-O	5.67	1.30	1.23
1	D	255	ILE	C-O	-5.65	1.18	1.24
1	C	213	ARG	C-O	5.49	1.30	1.23
1	B	157	VAL	C-O	-5.47	1.18	1.24
1	D	142	PRO	C-O	5.39	1.29	1.23
1	A	259	ASP	C-O	5.31	1.30	1.23
1	A	175	ARG	C-O	5.31	1.30	1.23
1	A	265	LEU	N-CA	5.25	1.53	1.46
1	D	235	ASN	C-O	5.24	1.30	1.24
1	C	274	VAL	C-O	-5.14	1.18	1.24

All (15) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	152	PRO	N-CA-C	7.58	117.74	110.47
1	A	152	PRO	CB-CA-C	-7.48	104.36	111.39
1	D	207	ASP	CA-CB-CG	7.11	119.71	112.60
1	B	151	PRO	N-CA-CB	6.11	106.61	103.19
1	B	135	CYS	CA-C-O	-5.93	114.86	121.51
1	C	207	ASP	CA-CB-CG	5.88	118.48	112.60
1	D	288	ASN	CA-C-N	5.77	132.09	121.70
1	D	288	ASN	C-N-CA	5.77	132.09	121.70
1	B	235	ASN	CA-CB-CG	5.74	118.34	112.60
1	A	151	PRO	CA-C-N	5.69	123.81	119.66
1	A	151	PRO	C-N-CA	5.69	123.81	119.66
1	D	151	PRO	CB-CA-C	-5.44	106.28	111.39
1	B	150	THR	CA-C-N	5.13	123.41	119.66
1	B	150	THR	C-N-CA	5.13	123.41	119.66
1	C	181	ARG	NE-CZ-NH2	5.08	123.77	119.20

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	1590	0	1512	20	0
1	B	1560	0	1472	16	0
1	C	1598	0	1532	12	0
1	D	1595	0	1517	24	0
2	A	1	0	0	0	0
2	B	1	0	0	0	0
2	C	1	0	0	0	0
2	D	1	0	0	0	0
3	A	10	0	0	0	0
3	B	20	0	0	0	0
3	C	20	0	0	0	0
3	D	10	0	0	0	0
4	A	4	0	6	0	0
4	B	4	0	6	0	0
4	C	4	0	6	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
4	D	4	0	6	0	0
5	B	10	0	0	0	0
6	D	14	0	20	1	0
7	A	149	0	0	1	0
7	B	136	0	0	3	0
7	C	137	0	0	1	0
7	D	126	0	0	3	0
All	All	6995	0	6077	71	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 6.

All (71) 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:251:ILE:HG13	1:A:272[B]:VAL:HG22	1.63	0.80
1:A:124[A]:CYS:SG	1:A:133[A]:MET:SD	2.82	0.76
1:D:162[A]:ILE:HD12	1:D:254:ILE:HD11	1.69	0.74
1:B:132:LYS:CE	1:B:273[B]:CYS:SG	2.76	0.74
1:B:124[A]:CYS:SG	1:B:133[A]:MET:SD	2.86	0.73
1:D:277[B]:CYS:HB2	1:D:280[B]:ARG:HH21	1.53	0.73
1:A:158:ARG:HB3	1:A:256[B]:THR:CG2	2.22	0.69
1:D:251:ILE:HG13	1:D:272[B]:VAL:HG22	1.74	0.69
1:D:251:ILE:HG13	1:D:272[B]:VAL:CG2	2.23	0.69
1:D:251:ILE:HD11	1:D:272[B]:VAL:CG2	2.26	0.65
1:D:251:ILE:HD11	1:D:272[B]:VAL:HG21	1.81	0.61
1:D:251:ILE:CD1	1:D:272[B]:VAL:CG2	2.79	0.61
1:B:132:LYS:NZ	1:B:273[B]:CYS:SG	2.74	0.60
1:A:251:ILE:HG13	1:A:272[B]:VAL:CG2	2.30	0.60
1:D:114:LEU:HD22	6:D:305:PEG:H21	1.84	0.59
1:D:256[B]:THR:HG21	7:D:498:HOH:O	2.02	0.58
1:D:277[B]:CYS:HB2	1:D:280[B]:ARG:NH2	2.18	0.58
1:A:132:LYS:HE2	1:A:273[B]:CYS:SG	2.43	0.58
1:D:97:VAL:HG11	1:D:169:MET:HE3	1.86	0.58
1:D:122[B]:VAL:CG1	1:D:122[B]:VAL:O	2.52	0.58
1:C:177:PRO:HA	1:C:180:GLU:HG2	1.86	0.57
1:C:284:THR:O	1:C:287:GLU:HG2	2.05	0.57
1:D:122[B]:VAL:O	1:D:122[B]:VAL:HG13	2.05	0.56
1:A:251:ILE:HD11	1:A:272[B]:VAL:CG2	2.35	0.56
1:D:158:ARG:HB3	1:D:256[B]:THR:CG2	2.35	0.56
1:D:277[B]:CYS:CB	1:D:280[B]:ARG:HH21	2.17	0.56

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:251:ILE:CG1	1:D:272[B]:VAL:CG2	2.84	0.56
1:C:256:THR:HG22	1:C:267:ARG:HG3	1.89	0.55
1:A:158:ARG:HB3	1:A:256[B]:THR:HG23	1.87	0.55
1:A:251:ILE:HD11	1:A:272[B]:VAL:HG21	1.88	0.55
1:A:256[B]:THR:HG22	7:A:512:HOH:O	2.06	0.55
1:B:238[A]:CYS:SG	7:B:522[A]:HOH:O	2.58	0.54
1:D:209:ARG:HD2	7:D:503:HOH:O	2.08	0.53
1:D:137[A]:LEU:C	1:D:137[A]:LEU:HD23	2.34	0.53
1:B:256:THR:HG23	7:B:506:HOH:O	2.08	0.53
1:C:178:HIS:O	1:C:181:ARG:HD3	2.10	0.52
1:A:132:LYS:CE	1:A:273[B]:CYS:SG	2.98	0.52
1:C:158:ARG:CZ	1:C:217[B]:VAL:HG21	2.41	0.51
1:B:175:ARG:HD3	1:B:191:PRO:O	2.10	0.51
1:A:100:GLN:OE1	1:A:169:MET:HE1	2.11	0.50
1:C:268[B]:ASN:ND2	7:C:402:HOH:O	2.43	0.50
1:C:137[B]:LEU:HD23	1:C:138:ALA:N	2.26	0.50
1:D:277[B]:CYS:CB	1:D:280[B]:ARG:NH2	2.75	0.50
1:C:122[A]:VAL:HG11	1:C:125:THR:HB	1.93	0.49
1:A:251:ILE:CG1	1:A:272[B]:VAL:CG2	2.89	0.49
1:A:251:ILE:CD1	1:A:272[B]:VAL:CG2	2.91	0.49
1:B:133[B]:MET:SD	1:B:141[B]:CYS:HB3	2.52	0.49
1:C:101:LYS:O	1:C:267:ARG:HD2	2.13	0.48
1:B:180:GLU:CD	1:B:192:GLN:HG2	2.38	0.48
1:A:177:PRO:HD3	1:A:244:GLY:O	2.14	0.47
1:B:132:LYS:HE3	1:B:273[B]:CYS:SG	2.55	0.46
1:A:209:ARG:HG2	1:A:210:ASN:N	2.31	0.46
1:B:132:LYS:HE2	1:B:273[B]:CYS:SG	2.55	0.45
1:D:209:ARG:CD	7:D:503:HOH:O	2.63	0.45
1:A:158:ARG:HB3	1:A:256[B]:THR:HG22	1.97	0.45
1:B:158:ARG:CZ	1:B:217[B]:VAL:HG21	2.47	0.45
1:A:96:SER:O	1:A:97:VAL:C	2.60	0.44
1:D:98:PRO:HG2	1:D:162[A]:ILE:HD11	1.99	0.44
1:C:179:HIS:HE1	1:C:242:CYS:SG	2.38	0.44
1:A:106:SER:HB2	1:B:242:CYS:SG	2.58	0.44
1:B:164:LYS:HA	1:B:252:LEU:CD1	2.48	0.43
1:D:193:HIS:CE1	1:D:214:HIS:HB3	2.52	0.43
1:B:238[A]:CYS:CB	7:B:522[A]:HOH:O	2.66	0.43
1:A:196:ARG:CZ	1:A:237:MET:HE2	2.50	0.42
1:D:251:ILE:CG1	1:D:272[B]:VAL:HG23	2.50	0.42
1:B:122[B]:VAL:O	1:B:122[B]:VAL:HG13	2.20	0.42
1:D:162[B]:ILE:HD11	1:D:169:MET:HG2	2.02	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:259:ASP:C	1:B:259:ASP:OD1	2.64	0.41
1:A:256[A]:THR:HG22	1:A:267:ARG:HG3	2.03	0.41
1:C:247:ASN:OD1	1:C:248[B]:ARG:NH2	2.54	0.41
1:C:156:ARG:HB3	1:C:217[A]:VAL:CG2	2.52	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	203/200 (102%)	201 (99%)	2 (1%)	0	100	100
1	B	199/200 (100%)	197 (99%)	2 (1%)	0	100	100
1	C	202/200 (101%)	200 (99%)	2 (1%)	0	100	100
1	D	205/200 (102%)	203 (99%)	2 (1%)	0	100	100
All	All	809/800 (101%)	801 (99%)	8 (1%)	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	182/179 (102%)	178 (98%)	4 (2%)	45	23
1	B	177/179 (99%)	173 (98%)	4 (2%)	44	21

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	C	184/179 (103%)	181 (98%)	3 (2%)	55	34
1	D	179/179 (100%)	173 (97%)	6 (3%)	32	10
All	All	722/716 (101%)	705 (98%)	17 (2%)	48	20

All (17) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	169	MET
1	A	209	ARG
1	A	238[A]	CYS
1	A	238[B]	CYS
1	B	169	MET
1	B	198	GLU
1	B	238[A]	CYS
1	B	238[B]	CYS
1	C	169	MET
1	C	209	ARG
1	C	210	ASN
1	D	137[A]	LEU
1	D	137[B]	LEU
1	D	209	ARG
1	D	217[A]	VAL
1	D	217[B]	VAL
1	D	288	ASN

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	168	HIS
1	B	192	GLN
1	B	239	ASN
1	C	178	HIS

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

Of 17 ligands modelled in this entry, 4 are monoatomic - leaving 13 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	QNN	B	302[A]	1	10,11,11	1.23	1 (10%)	14,16,16	0.92	0
3	QNN	D	302[A]	1	10,11,11	1.40	1 (10%)	14,16,16	1.21	2 (14%)
3	QNN	C	303[A]	1	10,11,11	1.37	1 (10%)	14,16,16	1.26	2 (14%)
3	QNN	A	302[A]	1	10,11,11	1.30	2 (20%)	14,16,16	1.28	1 (7%)
5	QN8	B	303[A]	1	10,11,11	1.87	1 (10%)	14,16,16	1.65	4 (28%)
6	PEG	D	304	-	6,6,6	0.31	0	5,5,5	0.41	0
4	EDO	D	303	-	3,3,3	0.30	0	2,2,2	0.27	0
3	QNN	B	304[A]	1	10,11,11	1.41	1 (10%)	14,16,16	1.21	2 (14%)
6	PEG	D	305	-	6,6,6	0.46	0	5,5,5	0.41	0
3	QNN	C	301[A]	1	10,11,11	1.18	1 (10%)	14,16,16	1.04	0
4	EDO	A	303	-	3,3,3	0.15	0	2,2,2	0.37	0
4	EDO	B	305	-	3,3,3	0.16	0	2,2,2	0.28	0
4	EDO	C	304	-	3,3,3	0.38	0	2,2,2	0.35	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	QNN	B	302[A]	1	-	-	0/3/2/2
3	QNN	D	302[A]	1	-	-	0/3/2/2
3	QNN	C	303[A]	1	-	-	0/3/2/2
3	QNN	A	302[A]	1	-	-	0/3/2/2
5	QN8	B	303[A]	1	-	-	0/3/2/2
6	PEG	D	304	-	-	1/4/4/4	-
3	QNN	C	301[A]	1	-	-	0/3/2/2
3	QNN	B	304[A]	1	-	-	0/3/2/2
6	PEG	D	305	-	-	2/4/4/4	-
4	EDO	D	303	-	-	1/1/1/1	-
4	EDO	A	303	-	-	1/1/1/1	-
4	EDO	B	305	-	-	1/1/1/1	-
4	EDO	C	304	-	-	1/1/1/1	-

All (8) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
5	B	303[A]	QN8	C7-N1	5.13	1.56	1.47
3	D	302[A]	QNN	C7-N1	3.22	1.53	1.47
3	B	304[A]	QNN	C7-N1	2.93	1.52	1.47
3	C	303[A]	QNN	C7-N1	2.85	1.52	1.47
3	C	301[A]	QNN	C7-N1	2.70	1.52	1.47
3	B	302[A]	QNN	C7-N1	2.67	1.52	1.47
3	A	302[A]	QNN	C7-N1	2.36	1.51	1.47
3	A	302[A]	QNN	C6-N1	2.26	1.51	1.47

All (11) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	B	303[A]	QN8	O1-C3-C2	3.92	128.04	121.72
3	C	303[A]	QNN	O1-C3-C2	2.83	126.28	121.72
3	B	304[A]	QNN	C7-N1-C6	-2.77	103.84	109.13
5	B	303[A]	QN8	C7-N1-C2	-2.64	106.00	111.22
3	A	302[A]	QNN	O1-C3-C2	2.57	125.87	121.72
3	D	302[A]	QNN	O1-C3-C2	2.30	125.43	121.72
5	B	303[A]	QN8	C7-N1-C6	-2.23	104.88	109.13
3	C	303[A]	QNN	C7-N1-C6	-2.22	104.90	109.13
5	B	303[A]	QN8	C8-C4-C5	-2.08	105.63	110.00
3	B	304[A]	QNN	C6-N1-C2	-2.03	107.21	111.22
3	D	302[A]	QNN	C1-C2-C3	2.02	112.81	109.61

There are no chirality outliers.

All (7) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
6	D	304	PEG	C1-C2-O2-C3
6	D	305	PEG	O2-C3-C4-O4
6	D	305	PEG	O1-C1-C2-O2
4	B	305	EDO	O1-C1-C2-O2
4	D	303	EDO	O1-C1-C2-O2
4	C	304	EDO	O1-C1-C2-O2
4	A	303	EDO	O1-C1-C2-O2

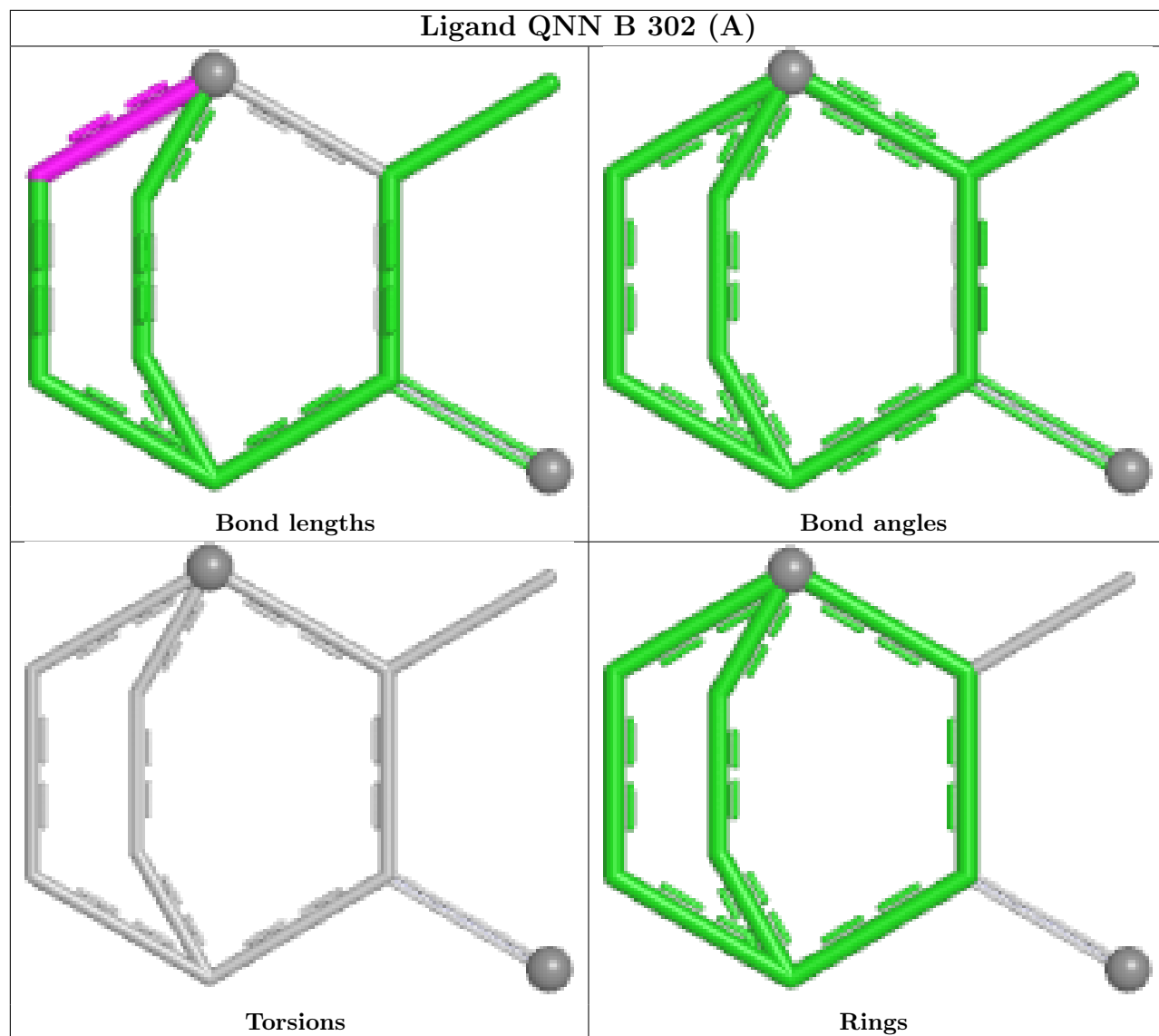
There are no ring outliers.

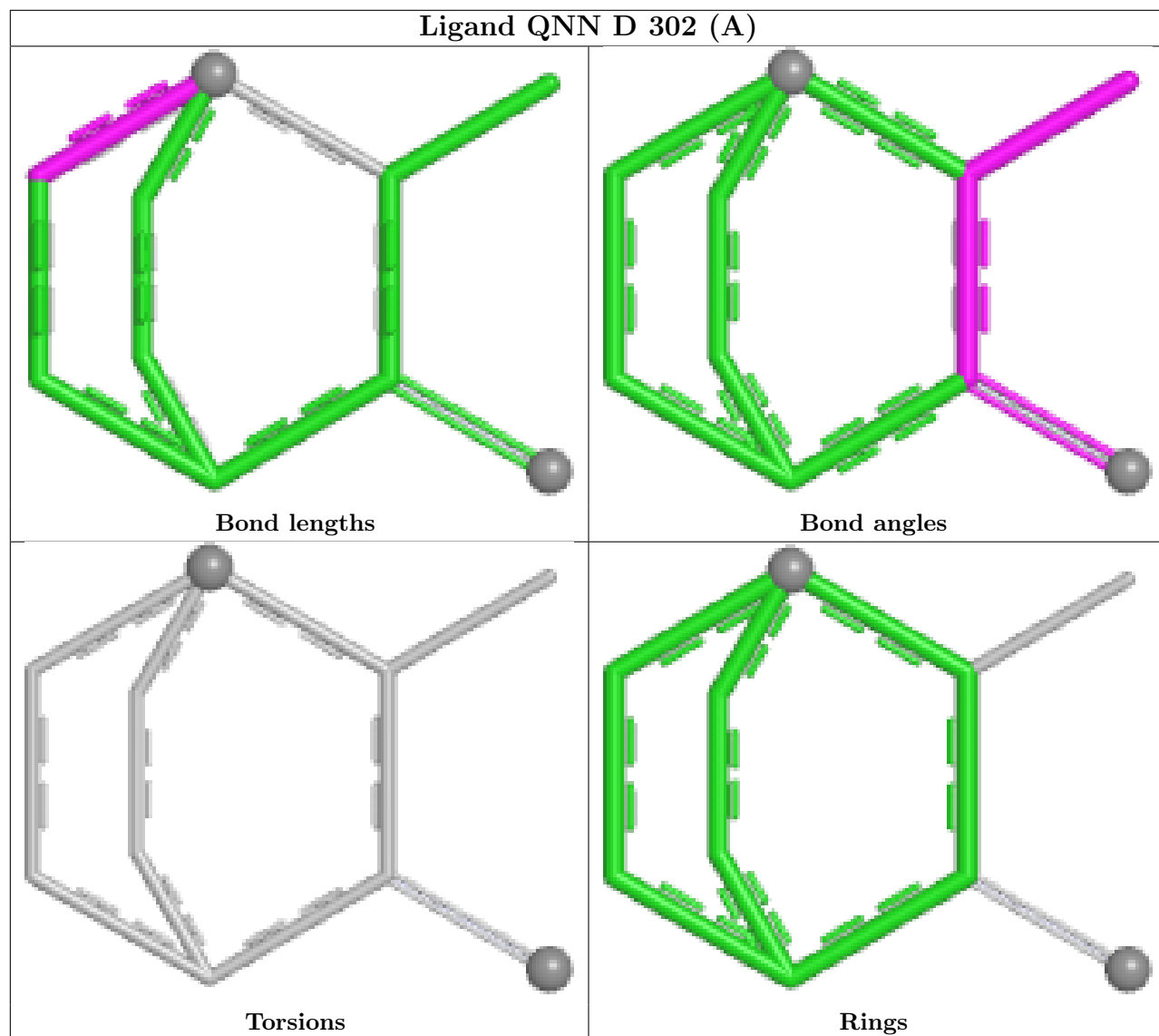
1 monomer is involved in 1 short contact:

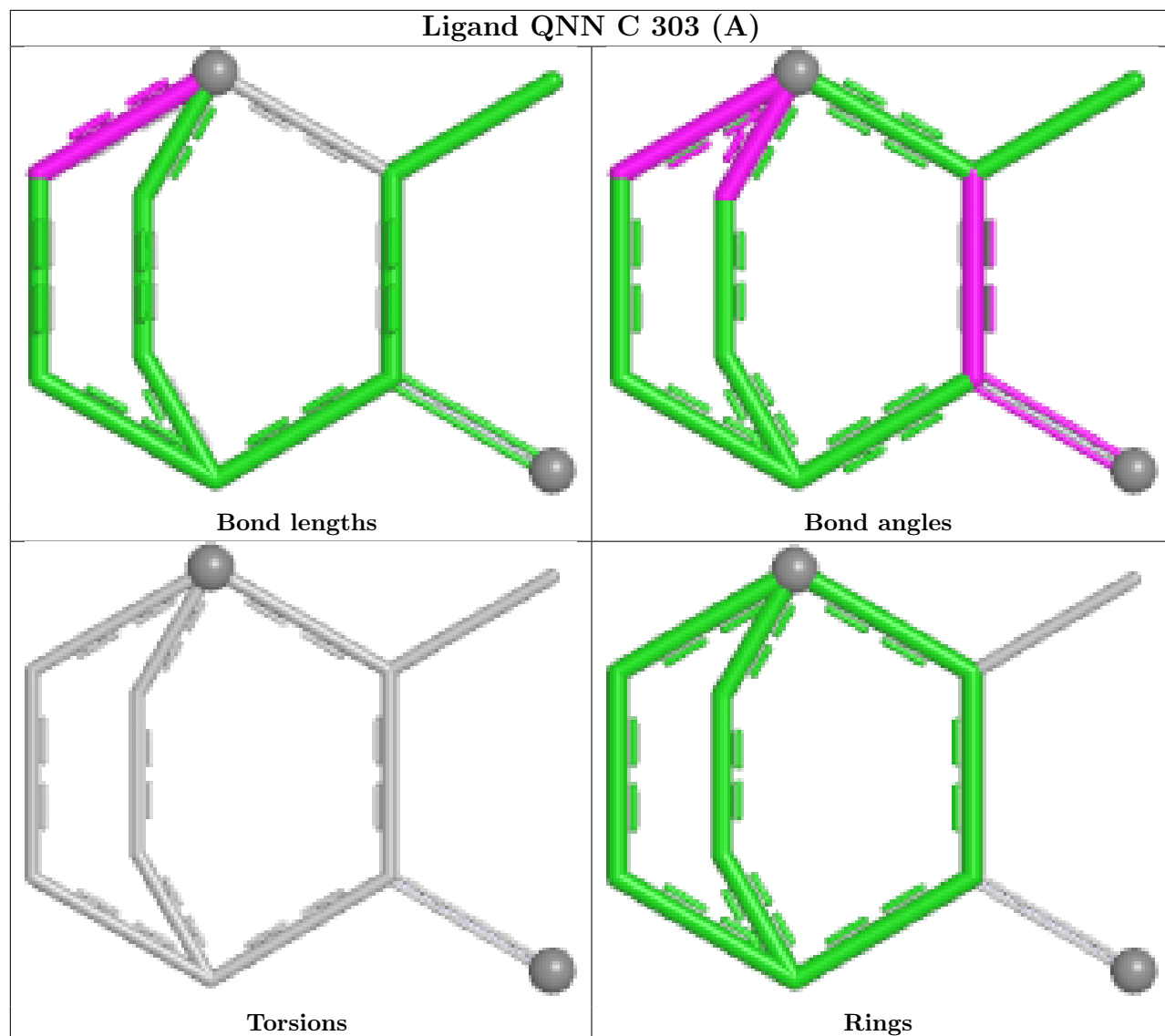
Mol	Chain	Res	Type	Clashes	Symm-Clashes
6	D	305	PEG	1	0

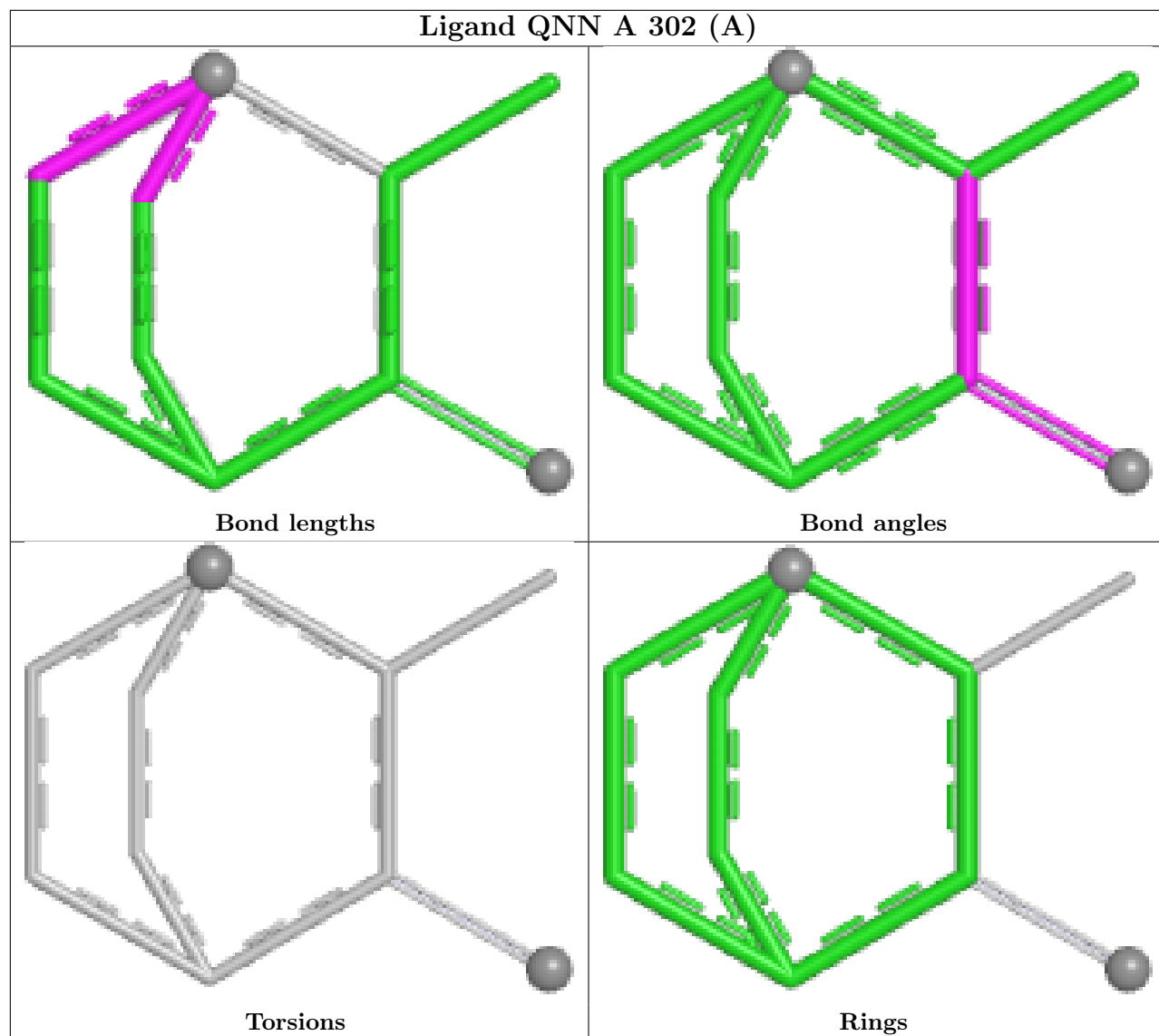
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. 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.

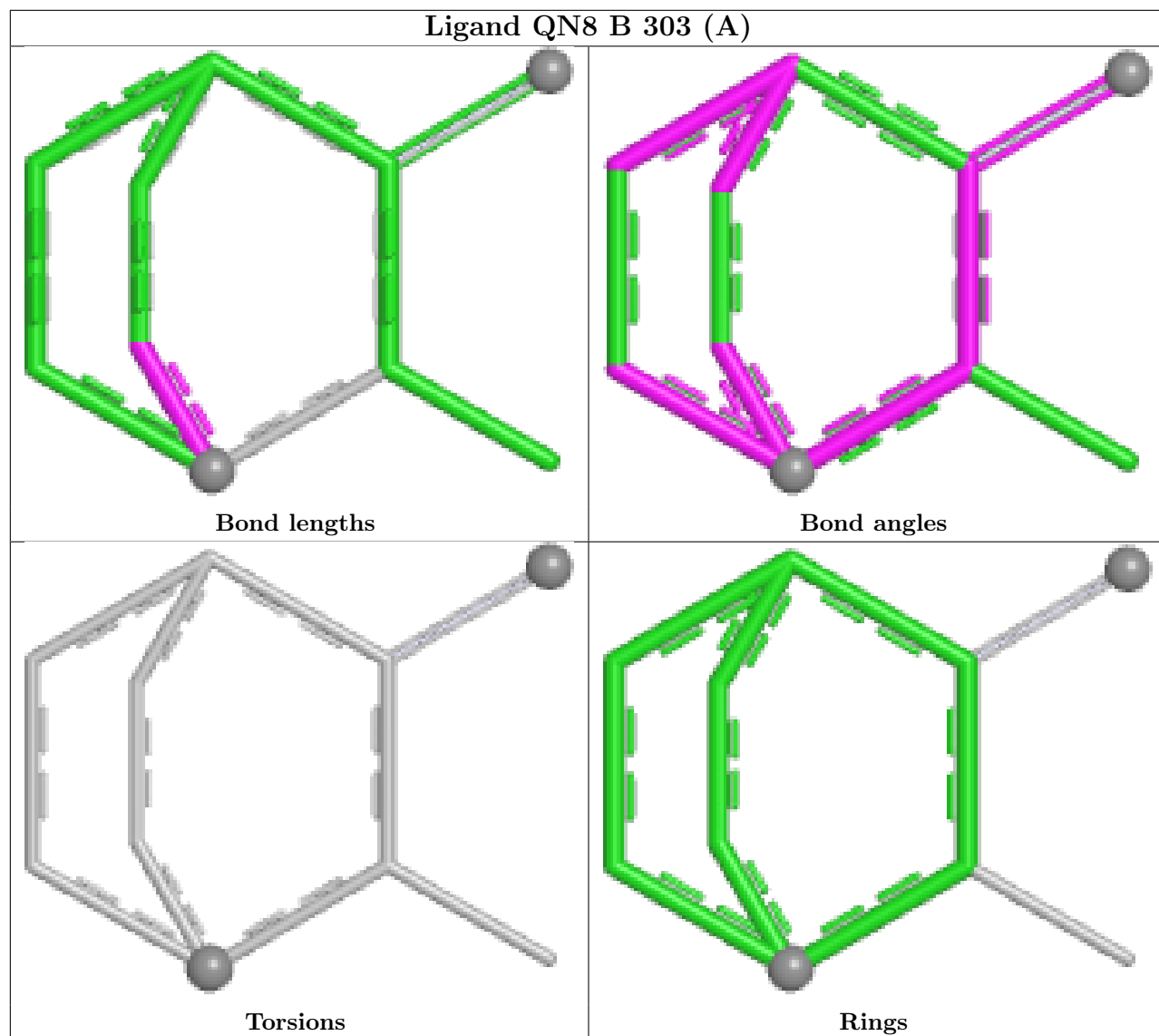
Ligand QNN B 302 (A)

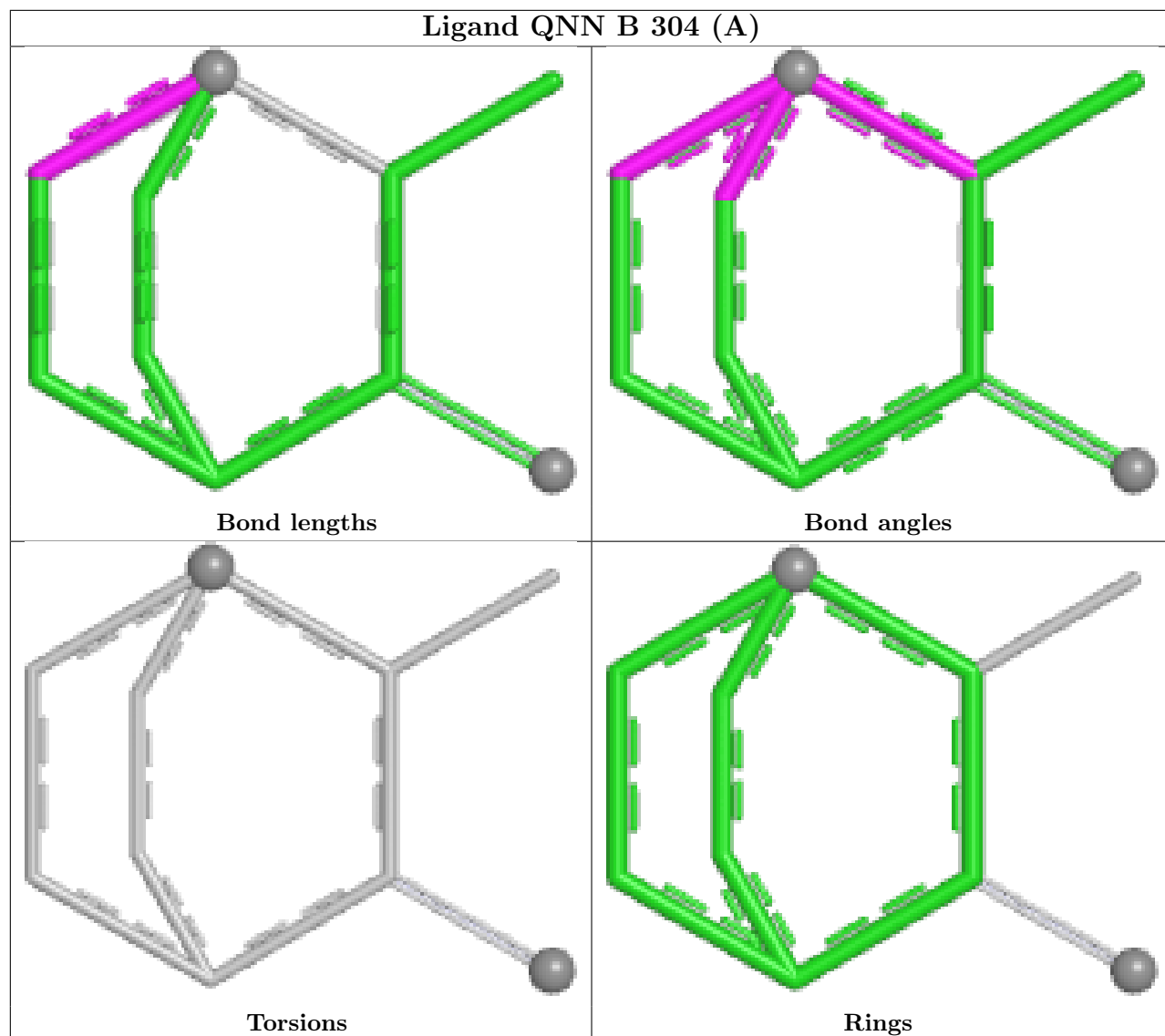


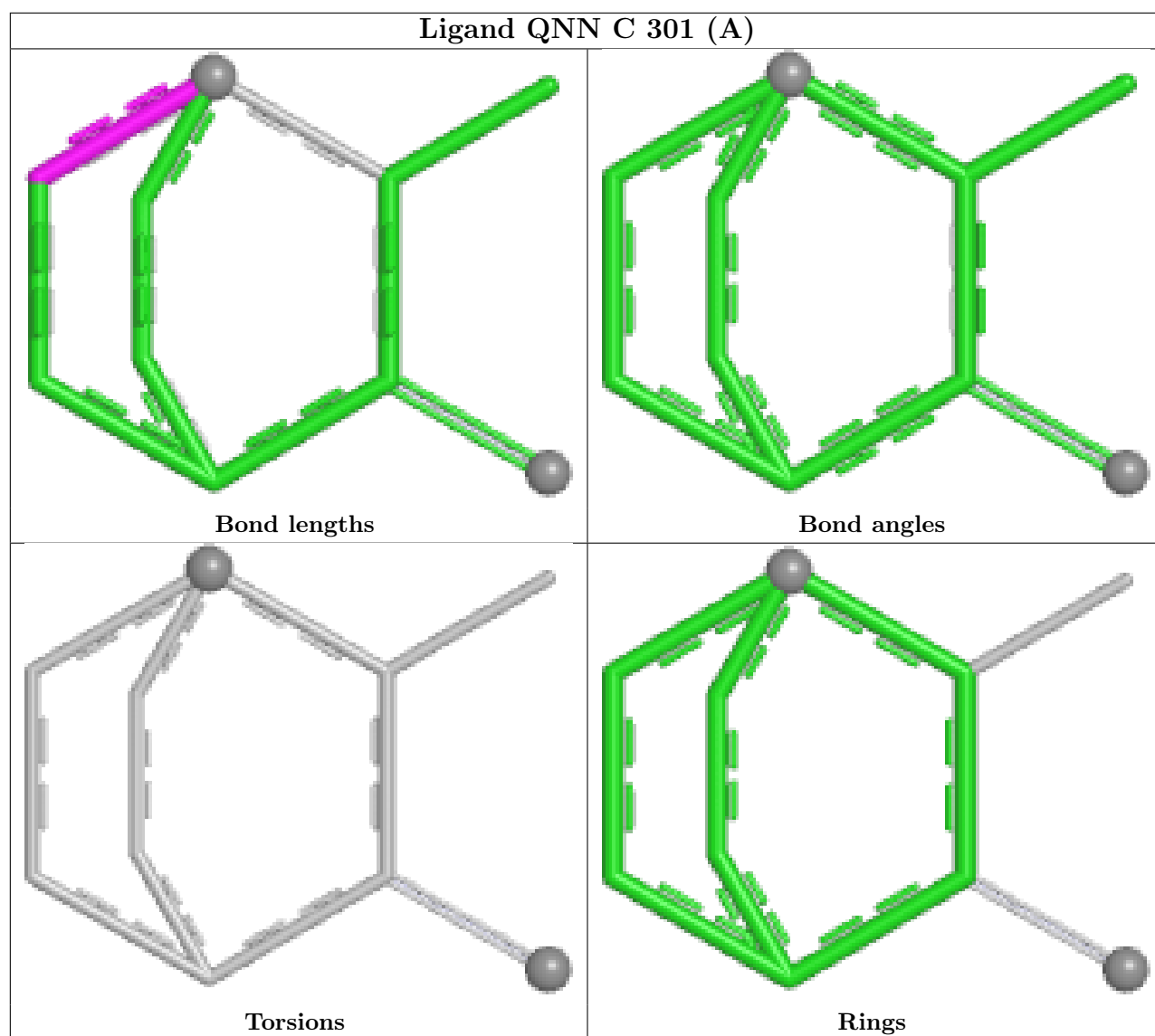












5.7 Other polymers [i](#)

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	191/200 (95%)	-1.11	0 100 100	9, 26, 47, 73	17 (8%)
1	B	190/200 (95%)	-0.95	0 100 100	9, 30, 52, 66	15 (7%)
1	C	191/200 (95%)	-0.95	0 100 100	10, 32, 54, 80	17 (8%)
1	D	193/200 (96%)	-0.93	0 100 100	10, 32, 59, 72	17 (8%)
All	All	765/800 (95%)	-0.99	0 100 100	9, 30, 54, 80	66 (8%)

There are no RSRZ outliers to report.

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
3	QNN	C	303[A]	10/10	0.96	0.06	38,47,50,51	10
3	QNN	D	302[A]	10/10	0.96	0.07	37,45,46,47	10
4	EDO	D	303	4/4	0.96	0.08	36,36,36,37	4
4	EDO	A	303	4/4	0.97	0.07	36,42,43,49	4

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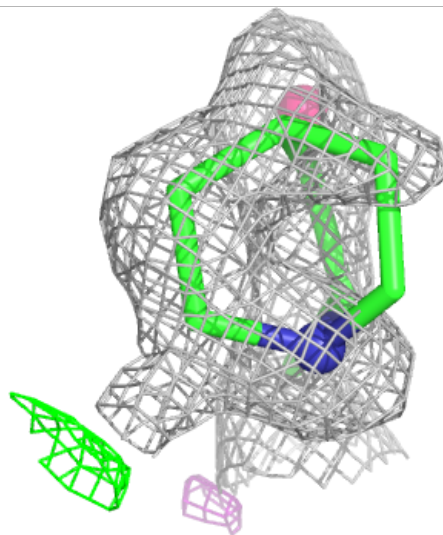
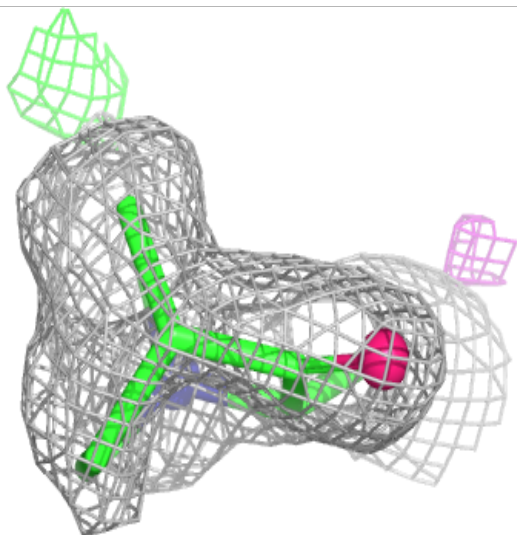
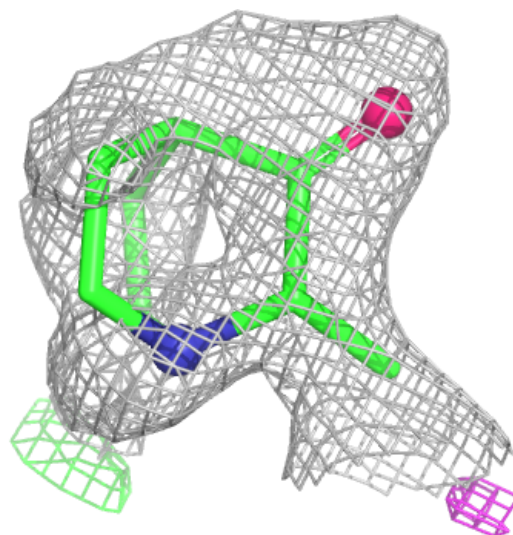
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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
4	EDO	B	305	4/4	0.97	0.07	38,39,42,43	4
3	QNN	A	302[A]	10/10	0.97	0.05	31,38,38,43	10
5	QN8	B	303[A]	10/10	0.97	0.07	45,52,54,54	10
4	EDO	C	304	4/4	0.98	0.06	26,26,27,27	4
3	QNN	B	304[A]	10/10	0.98	0.06	38,44,45,45	10
3	QNN	C	301[A]	10/10	0.98	0.06	39,42,43,44	10
6	PEG	D	305	7/7	0.98	0.06	26,32,37,37	7
6	PEG	D	304	7/7	0.99	0.05	26,29,31,31	7
3	QNN	B	302[A]	10/10	0.99	0.04	34,43,45,47	10
2	ZN	B	301	1/1	1.00	0.03	24,24,24,24	0
2	ZN	C	302	1/1	1.00	0.03	26,26,26,26	0
2	ZN	D	301	1/1	1.00	0.02	30,30,30,30	0
2	ZN	A	301	1/1	1.00	0.02	28,28,28,28	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.

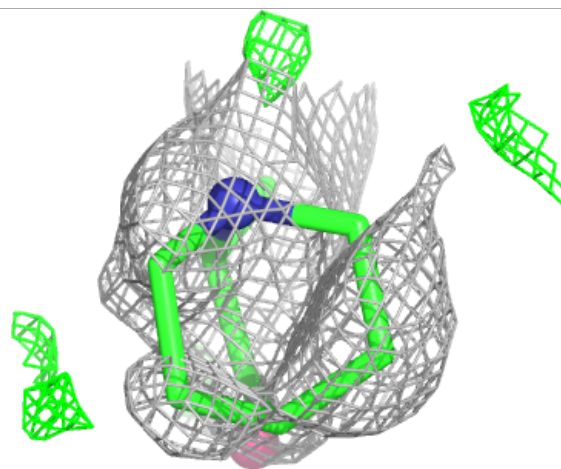
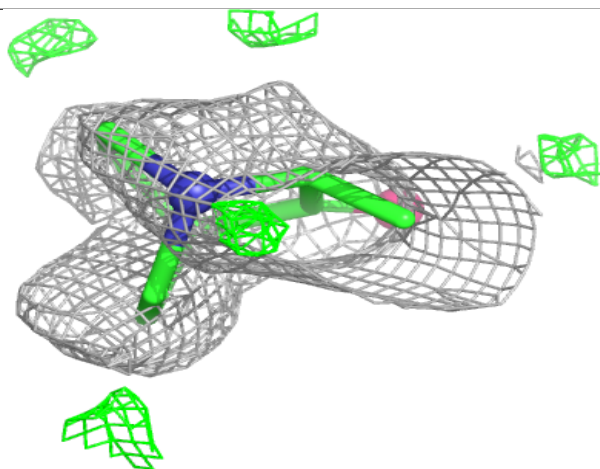
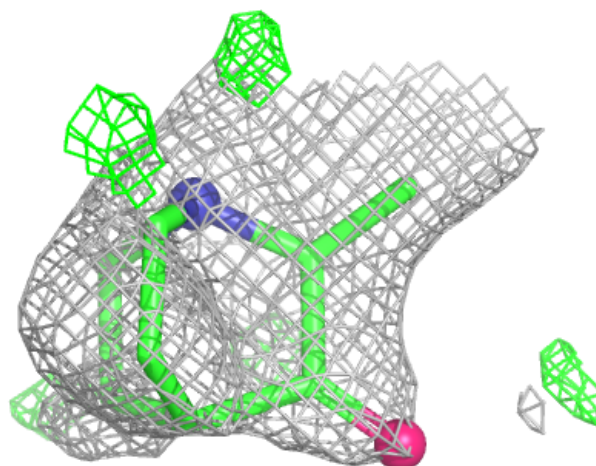
Electron density around QNN C 303 (A):

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



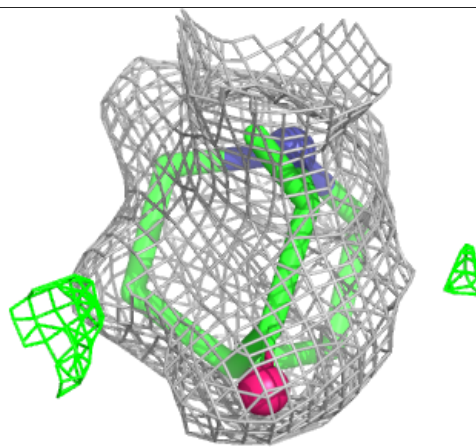
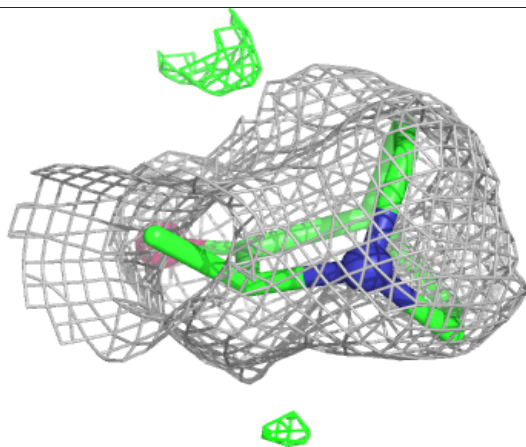
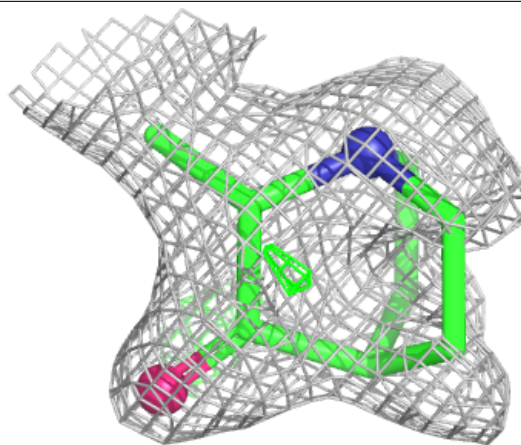
Electron density around QNN D 302 (A):

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



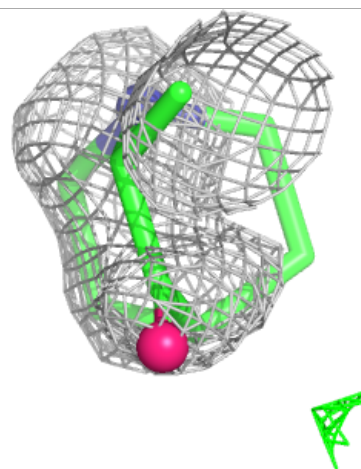
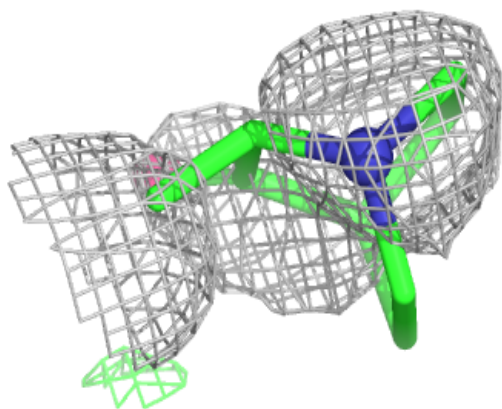
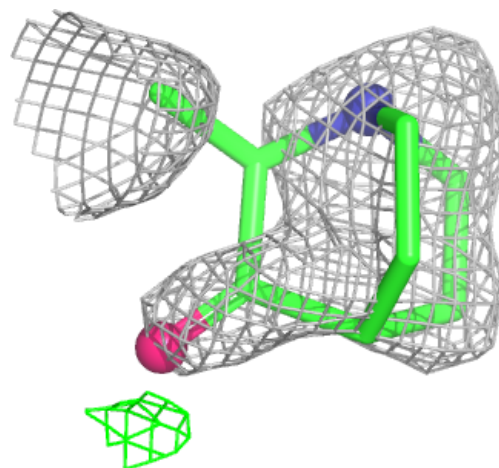
Electron density around QNN A 302 (A):

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



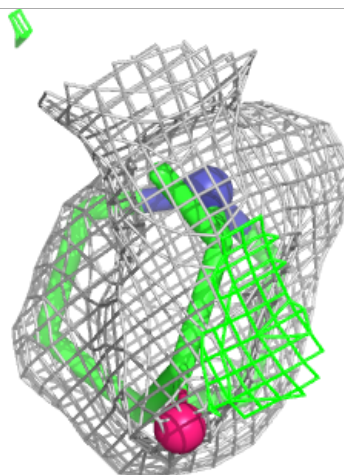
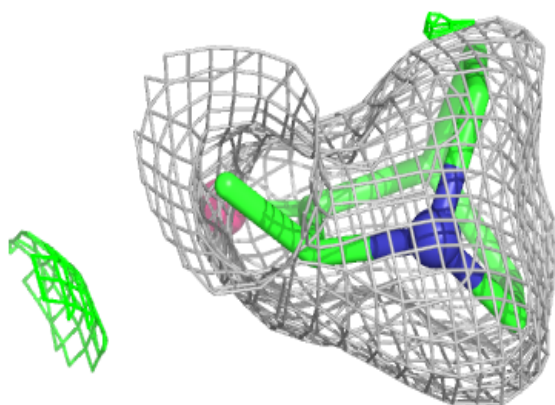
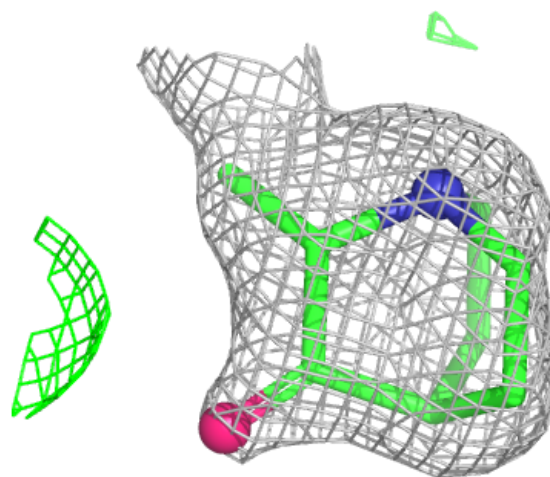
Electron density around QN8 B 303 (A):

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 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)



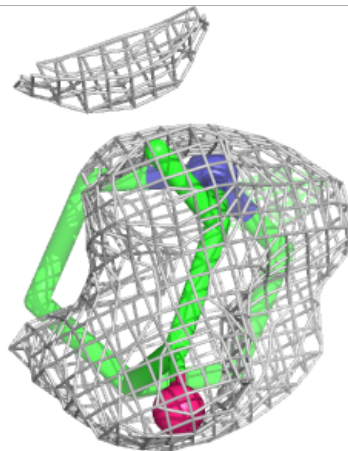
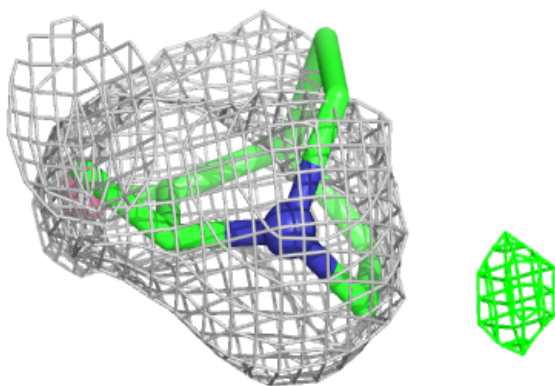
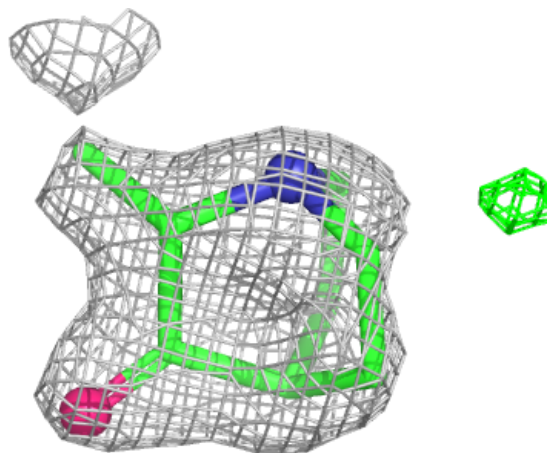
Electron density around QNN B 304 (A):

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 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)



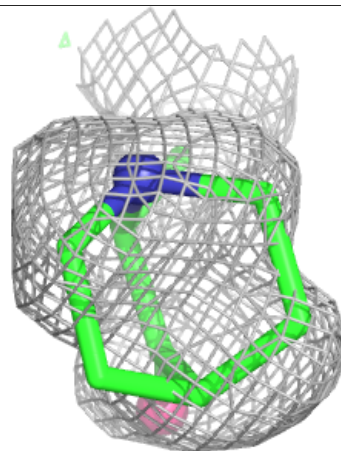
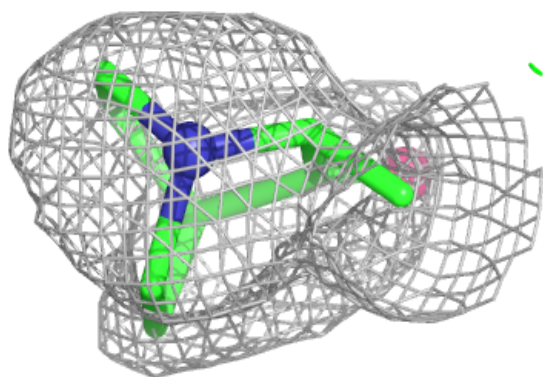
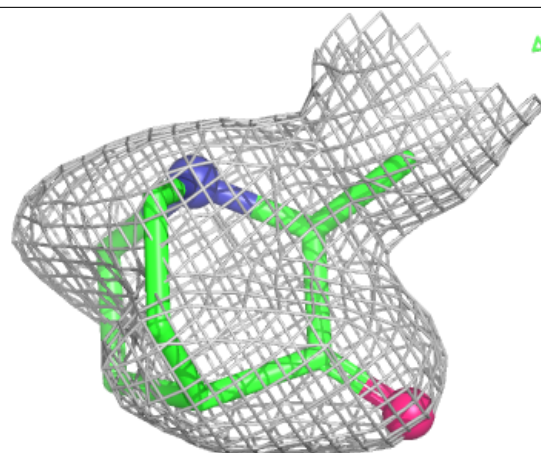
Electron density around QNN C 301 (A):

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



Electron density around QNN B 302 (A):

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



6.5 Other polymers ⓘ

There are no such residues in this entry.