



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 9, 2026 – 04:59 PM UTC

PDB ID : 8IM2 / pdb_00008im2
Title : Crystal structure of human HPPD complexed with NTBC
Authors : Dong, J.; Lin, H.-Y.; Yang, G.-F.
Deposited on : 2023-03-05
Resolution : 2.81 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

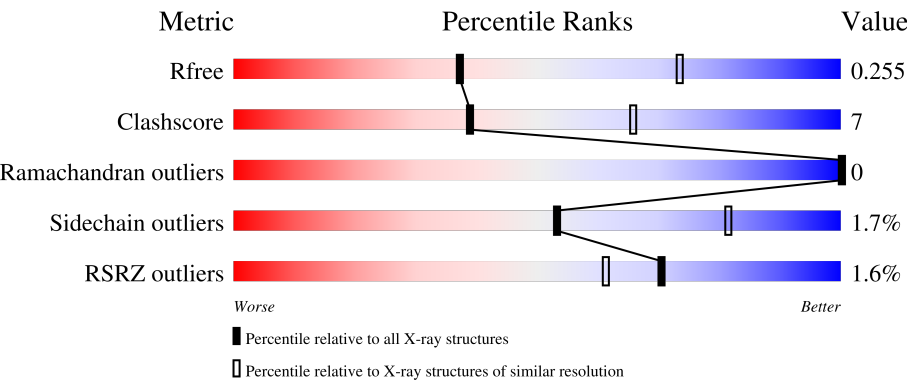
1 Overall quality at a glance i

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.81 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	4591 (2.84-2.80)
Clashscore	190562	5010 (2.84-2.80)
Ramachandran outliers	187476	4916 (2.84-2.80)
Sidechain outliers	187428	4918 (2.84-2.80)
RSRZ outliers	180081	4594 (2.84-2.80)

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	393	% 82%13%5%
1	B	393	3% 75%19%6%
1	C	393	2% 77%17%6%
1	D	393	% 76%18%6%
1	E	393	% 75%19%5%

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Mol	Chain	Length	Quality of chain
1	F	393	2% 77% 16% 7%

2 Entry composition

There are 5 unique types of molecules in this entry. The entry contains 17761 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.

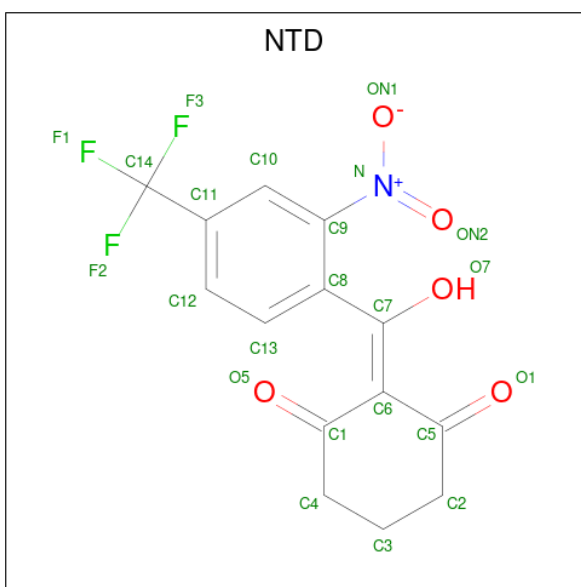
- Molecule 1 is a protein called 4-hydroxyphenylpyruvate dioxygenase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	374	Total	C	N	O	S	0	2	0
			2964	1902	505	546	11			
1	B	371	Total	C	N	O	S	0	1	0
			2880	1846	494	529	11			
1	C	371	Total	C	N	O	S	0	1	0
			2929	1882	497	539	11			
1	D	368	Total	C	N	O	S	0	0	0
			2907	1868	493	535	11			
1	E	372	Total	C	N	O	S	0	0	0
			2966	1903	504	548	11			
1	F	365	Total	C	N	O	S	0	1	0
			2840	1822	480	527	11			

- Molecule 2 is COBALT (II) ION (CCD ID: CO) (formula: Co).

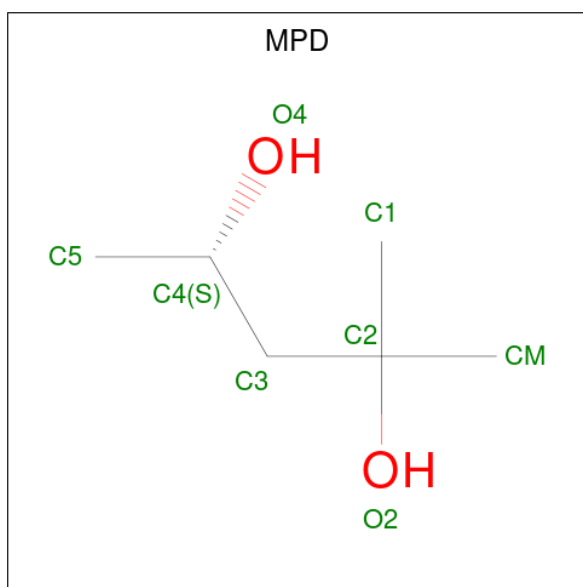
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	1	Total	Co	0	0
			1	1		
2	B	1	Total	Co	0	0
			1	1		
2	C	1	Total	Co	0	0
			1	1		
2	D	1	Total	Co	0	0
			1	1		
2	E	1	Total	Co	0	0
			1	1		
2	F	1	Total	Co	0	0
			1	1		

- Molecule 3 is 2-{HYDROXY[2-NITRO-4-(TRIFLUOROMETHYL)PHENYL]METHYLENE}CYCLOHEXANE-1,3-DIONE (CCD ID: NTD) (formula: C₁₄H₁₀F₃NO₅).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
3	A	1	Total	C	F	N	O	0	0
			23	14	3	1	5		
3	B	1	Total	C	F	N	O	0	0
			23	14	3	1	5		
3	C	1	Total	C	F	N	O	0	0
			23	14	3	1	5		
3	D	1	Total	C	F	N	O	0	0
			23	14	3	1	5		
3	E	1	Total	C	F	N	O	0	0
			23	14	3	1	5		
3	F	1	Total	C	F	N	O	0	0
			23	14	3	1	5		

- Molecule 4 is (4S)-2-METHYL-2,4-PENTANEDIOL (CCD ID: MPD) (formula: C₆H₁₄O₂).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
4	A	1	Total	C	O	0	0
			8	6	2		
4	B	1	Total	C	O	0	0
			8	6	2		
4	C	1	Total	C	O	0	0
			8	6	2		
4	D	1	Total	C	O	0	0
			8	6	2		
4	E	1	Total	C	O	0	0
			8	6	2		
4	F	1	Total	C	O	0	0
			8	6	2		

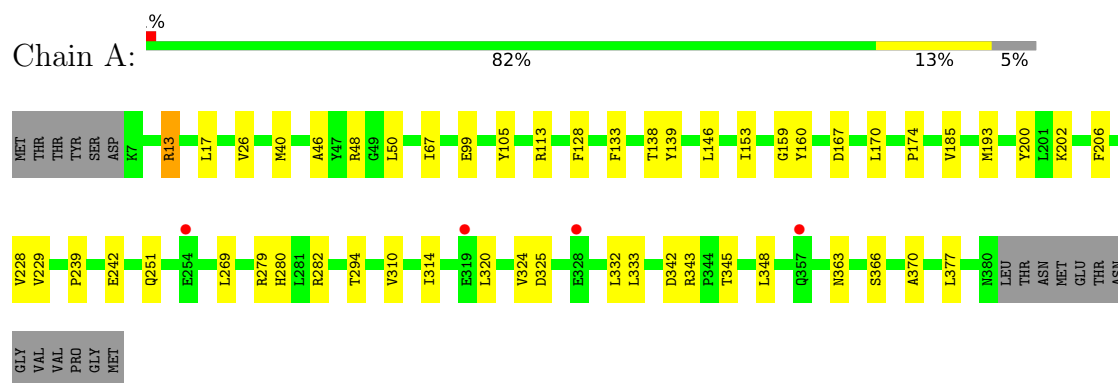
- Molecule 5 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	33	Total	O	0	0
			33	33		
5	B	4	Total	O	0	0
			4	4		
5	C	6	Total	O	0	0
			6	6		
5	D	8	Total	O	0	0
			8	8		
5	E	32	Total	O	0	0
			32	32		

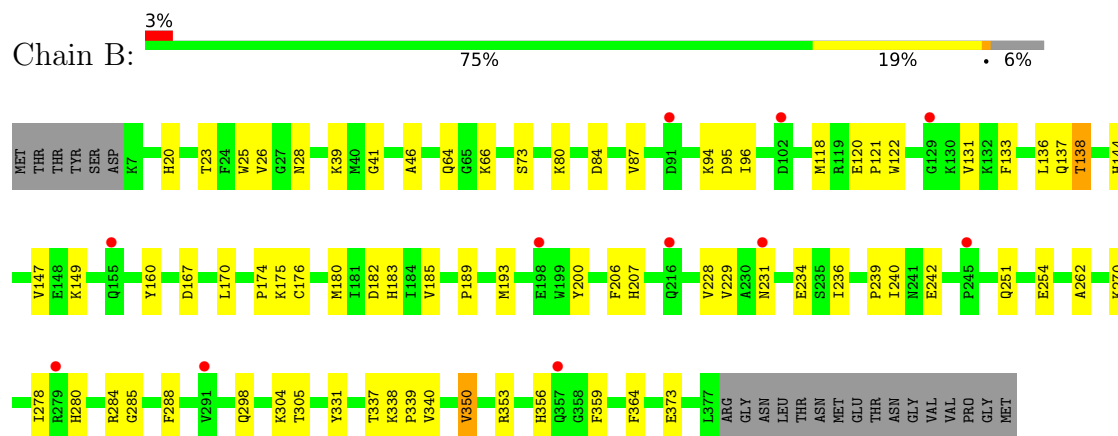
3 Residue-property plots [i](#)

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.

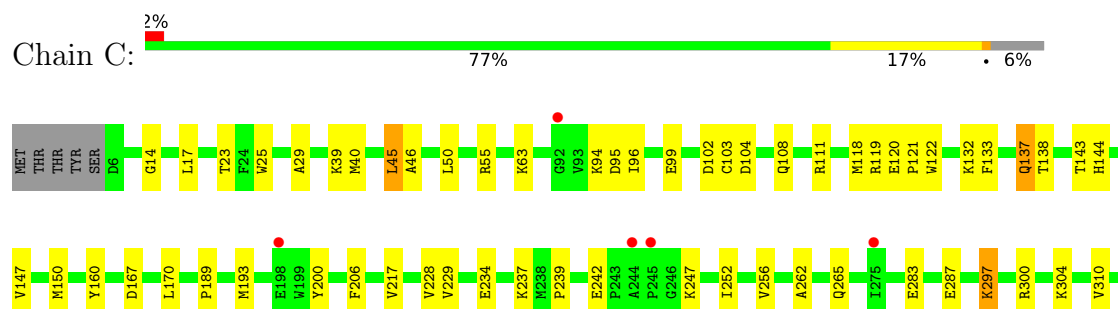
• Molecule 1: 4-hydroxyphenylpyruvate dioxygenase

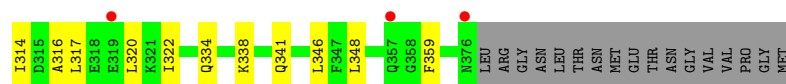


• Molecule 1: 4-hydroxyphenylpyruvate dioxygenase

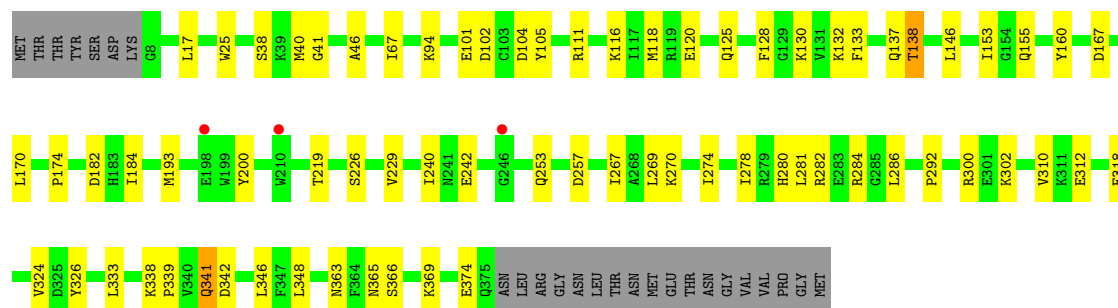
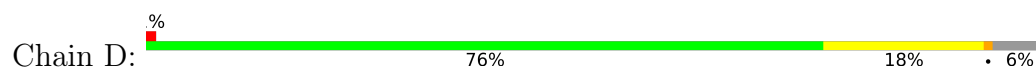


• Molecule 1: 4-hydroxyphenylpyruvate dioxygenase

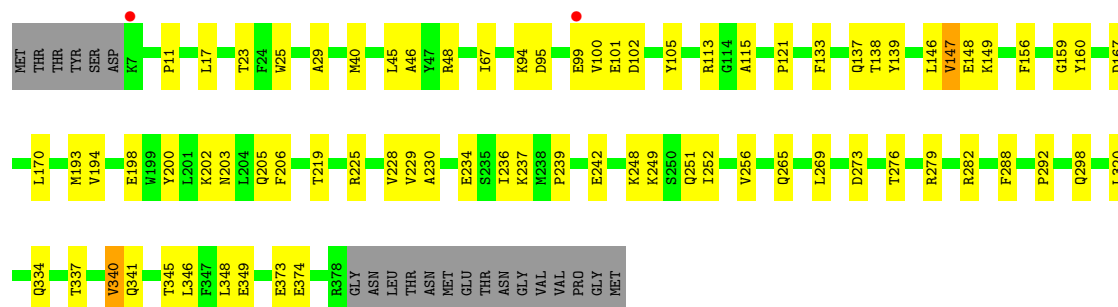
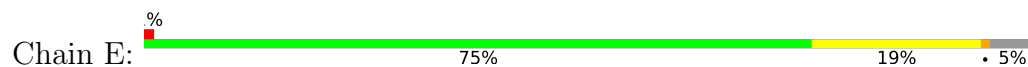




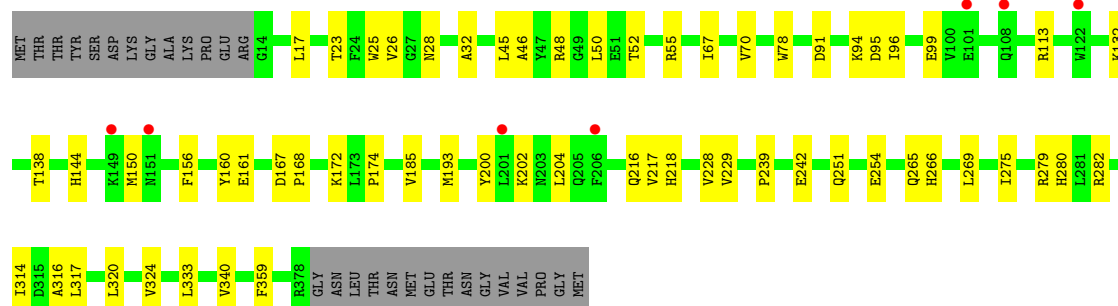
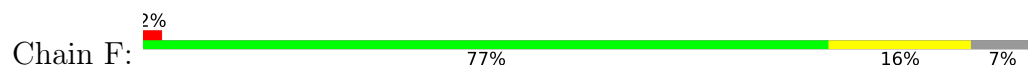
- Molecule 1: 4-hydroxyphenylpyruvate dioxygenase



- Molecule 1: 4-hydroxyphenylpyruvate dioxygenase



- Molecule 1: 4-hydroxyphenylpyruvate dioxygenase



4 Data and refinement statistics

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, α , β , γ	121.55Å 147.44Å 133.93Å 90.00° 97.12° 90.00°	Depositor
Resolution (Å)	29.67 – 2.81 29.67 – 2.81	Depositor EDS
% Data completeness (in resolution range)	96.4 (29.67-2.81) 96.6 (29.67-2.81)	Depositor EDS
R_{merge}	0.12	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	3.78 (at 2.80Å)	Xtriage
Refinement program	PHENIX (1.18.2_3874: ???)	Depositor
R, R_{free}	0.213 , 0.254 0.215 , 0.255	Depositor DCC
R_{free} test set	2680 reflections (4.68%)	wwPDB-VP
Wilson B-factor (Å ²)	49.6	Xtriage
Anisotropy	0.409	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.26 , 25.1	EDS
L-test for twinning ²	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.33$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.92	EDS
Total number of atoms	17761	wwPDB-VP
Average B, all atoms (Å ²)	53.0	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 23.05 % 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 5.0398e-03. 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: NTD, CO, MPD

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	0.16	0/3048	0.40	0/4125
1	B	0.21	0/2951	0.47	2/4005 (0.0%)
1	C	0.19	0/3005	0.44	0/4072
1	D	0.16	0/2980	0.40	0/4038
1	E	0.16	0/3039	0.41	0/4111
1	F	0.17	0/2910	0.43	0/3950
All	All	0.18	0/17933	0.43	2/24301 (0.0%)

There are no bond length outliers.

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	304	LYS	CA-CB-CG	-8.35	97.40	114.10
1	B	304	LYS	CB-CG-CD	5.11	123.05	111.30

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	2964	0	2866	29	0
1	B	2880	0	2735	42	0
1	C	2929	0	2824	42	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	D	2907	0	2804	40	0
1	E	2966	0	2884	47	0
1	F	2840	0	2690	41	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
2	E	1	0	0	0	0
2	F	1	0	0	0	0
3	A	23	0	9	1	0
3	B	23	0	9	1	0
3	C	23	0	9	0	0
3	D	23	0	9	0	0
3	E	23	0	9	1	0
3	F	23	0	9	2	0
4	A	8	0	14	1	0
4	B	8	0	14	1	0
4	C	8	0	14	0	0
4	D	8	0	14	0	0
4	E	8	0	14	1	0
4	F	8	0	14	1	0
5	A	33	0	0	2	0
5	B	4	0	0	0	0
5	C	6	0	0	0	0
5	D	8	0	0	0	0
5	E	32	0	0	1	0
All	All	17761	0	16941	236	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 7.

All (236) 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:E:102:ASP:OD2	1:E:105:TYR:HB3	1.70	0.92
1:D:102:ASP:OD2	1:D:105:TYR:HB3	1.75	0.85
1:E:115:ALA:HB2	1:E:203:ASN:HD22	1.42	0.84
1:B:80:LYS:HE2	1:B:84:ASP:OD2	1.81	0.81
1:C:193:MET:HB2	1:C:242:GLU:HB3	1.64	0.79
1:C:137:GLN:HG2	1:C:143:THR:HG22	1.67	0.76
1:E:341:GLN:HE22	1:E:346:LEU:HB3	1.52	0.74

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:E:282:ARG:NH1	1:E:320:LEU:O	2.20	0.74
1:C:234:GLU:HB3	1:C:237:LYS:NZ	2.04	0.73
1:C:310:VAL:HG21	1:C:314:ILE:HD11	1.69	0.73
1:B:338:LYS:HG3	1:B:339:PRO:HD2	1.72	0.72
1:B:66:LYS:HD2	1:B:180:MET:HE2	1.71	0.71
1:B:193:MET:HB2	1:B:242:GLU:HB3	1.73	0.70
1:E:113:ARG:NH1	1:E:202:LYS:O	2.26	0.69
1:E:17:LEU:HD11	1:E:101:GLU:HG3	1.75	0.67
1:F:26:VAL:HG21	1:F:32:ALA:HB2	1.76	0.67
1:F:282:ARG:NH1	1:F:320:LEU:O	2.29	0.66
1:E:193:MET:HB2	1:E:242:GLU:HB3	1.77	0.66
1:A:113:ARG:O	1:A:202:LYS:NZ	2.24	0.66
1:B:23:THR:HB	1:B:95:ASP:HB3	1.77	0.66
1:F:17:LEU:HD12	1:F:99:GLU:HG2	1.76	0.66
1:C:45:LEU:HD12	1:C:63:LYS:HB2	1.77	0.66
1:F:26:VAL:HG22	1:F:28:ASN:H	1.61	0.65
1:D:300:ARG:NH2	1:D:318:GLU:OE1	2.27	0.65
4:F:403:MPD:O2	4:F:403:MPD:O4	2.12	0.65
1:F:113:ARG:HD3	1:F:202:LYS:O	1.97	0.65
1:E:279:ARG:HG2	1:E:320:LEU:HD21	1.80	0.64
1:F:26:VAL:HG23	1:F:91:ASP:OD2	1.97	0.64
1:A:40:MET:HE1	1:A:348:LEU:HD13	1.80	0.63
1:C:234:GLU:HB3	1:C:237:LYS:HZ1	1.62	0.63
1:F:45:LEU:HD21	1:F:156:PHE:HB2	1.80	0.63
1:C:108:GLN:OE1	1:C:111:ARG:NH1	2.32	0.63
1:B:298:GLN:NE2	1:B:373:GLU:OE2	2.28	0.62
1:B:46:ALA:HB1	1:B:160:TYR:HB3	1.83	0.60
1:F:46:ALA:HB1	1:F:160:TYR:HB3	1.82	0.60
1:C:104:ASP:OD1	1:C:132:LYS:NZ	2.33	0.60
1:D:67:ILE:HD13	1:D:269:LEU:HD22	1.82	0.60
1:C:341:GLN:HE22	1:C:346:LEU:HB3	1.67	0.59
1:D:174:PRO:HB2	1:D:280:HIS:CG	2.38	0.58
1:A:193:MET:HB2	1:A:242:GLU:HB3	1.85	0.58
1:A:310:VAL:HG21	1:A:314:ILE:HD11	1.84	0.58
1:B:25:TRP:CD2	1:B:94:LYS:HG3	2.38	0.58
1:F:314:ILE:HD13	1:F:317:LEU:HD12	1.85	0.58
1:C:341:GLN:NE2	1:C:346:LEU:HB3	2.18	0.58
1:E:341:GLN:NE2	1:E:346:LEU:HB3	2.16	0.58
1:F:228:VAL:HA	1:F:239:PRO:HA	1.86	0.58
1:B:285:GLY:HA2	1:F:168:PRO:HD2	1.85	0.57
1:E:46:ALA:HB1	1:E:160:TYR:HB3	1.85	0.57

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:39:LYS:NZ	1:F:167:ASP:OD2	2.34	0.56
1:F:185:VAL:HG23	1:F:239:PRO:HB2	1.87	0.56
1:C:40:MET:HE1	1:C:348:LEU:HD22	1.87	0.56
1:D:253:GLN:NE2	1:D:257:ASP:OD1	2.38	0.56
1:F:23:THR:HB	1:F:95:ASP:HB3	1.87	0.56
1:E:206:PHE:HD2	1:E:229:VAL:HG12	1.71	0.56
1:C:316:ALA:O	1:C:320:LEU:HD12	2.05	0.55
1:B:200:TYR:HB2	1:B:229:VAL:HG11	1.88	0.55
1:B:359:PHE:O	3:B:502:NTD:H13	2.06	0.55
1:A:200:TYR:HB2	1:A:229:VAL:HG11	1.87	0.55
1:B:364:PHE:HE1	4:B:503:MPD:H12	1.70	0.55
1:A:17:LEU:HD12	1:A:99:GLU:HG2	1.87	0.55
1:B:288:PHE:HA	1:B:337:THR:HA	1.89	0.55
1:C:228:VAL:HA	1:C:239:PRO:HA	1.88	0.55
1:C:17:LEU:HD12	1:C:99:GLU:HG2	1.88	0.55
1:C:200:TYR:HB2	1:C:229:VAL:HG11	1.88	0.55
1:D:118:MET:HE3	1:D:137:GLN:OE1	2.07	0.55
1:C:29:ALA:HB3	1:D:342:ASP:OD2	2.06	0.54
1:E:252:ILE:O	1:E:256:VAL:HG23	2.08	0.54
1:D:46:ALA:HB1	1:D:160:TYR:HB3	1.90	0.54
1:D:167:ASP:HB3	1:D:170:LEU:HG	1.90	0.54
1:B:118:MET:HE3	1:B:137:GLN:NE2	2.23	0.53
1:D:17:LEU:HD11	1:D:101:GLU:HG3	1.90	0.53
1:F:25:TRP:CE2	1:F:94:LYS:HG2	2.43	0.53
1:E:251:GLN:HG3	4:E:403:MPD:H13	1.91	0.53
1:D:341:GLN:NE2	1:D:346:LEU:HB3	2.24	0.53
1:B:20:HIS:CD2	1:B:147:VAL:HG21	2.43	0.53
1:F:185:VAL:HG13	1:F:265:GLN:HB3	1.90	0.53
1:A:48:ARG:HH21	1:A:159:GLY:HA3	1.73	0.53
1:C:23:THR:HB	1:C:95:ASP:HB3	1.90	0.52
1:B:270:LYS:HZ1	1:B:353:ARG:H	1.58	0.52
1:B:189:PRO:HD3	1:B:262:ALA:HB2	1.90	0.52
1:B:28:ASN:HB2	1:F:91:ASP:OD2	2.10	0.52
1:C:118:MET:HG3	1:C:137:GLN:HG3	1.91	0.52
1:C:189:PRO:HD3	1:C:262:ALA:HB2	1.92	0.52
3:A:402:NTD:ON1	4:A:403:MPD:HM1	2.08	0.52
1:C:46:ALA:HB1	1:C:160:TYR:HB3	1.92	0.52
1:E:40:MET:HE1	1:E:348:LEU:HD13	1.91	0.52
1:E:340:VAL:HG23	1:E:341:GLN:NE2	2.25	0.52
1:A:282:ARG:NH1	1:A:320:LEU:O	2.43	0.52
1:C:167:ASP:HB3	1:C:170:LEU:HG	1.91	0.52

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:E:167:ASP:HB3	1:E:170:LEU:HG	1.91	0.52
1:B:206:PHE:HD2	1:B:229:VAL:HG12	1.75	0.51
1:C:111:ARG:NH2	1:C:120:GLU:OE1	2.44	0.51
1:E:121:PRO:HA	1:E:133:PHE:O	2.10	0.51
1:F:193:MET:HB2	1:F:242:GLU:HB3	1.93	0.51
1:B:138:THR:HG21	1:B:200:TYR:OH	2.10	0.51
1:D:324:VAL:HG22	1:D:333:LEU:HD23	1.93	0.51
1:E:115:ALA:CB	1:E:203:ASN:HD22	2.21	0.51
1:D:41:GLY:HA2	1:D:284:ARG:NH2	2.26	0.51
1:B:167:ASP:HB3	1:B:170:LEU:HG	1.92	0.50
1:A:46:ALA:HB1	1:A:160:TYR:HB3	1.94	0.50
1:F:185:VAL:HG11	1:F:266:HIS:CE1	2.47	0.50
1:C:287:GLU:CD	1:C:338:LYS:HD3	2.37	0.50
1:E:67:ILE:HD13	1:E:269:LEU:HD22	1.94	0.50
1:F:52:THR:HG22	1:F:161:GLU:OE2	2.12	0.49
1:B:87:VAL:HG12	1:F:78:TRP:HA	1.93	0.49
1:B:251:GLN:NE2	1:B:254:GLU:OE1	2.44	0.49
1:B:121:PRO:HA	1:B:133:PHE:O	2.11	0.49
1:B:228:VAL:HA	1:B:239:PRO:HA	1.93	0.49
1:E:225:ARG:NE	1:E:242:GLU:OE2	2.39	0.49
1:A:324:VAL:HG22	1:A:333:LEU:HD23	1.93	0.49
1:B:131:VAL:HG12	1:B:149:LYS:HA	1.94	0.49
1:F:26:VAL:HG23	1:F:91:ASP:CG	2.38	0.49
1:F:52:THR:HG22	1:F:161:GLU:CD	2.37	0.49
1:E:11:PRO:HB3	1:E:205:GLN:OE1	2.13	0.49
1:A:325:ASP:HB3	1:A:332:LEU:HD21	1.95	0.48
1:E:133:PHE:CE1	1:E:147:VAL:HG13	2.48	0.48
1:E:248:LYS:HE3	1:E:249:LYS:H	1.77	0.48
1:C:247:LYS:HE2	1:E:137:GLN:NE2	2.27	0.48
1:E:203:ASN:OD1	1:E:203:ASN:N	2.45	0.48
1:A:325:ASP:O	1:A:332:LEU:HD23	2.12	0.48
1:E:99:GLU:OE2	1:E:149:LYS:N	2.45	0.48
1:F:200:TYR:HD1	1:F:204:LEU:HD12	1.79	0.48
1:A:282:ARG:NH2	5:A:502:HOH:O	2.35	0.48
1:D:104:ASP:OD1	1:D:132:LYS:NZ	2.39	0.48
1:A:206:PHE:HD2	1:A:229:VAL:HG12	1.78	0.48
1:F:200:TYR:HB2	1:F:229:VAL:HG11	1.95	0.48
1:E:25:TRP:CE2	1:E:94:LYS:HG2	2.48	0.48
1:C:119:ARG:HD2	1:C:122:TRP:CE3	2.49	0.48
1:E:200:TYR:HB2	1:E:229:VAL:HG11	1.95	0.48
1:A:67:ILE:HD13	1:A:269:LEU:HD22	1.96	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:F:239:PRO:HG2	3:F:402:NTD:H41	1.96	0.47
1:A:342:ASP:OD2	1:E:29:ALA:HB3	2.14	0.47
1:D:25:TRP:CE2	1:D:94:LYS:HG2	2.49	0.47
1:F:251:GLN:NE2	1:F:254:GLU:OE2	2.47	0.47
1:D:111:ARG:NH2	1:D:120:GLU:OE1	2.47	0.47
1:A:251:GLN:O	1:A:251:GLN:HG3	2.13	0.47
1:C:234:GLU:HB3	1:C:237:LYS:HZ2	1.78	0.47
1:E:228:VAL:HA	1:E:239:PRO:HA	1.96	0.47
1:C:206:PHE:HD2	1:C:229:VAL:HG12	1.79	0.47
1:E:23:THR:HB	1:E:95:ASP:HB3	1.95	0.47
1:C:252:ILE:O	1:C:256:VAL:HG23	2.15	0.47
1:F:275:ILE:O	1:F:279:ARG:HG3	2.13	0.47
1:B:175:LYS:O	1:B:280:HIS:ND1	2.24	0.47
1:B:278:ILE:HD11	1:B:350:VAL:HG11	1.96	0.47
1:C:317:LEU:HD22	1:C:322:ILE:HB	1.97	0.47
1:F:144:HIS:NE2	1:F:200:TYR:OH	2.38	0.47
1:C:39:LYS:NZ	1:D:167:ASP:OD2	2.29	0.46
1:D:133:PHE:HA	1:D:146:LEU:O	2.14	0.46
1:E:48:ARG:HH21	1:E:159:GLY:HA3	1.80	0.46
1:D:278:ILE:O	1:D:282:ARG:HG3	2.15	0.46
3:E:402:NTD:ON1	5:E:501:HOH:O	2.21	0.46
1:C:103:CYS:HB3	1:C:132:LYS:HD2	1.97	0.46
1:D:302:LYS:HB3	1:D:326:TYR:OH	2.16	0.46
1:A:363:ASN:HA	1:A:366:SER:HB2	1.96	0.46
1:C:50:LEU:HD23	1:C:55:ARG:HA	1.98	0.46
1:D:40:MET:HE1	1:D:348:LEU:HD13	1.96	0.46
1:D:182:ASP:HB2	1:D:270:LYS:HB2	1.96	0.46
1:C:297:LYS:HE3	1:C:297:LYS:HB3	1.42	0.46
1:C:300:ARG:O	1:C:304:LYS:HG3	2.16	0.46
1:F:17:LEU:HD12	1:F:99:GLU:CG	2.43	0.46
1:E:100:VAL:HG11	1:E:146:LEU:HD22	1.97	0.45
1:F:96:ILE:HB	1:F:144:HIS:CE1	2.51	0.45
1:A:128:PHE:O	1:A:153:ILE:HG12	2.16	0.45
1:C:121:PRO:HA	1:C:133:PHE:O	2.16	0.45
1:B:193:MET:HG3	1:B:240:ILE:HG22	1.97	0.45
1:A:228:VAL:HA	1:A:239:PRO:HA	1.98	0.45
1:E:234:GLU:O	1:E:237:LYS:NZ	2.49	0.45
1:F:279:ARG:HH21	1:F:316:ALA:HB1	1.82	0.45
1:D:365:ASN:O	1:D:369:LYS:HG3	2.17	0.45
1:F:359:PHE:O	3:F:402:NTD:H13	2.17	0.45
1:C:25:TRP:CE2	1:C:94:LYS:HG2	2.52	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:310:VAL:HG12	1:D:312:GLU:H	1.81	0.45
1:D:184:ILE:HG12	1:D:267:ILE:HG23	1.99	0.44
1:D:116:LYS:HG2	1:D:118:MET:HE2	1.99	0.44
1:D:338:LYS:HG3	1:D:339:PRO:HD2	1.98	0.44
1:A:138:THR:OG1	1:A:139:TYR:N	2.46	0.44
1:B:120:GLU:O	1:B:122:TRP:HE3	2.01	0.44
1:F:23:THR:HA	1:F:70:VAL:HB	1.99	0.44
1:F:324:VAL:HG22	1:F:333:LEU:HD23	1.98	0.44
1:D:278:ILE:HD13	1:D:281:LEU:HD12	2.00	0.44
1:F:132:LYS:HE3	1:F:150:MET:SD	2.57	0.44
1:E:45:LEU:HD11	1:E:156:PHE:HB2	2.00	0.44
1:F:216:GLN:HB3	1:F:218:HIS:NE2	2.32	0.44
1:A:174:PRO:HB2	1:A:280:HIS:CG	2.53	0.43
1:E:248:LYS:HD2	1:E:248:LYS:HA	1.74	0.43
1:F:174:PRO:HB2	1:F:280:HIS:ND1	2.33	0.43
1:B:182:ASP:OD2	1:B:183:HIS:ND1	2.32	0.43
1:D:274:ILE:HG21	1:D:333:LEU:HD13	1.99	0.43
1:B:231:ASN:CG	1:B:236:ILE:H	2.26	0.43
1:E:292:PRO:HB3	1:E:374:GLU:OE1	2.18	0.43
1:B:26:VAL:O	1:B:73:SER:OG	2.36	0.43
1:D:292:PRO:HB3	1:D:374:GLU:OE1	2.18	0.43
1:D:40:MET:HG2	1:D:286:LEU:HD22	2.01	0.43
1:D:138:THR:HG21	1:D:200:TYR:OH	2.18	0.43
1:E:298:GLN:NE2	1:E:373:GLU:OE2	2.51	0.43
1:E:265:GLN:O	1:E:346:LEU:HA	2.19	0.43
1:B:174:PRO:O	1:B:284:ARG:NH1	2.49	0.43
1:F:50:LEU:HD23	1:F:55:ARG:HA	2.00	0.42
1:B:41:GLY:HA2	1:B:284:ARG:NH2	2.33	0.42
1:D:200:TYR:HB2	1:D:229:VAL:HG11	2.01	0.42
1:F:67:ILE:HD13	1:F:269:LEU:HD22	2.01	0.42
1:D:128:PHE:HB3	1:D:153:ILE:HG13	2.02	0.42
1:D:226:SER:HA	1:D:240:ILE:O	2.18	0.42
1:C:265:GLN:O	1:C:346:LEU:HA	2.20	0.42
1:A:294:THR:OG1	1:A:370:ALA:O	2.35	0.42
1:D:38:SER:O	1:D:284:ARG:HD3	2.20	0.42
1:B:138:THR:HG21	1:B:200:TYR:CZ	2.55	0.42
1:E:230:ALA:HA	1:E:236:ILE:O	2.20	0.42
1:E:273:ASP:OD2	1:E:276:THR:OG1	2.33	0.42
1:B:207:HIS:HE1	1:B:234:GLU:OE2	2.03	0.42
1:B:96:ILE:HB	1:B:144:HIS:CE1	2.55	0.42
1:B:185:VAL:HG22	1:B:239:PRO:HB2	2.02	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:331:TYR:HA	1:B:356:HIS:HD2	1.85	0.42
1:D:125:GLN:HB3	1:D:130:LYS:HG2	2.01	0.41
1:C:96:ILE:HB	1:C:144:HIS:CE1	2.56	0.41
1:C:228:VAL:HG21	1:C:359:PHE:CE1	2.55	0.41
1:A:133:PHE:HA	1:A:146:LEU:O	2.20	0.41
1:C:200:TYR:CB	1:C:229:VAL:HG11	2.49	0.41
1:E:102:ASP:N	1:E:148:GLU:OE2	2.49	0.41
1:A:50:LEU:HD12	5:A:506:HOH:O	2.21	0.41
1:A:185:VAL:HG22	1:A:239:PRO:HB2	2.02	0.41
1:E:334:GLN:NE2	1:E:349:GLU:OE1	2.54	0.41
1:A:167:ASP:HB3	1:A:170:LEU:HG	2.02	0.41
1:A:13:ARG:HH21	1:A:105:TYR:HB2	1.86	0.41
1:C:14:GLY:HA2	1:C:102:ASP:HB3	2.02	0.41
1:C:133:PHE:CE2	1:C:147:VAL:HG13	2.55	0.41
1:D:363:ASN:HA	1:D:366:SER:HB2	2.03	0.41
1:F:48:ARG:HA	1:F:52:THR:HG21	2.02	0.41
1:E:138:THR:OG1	1:E:139:TYR:N	2.54	0.40
1:A:343:ARG:O	1:A:345:THR:N	2.54	0.40
1:B:64:GLN:OE1	1:B:176:CYS:HB2	2.21	0.40
1:D:128:PHE:O	1:D:153:ILE:HG12	2.22	0.40
1:D:193:MET:HB2	1:D:242:GLU:HB2	2.02	0.40
1:E:288:PHE:HA	1:E:337:THR:HA	2.03	0.40
1:E:133:PHE:HA	1:E:146:LEU:O	2.22	0.40
1:E:345:THR:OG1	1:E:346:LEU:N	2.54	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	374/393 (95%)	361 (96%)	13 (4%)	0	100 100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	B	370/393 (94%)	359 (97%)	11 (3%)	0	100	100
1	C	370/393 (94%)	356 (96%)	14 (4%)	0	100	100
1	D	366/393 (93%)	353 (96%)	13 (4%)	0	100	100
1	E	370/393 (94%)	357 (96%)	13 (4%)	0	100	100
1	F	364/393 (93%)	353 (97%)	11 (3%)	0	100	100
All	All	2214/2358 (94%)	2139 (97%)	75 (3%)	0	100	100

There are no Ramachandran outliers to report.

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	310/343 (90%)	306 (99%)	4 (1%)	61	85
1	B	292/343 (85%)	287 (98%)	5 (2%)	53	81
1	C	305/343 (89%)	297 (97%)	8 (3%)	40	73
1	D	303/343 (88%)	299 (99%)	4 (1%)	61	85
1	E	313/343 (91%)	308 (98%)	5 (2%)	55	82
1	F	290/343 (84%)	286 (99%)	4 (1%)	59	84
All	All	1813/2058 (88%)	1783 (98%)	30 (2%)	53	81

All (30) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	13	ARG
1	A	26	VAL
1	A	279	ARG
1	A	377	LEU
1	B	136	LEU
1	B	138	THR
1	B	305	THR
1	B	340	VAL

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Mol	Chain	Res	Type
1	B	350	VAL
1	C	45	LEU
1	C	137	GLN
1	C	138	THR
1	C	150	MET
1	C	217	VAL
1	C	283	GLU
1	C	297	LYS
1	C	334	GLN
1	D	138	THR
1	D	155	GLN
1	D	219	THR
1	D	341	GLN
1	E	147	VAL
1	E	194	VAL
1	E	198	GLU
1	E	219	THR
1	E	340	VAL
1	F	138	THR
1	F	172	LYS
1	F	217	VAL
1	F	340	VAL

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (19) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	205	GLN
1	A	266	HIS
1	B	60	HIS
1	B	137	GLN
1	B	207	HIS
1	C	207	HIS
1	C	266	HIS
1	C	341	GLN
1	D	76	ASN
1	D	203	ASN
1	D	241	ASN
1	D	265	GLN
1	D	354	HIS
1	D	365	ASN
1	E	76	ASN
1	E	251	GLN

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Mol	Chain	Res	Type
1	E	266	HIS
1	E	341	GLN
1	E	357	GLN

5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

Of 18 ligands modelled in this entry, 6 are monoatomic - leaving 12 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	$\# Z > 2$
4	MPD	B	503	-	7,7,7	0.73	0	9,10,10	0.29	0
4	MPD	F	403	-	7,7,7	0.75	0	9,10,10	0.38	0
3	NTD	D	403	2	23,24,24	3.93	9 (39%)	27,36,36	3.66	9 (33%)
3	NTD	A	402	2	23,24,24	3.90	9 (39%)	27,36,36	3.73	9 (33%)
4	MPD	E	403	-	7,7,7	0.73	0	9,10,10	0.35	0
4	MPD	A	403	-	7,7,7	0.73	0	9,10,10	0.67	0
4	MPD	D	401	-	7,7,7	0.72	0	9,10,10	0.35	0
3	NTD	F	402	2	23,24,24	3.94	8 (34%)	27,36,36	3.70	8 (29%)
3	NTD	B	502	2	23,24,24	3.98	8 (34%)	27,36,36	3.77	9 (33%)
4	MPD	C	403	-	7,7,7	0.74	0	9,10,10	0.36	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
3	NTD	C	402	2	23,24,24	3.91	8 (34%)	27,36,36	3.77	9 (33%)
3	NTD	E	402	2	23,24,24	3.95	9 (39%)	27,36,36	3.68	9 (33%)

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
4	MPD	B	503	-	-	5/5/5/5	-
4	MPD	F	403	-	-	5/5/5/5	-
3	NTD	D	403	2	-	3/16/32/32	0/2/2/2
3	NTD	A	402	2	-	5/16/32/32	0/2/2/2
4	MPD	E	403	-	-	4/5/5/5	-
4	MPD	A	403	-	-	2/5/5/5	-
4	MPD	D	401	-	-	2/5/5/5	-
3	NTD	F	402	2	-	5/16/32/32	0/2/2/2
3	NTD	B	502	2	-	5/16/32/32	0/2/2/2
4	MPD	C	403	-	-	3/5/5/5	-
3	NTD	C	402	2	-	6/16/32/32	0/2/2/2
3	NTD	E	402	2	-	4/16/32/32	0/2/2/2

All (51) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	B	502	NTD	ON2-N	10.70	1.41	1.22
3	D	403	NTD	ON2-N	10.59	1.41	1.22
3	E	402	NTD	ON2-N	10.46	1.40	1.22
3	F	402	NTD	ON2-N	10.45	1.40	1.22
3	C	402	NTD	ON2-N	10.37	1.40	1.22
3	A	402	NTD	ON2-N	10.30	1.40	1.22
3	F	402	NTD	O5-C1	9.10	1.41	1.23
3	E	402	NTD	O5-C1	8.97	1.41	1.23
3	D	403	NTD	O5-C1	8.95	1.41	1.23
3	B	502	NTD	O1-C5	8.95	1.41	1.23
3	A	402	NTD	O5-C1	8.95	1.41	1.23
3	C	402	NTD	O1-C5	8.95	1.41	1.23
3	B	502	NTD	O5-C1	8.93	1.41	1.23
3	E	402	NTD	O1-C5	8.89	1.41	1.23

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	A	402	NTD	O1-C5	8.87	1.41	1.23
3	F	402	NTD	O1-C5	8.85	1.41	1.23
3	C	402	NTD	O5-C1	8.84	1.41	1.23
3	D	403	NTD	O1-C5	8.79	1.40	1.23
3	E	402	NTD	C6-C7	6.36	1.54	1.39
3	B	502	NTD	C6-C7	6.27	1.54	1.39
3	A	402	NTD	C6-C7	6.14	1.54	1.39
3	D	403	NTD	C6-C7	6.14	1.54	1.39
3	F	402	NTD	C6-C7	6.12	1.54	1.39
3	C	402	NTD	C6-C7	6.11	1.54	1.39
3	B	502	NTD	C6-C5	3.74	1.54	1.45
3	E	402	NTD	C6-C5	3.59	1.54	1.45
3	C	402	NTD	C6-C5	3.54	1.54	1.45
3	F	402	NTD	C6-C5	3.52	1.54	1.45
3	A	402	NTD	C6-C5	3.42	1.54	1.45
3	E	402	NTD	C6-C1	3.41	1.53	1.45
3	D	403	NTD	C6-C5	3.35	1.53	1.45
3	D	403	NTD	C6-C1	3.35	1.53	1.45
3	F	402	NTD	C6-C1	3.31	1.53	1.45
3	C	402	NTD	C6-C1	3.28	1.53	1.45
3	A	402	NTD	C6-C1	3.19	1.53	1.45
3	B	502	NTD	C6-C1	3.15	1.53	1.45
3	F	402	NTD	O7-C7	2.73	1.40	1.33
3	E	402	NTD	O7-C7	2.63	1.40	1.33
3	A	402	NTD	O7-C7	2.62	1.40	1.33
3	B	502	NTD	O7-C7	2.58	1.40	1.33
3	D	403	NTD	O7-C7	2.56	1.40	1.33
3	C	402	NTD	O7-C7	2.55	1.40	1.33
3	E	402	NTD	C2-C5	2.48	1.54	1.50
3	B	502	NTD	C2-C5	2.41	1.54	1.50
3	F	402	NTD	C2-C5	2.41	1.54	1.50
3	C	402	NTD	C2-C5	2.38	1.54	1.50
3	A	402	NTD	C2-C5	2.29	1.53	1.50
3	D	403	NTD	C2-C5	2.22	1.53	1.50
3	E	402	NTD	C4-C1	2.09	1.53	1.50
3	D	403	NTD	C4-C1	2.08	1.53	1.50
3	A	402	NTD	C4-C1	2.01	1.53	1.50

All (53) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	B	502	NTD	O1-C5-C2	-8.67	106.66	120.87

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	C	402	NTD	O1-C5-C2	-8.37	107.16	120.87
3	E	402	NTD	O1-C5-C2	-8.35	107.18	120.87
3	F	402	NTD	O1-C5-C2	-8.22	107.40	120.87
3	F	402	NTD	O1-C5-C6	-8.19	109.43	122.77
3	F	402	NTD	O5-C1-C6	-8.16	109.48	122.77
3	C	402	NTD	O5-C1-C6	-8.15	109.50	122.77
3	B	502	NTD	O5-C1-C6	-8.13	109.53	122.77
3	A	402	NTD	O1-C5-C2	-7.91	107.90	120.87
3	A	402	NTD	O1-C5-C6	-7.69	110.25	122.77
3	C	402	NTD	O1-C5-C6	-7.60	110.39	122.77
3	E	402	NTD	O1-C5-C6	-7.58	110.42	122.77
3	A	402	NTD	O5-C1-C6	-7.57	110.44	122.77
3	E	402	NTD	O5-C1-C6	-7.57	110.44	122.77
3	D	403	NTD	O1-C5-C2	-7.44	108.67	120.87
3	D	403	NTD	O5-C1-C6	-7.39	110.73	122.77
3	B	502	NTD	O1-C5-C6	-7.38	110.75	122.77
3	B	502	NTD	C8-C7-C6	-7.07	112.02	126.41
3	C	402	NTD	O5-C1-C4	-7.04	109.34	120.87
3	D	403	NTD	O1-C5-C6	-6.94	111.46	122.77
3	D	403	NTD	O5-C1-C4	-6.93	109.51	120.87
3	B	502	NTD	O5-C1-C4	-6.91	109.55	120.87
3	A	402	NTD	C8-C7-C6	-6.90	112.37	126.41
3	E	402	NTD	O5-C1-C4	-6.88	109.59	120.87
3	F	402	NTD	O5-C1-C4	-6.86	109.62	120.87
3	A	402	NTD	O5-C1-C4	-6.82	109.69	120.87
3	C	402	NTD	C8-C7-C6	-6.73	112.71	126.41
3	D	403	NTD	C8-C7-C6	-6.55	113.07	126.41
3	E	402	NTD	O7-C7-C6	-6.55	109.18	120.11
3	F	402	NTD	O7-C7-C6	-6.49	109.28	120.11
3	C	402	NTD	O7-C7-C6	-6.49	109.28	120.11
3	D	403	NTD	O7-C7-C6	-6.45	109.35	120.11
3	A	402	NTD	O7-C7-C6	-6.44	109.36	120.11
3	B	502	NTD	O7-C7-C6	-6.13	109.87	120.11
3	D	403	NTD	C1-C6-C5	-5.89	107.31	118.97
3	F	402	NTD	C8-C7-C6	-5.89	114.41	126.41
3	E	402	NTD	C8-C7-C6	-5.76	114.69	126.41
3	E	402	NTD	C1-C6-C5	-5.17	108.74	118.97
3	A	402	NTD	C1-C6-C5	-5.06	108.96	118.97
3	B	502	NTD	C1-C6-C5	-4.46	110.14	118.97
3	C	402	NTD	C1-C6-C5	-4.42	110.23	118.97
3	F	402	NTD	C1-C6-C5	-4.09	110.88	118.97
3	A	402	NTD	C4-C1-C6	-3.55	110.39	116.94

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	D	403	NTD	C2-C5-C6	-3.50	110.48	116.94
3	D	403	NTD	C4-C1-C6	-3.46	110.55	116.94
3	B	502	NTD	C4-C1-C6	-3.08	111.24	116.94
3	E	402	NTD	C4-C1-C6	-2.93	111.53	116.94
3	C	402	NTD	C4-C1-C6	-2.92	111.54	116.94
3	A	402	NTD	C2-C5-C6	-2.89	111.60	116.94
3	C	402	NTD	C2-C5-C6	-2.69	111.97	116.94
3	E	402	NTD	C2-C5-C6	-2.60	112.13	116.94
3	F	402	NTD	C4-C1-C6	-2.53	112.26	116.94
3	B	502	NTD	C2-C5-C6	-2.15	112.96	116.94

There are no chirality outliers.

All (49) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	A	402	NTD	C5-C6-C7-C8
3	A	402	NTD	C1-C6-C7-O7
3	A	402	NTD	C8-C9-N-ON2
3	A	402	NTD	C10-C9-N-ON2
3	B	502	NTD	C5-C6-C7-C8
3	B	502	NTD	C1-C6-C7-O7
3	B	502	NTD	C8-C9-N-ON2
3	B	502	NTD	C10-C9-N-ON2
3	C	402	NTD	C5-C6-C7-C8
3	C	402	NTD	C1-C6-C7-O7
3	C	402	NTD	C8-C9-N-ON2
3	C	402	NTD	C10-C9-N-ON2
3	D	403	NTD	C5-C6-C7-C8
3	D	403	NTD	C1-C6-C7-O7
3	E	402	NTD	C5-C6-C7-C8
3	E	402	NTD	C1-C6-C7-O7
3	E	402	NTD	C8-C9-N-ON2
3	F	402	NTD	C5-C6-C7-C8
3	F	402	NTD	C1-C6-C7-O7
3	F	402	NTD	C8-C9-N-ON2
3	F	402	NTD	C10-C9-N-ON2
4	A	403	MPD	C2-C3-C4-O4
4	B	503	MPD	CM-C2-C3-C4
4	B	503	MPD	C2-C3-C4-O4
4	B	503	MPD	C2-C3-C4-C5
3	C	402	NTD	O7-C7-C8-C13
3	A	402	NTD	O7-C7-C8-C13

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Mol	Chain	Res	Type	Atoms
3	D	403	NTD	O7-C7-C8-C13
4	B	503	MPD	C1-C2-C3-C4
4	C	403	MPD	C1-C2-C3-C4
4	C	403	MPD	CM-C2-C3-C4
4	F	403	MPD	C1-C2-C3-C4
4	F	403	MPD	CM-C2-C3-C4
3	E	402	NTD	C10-C9-N-ON2
4	A	403	MPD	C2-C3-C4-C5
4	F	403	MPD	C2-C3-C4-C5
3	F	402	NTD	O7-C7-C8-C13
4	B	503	MPD	O2-C2-C3-C4
4	C	403	MPD	O2-C2-C3-C4
4	D	401	MPD	O2-C2-C3-C4
4	E	403	MPD	O2-C2-C3-C4
4	F	403	MPD	O2-C2-C3-C4
4	E	403	MPD	C2-C3-C4-O4
4	F	403	MPD	C2-C3-C4-O4
3	B	502	NTD	O7-C7-C8-C9
3	C	402	NTD	O7-C7-C8-C9
4	D	401	MPD	C1-C2-C3-C4
4	E	403	MPD	C1-C2-C3-C4
4	E	403	MPD	CM-C2-C3-C4

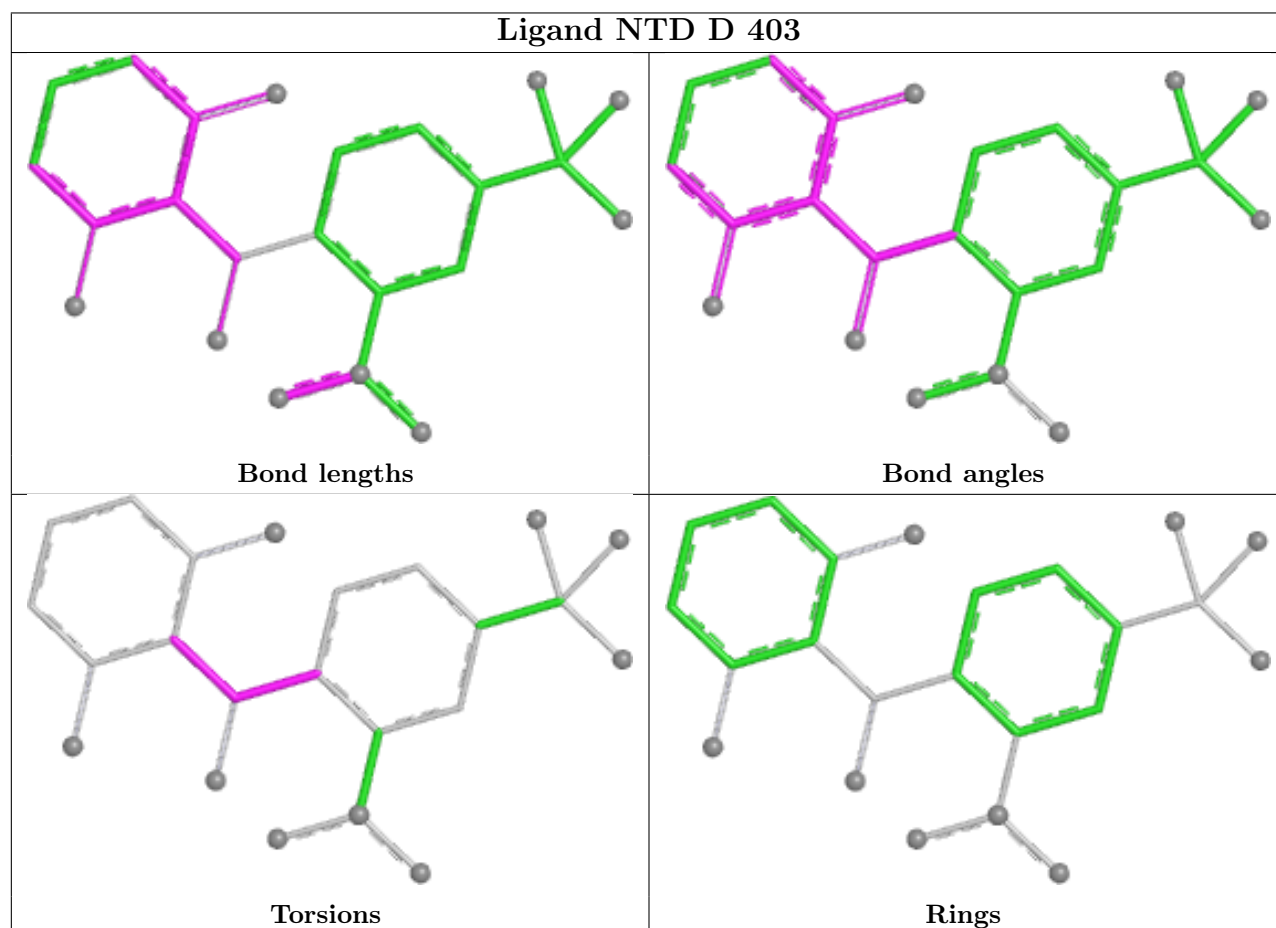
There are no ring outliers.

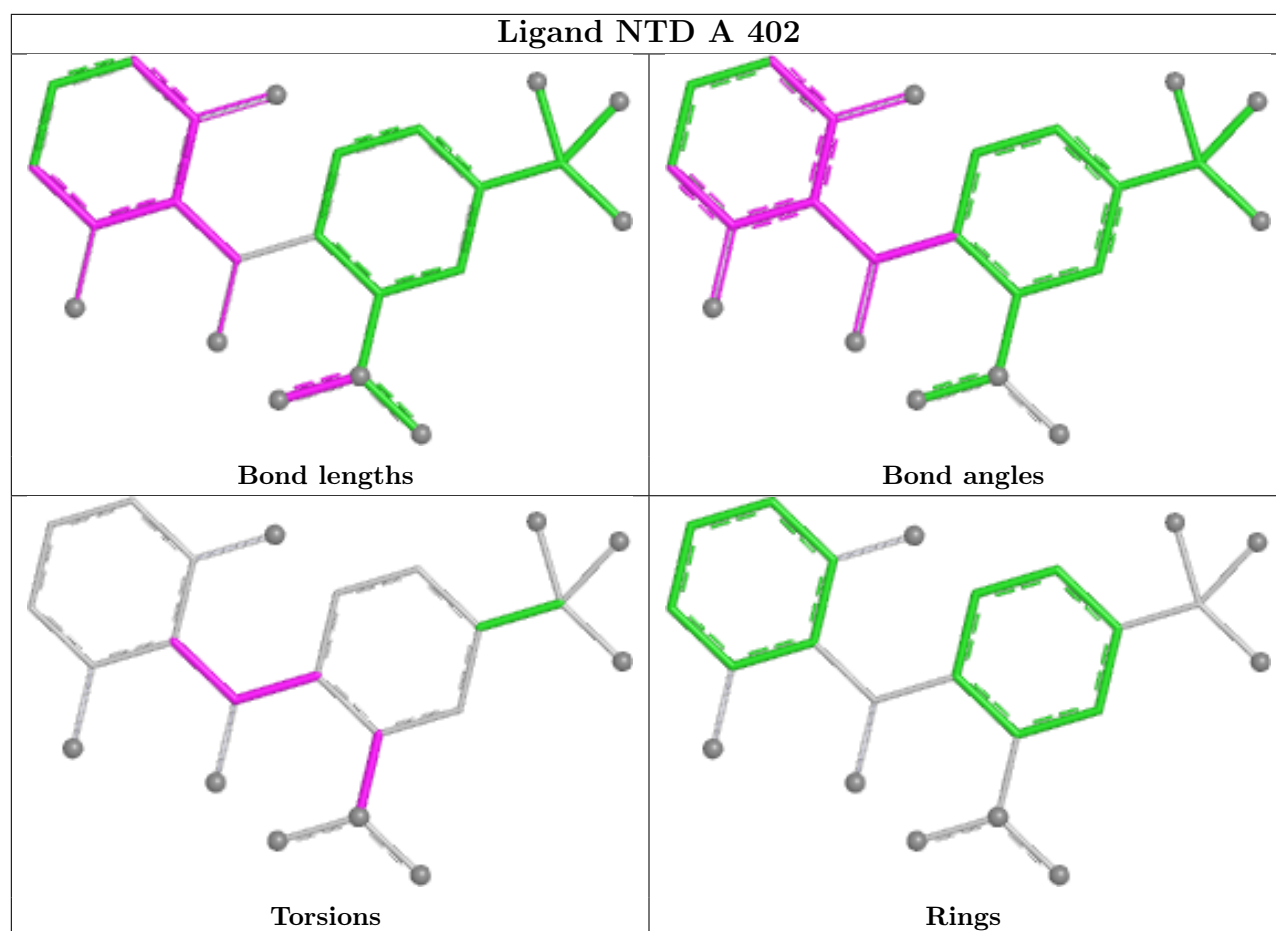
8 monomers are involved in 8 short contacts:

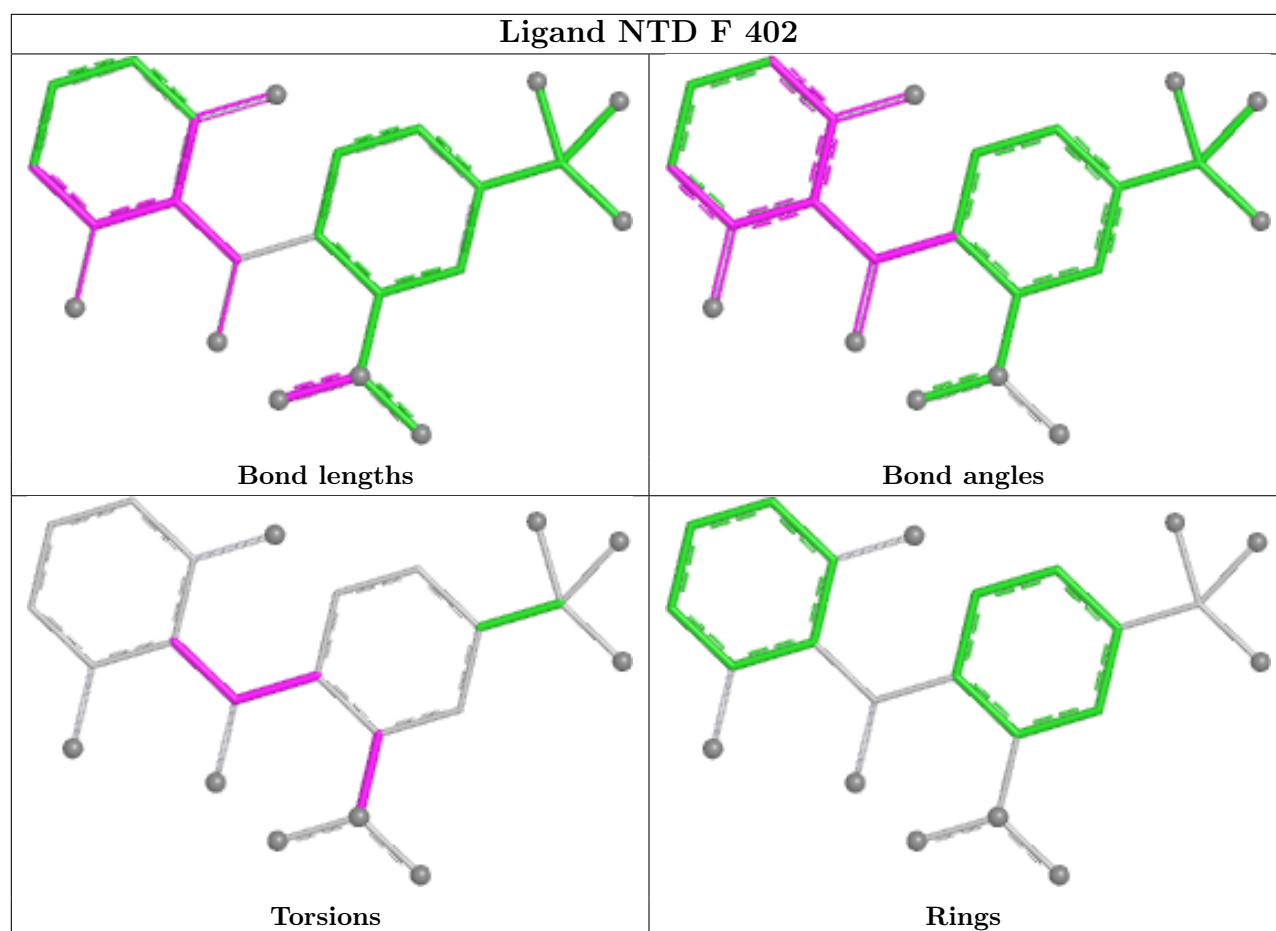
Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	B	503	MPD	1	0
4	F	403	MPD	1	0
3	A	402	NTD	1	0
4	E	403	MPD	1	0
4	A	403	MPD	1	0
3	F	402	NTD	2	0
3	B	502	NTD	1	0
3	E	402	NTD	1	0

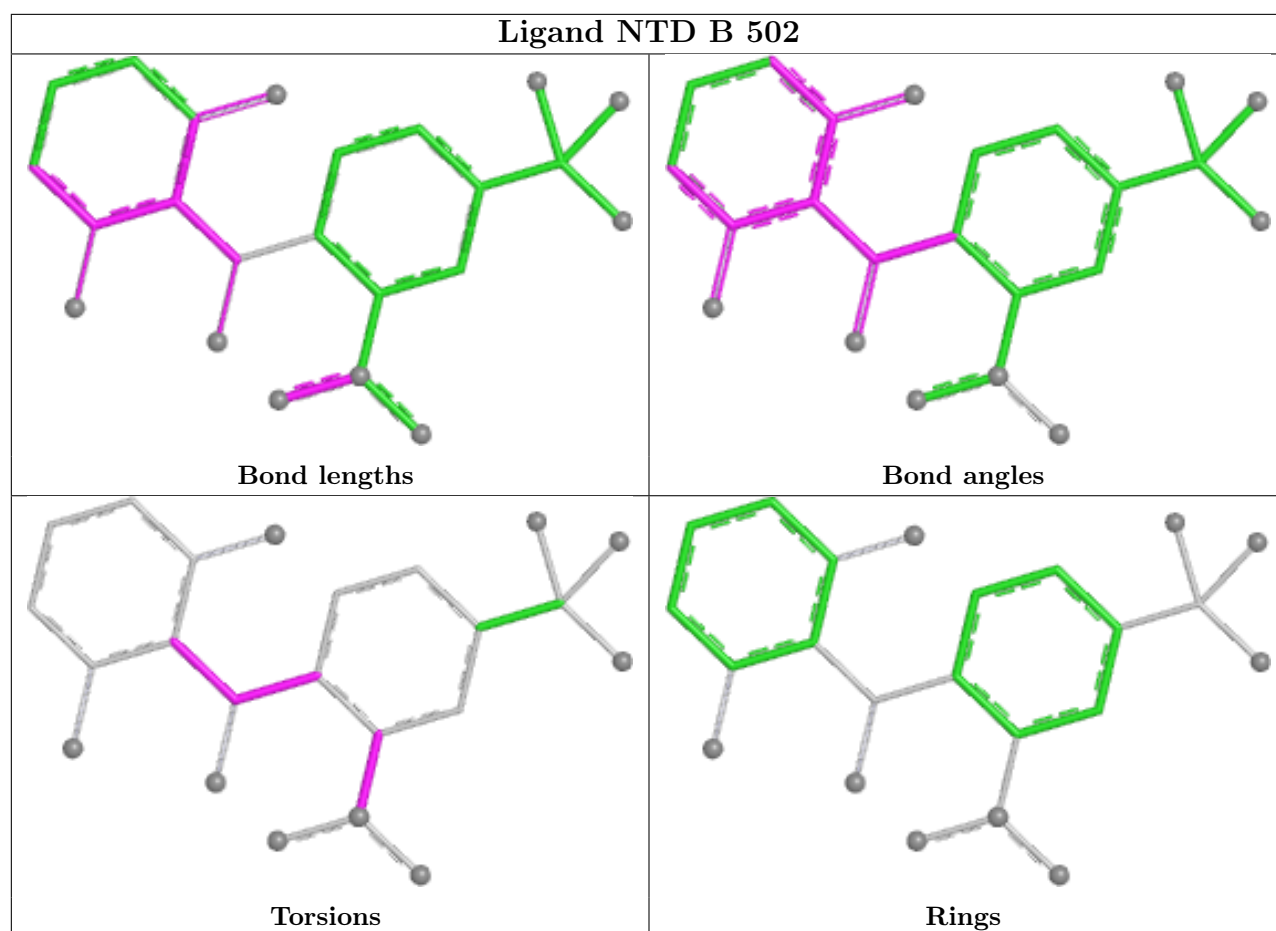
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included.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

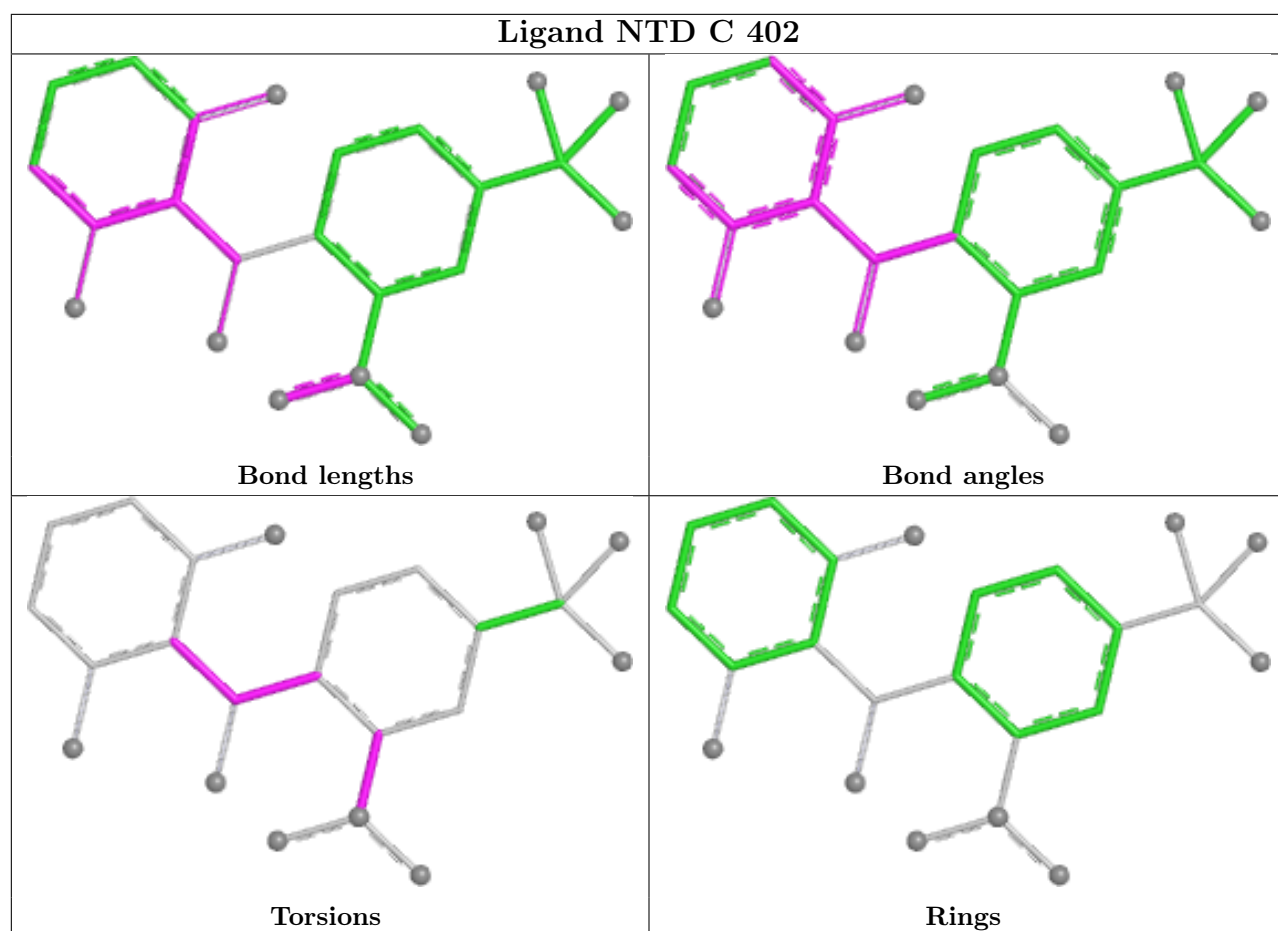
highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified 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.

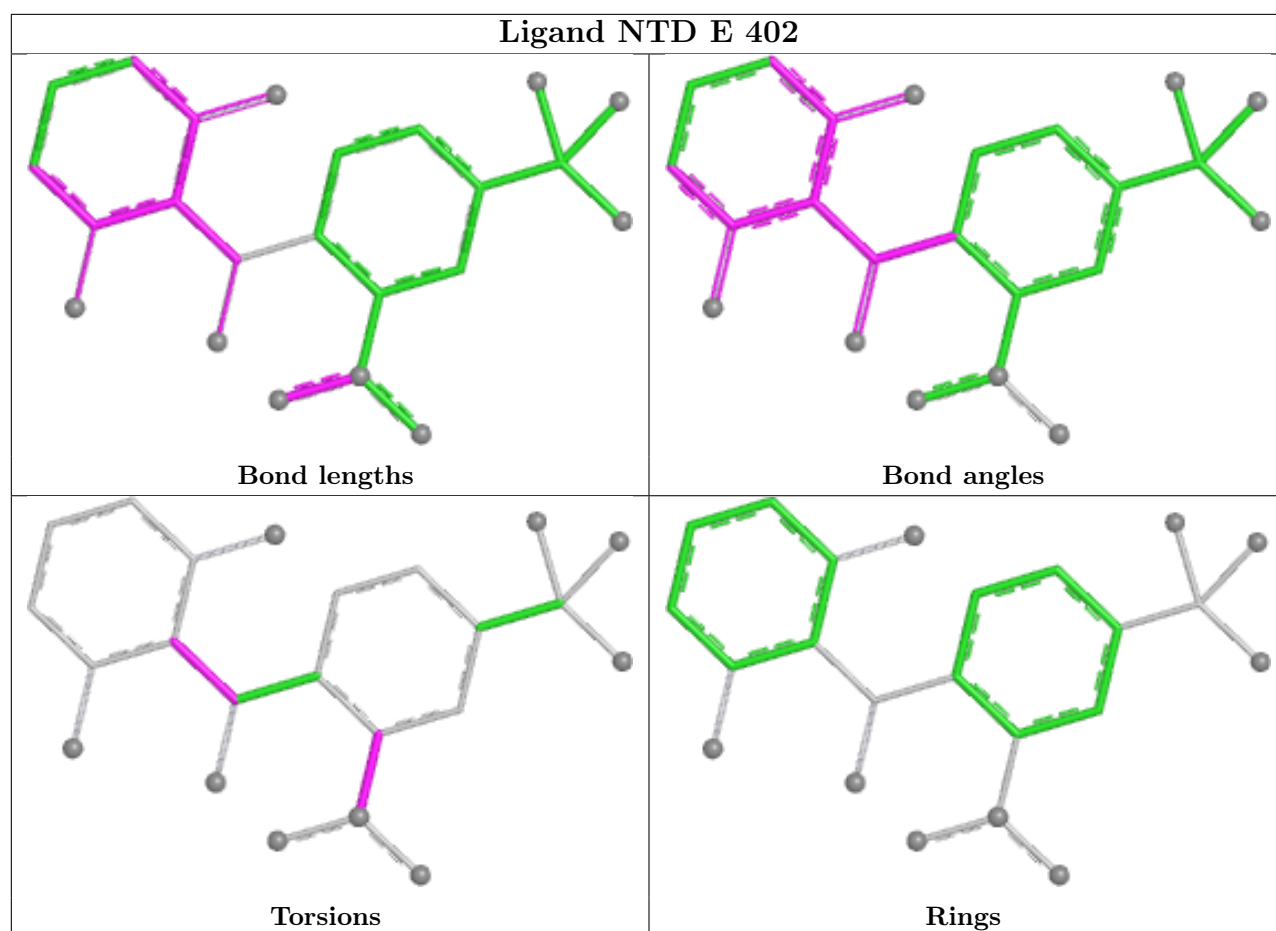












5.7 Other polymers [i](#)

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	374/393 (95%)	-0.06	4 (1%) 78 70	25, 45, 71, 94	2 (0%)
1	B	371/393 (94%)	0.35	11 (2%) 52 42	23, 59, 83, 96	1 (0%)
1	C	371/393 (94%)	0.07	8 (2%) 62 52	34, 53, 75, 83	1 (0%)
1	D	368/393 (93%)	0.02	3 (0%) 82 75	33, 51, 78, 101	0
1	E	372/393 (94%)	-0.18	2 (0%) 87 82	27, 41, 70, 85	0
1	F	365/393 (92%)	0.26	7 (1%) 66 57	23, 55, 93, 104	1 (0%)
All	All	2221/2358 (94%)	0.07	35 (1%) 70 61	23, 51, 81, 104	5 (0%)

All (35) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	198	GLU	5.0
1	D	210	TRP	4.9
1	F	206	PHE	4.1
1	C	198	GLU	3.8
1	D	246	GLY	3.8
1	B	231	ASN	3.6
1	F	201	LEU	3.5
1	C	245	PRO	3.3
1	B	216	GLN	3.3
1	C	275	ILE	3.0
1	A	254	GLU	2.8
1	D	198	GLU	2.8
1	B	357	GLN	2.7
1	E	99	GLU	2.7
1	B	91	ASP	2.6
1	B	279	ARG	2.5
1	B	245	PRO	2.5
1	B	291	VAL	2.5
1	A	357	GLN	2.4

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Mol	Chain	Res	Type	RSRZ
1	B	129	GLY	2.4
1	A	328	GLU	2.4
1	B	102	ASP	2.3
1	F	108	GLN	2.3
1	C	92	GLY	2.3
1	C	244	ALA	2.2
1	F	149	LYS	2.1
1	B	155	GLN	2.1
1	A	319	GLU	2.1
1	C	357	GLN	2.1
1	F	122	TRP	2.1
1	C	319	GLU	2.1
1	F	101	GLU	2.1
1	C	376	ASN	2.1
1	F	151	ASN	2.0
1	E	7	LYS	2.0

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
4	MPD	D	401	8/8	0.67	0.21	64,77,82,86	0
4	MPD	C	403	8/8	0.69	0.15	58,62,66,70	0
4	MPD	B	503	8/8	0.77	0.14	64,69,72,74	0
4	MPD	E	403	8/8	0.77	0.15	50,56,59,61	0
4	MPD	F	403	8/8	0.77	0.24	64,68,70,74	0
4	MPD	A	403	8/8	0.81	0.15	56,57,62,63	0
3	NTD	B	502	23/23	0.83	0.14	48,58,67,71	0

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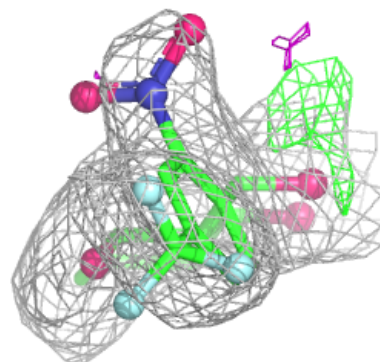
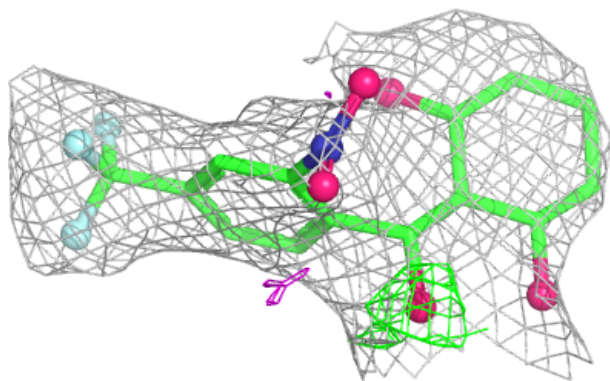
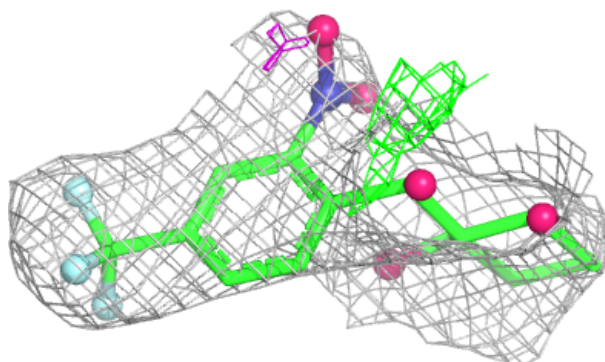
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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
3	NTD	A	402	23/23	0.89	0.11	40,45,56,57	0
3	NTD	D	403	23/23	0.90	0.12	43,49,60,62	0
3	NTD	E	402	23/23	0.90	0.10	33,35,41,46	0
3	NTD	F	402	23/23	0.91	0.10	42,46,55,59	0
3	NTD	C	402	23/23	0.93	0.09	44,48,56,60	0
2	CO	B	501	1/1	0.98	0.04	50,50,50,50	0
2	CO	D	402	1/1	0.99	0.07	44,44,44,44	0
2	CO	E	401	1/1	0.99	0.03	34,34,34,34	0
2	CO	F	401	1/1	0.99	0.04	49,49,49,49	0
2	CO	A	401	1/1	0.99	0.03	39,39,39,39	0
2	CO	C	401	1/1	0.99	0.04	45,45,45,45	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.

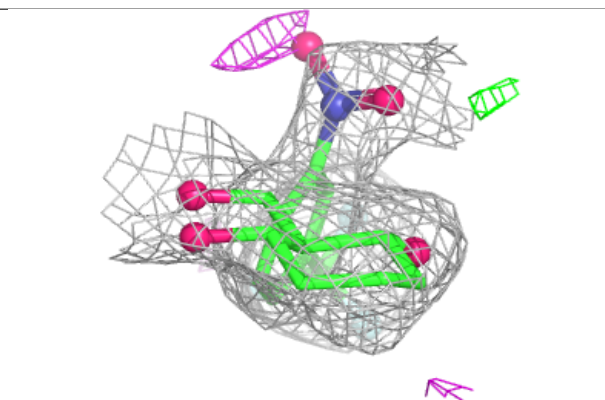
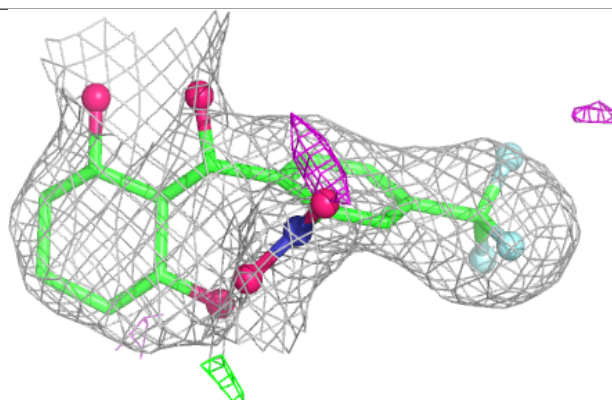
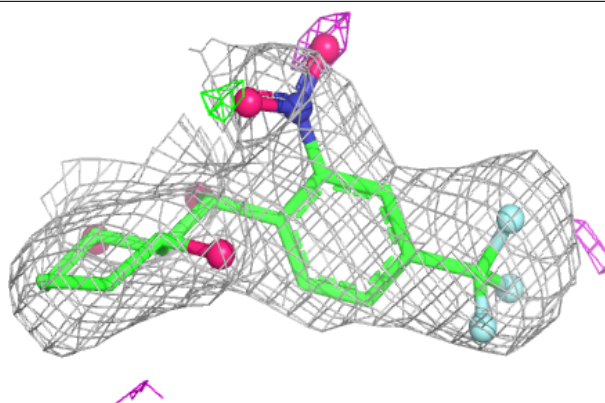
Electron density around NTD B 502:

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

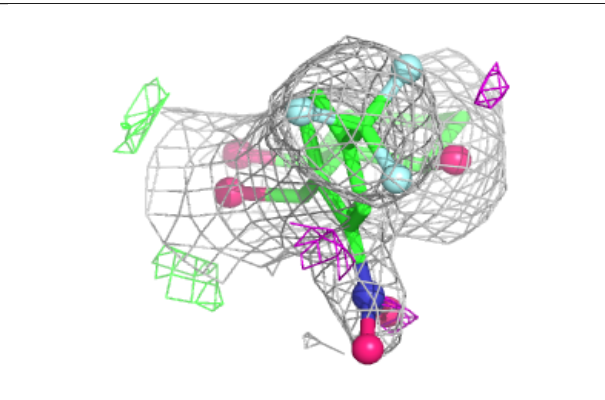
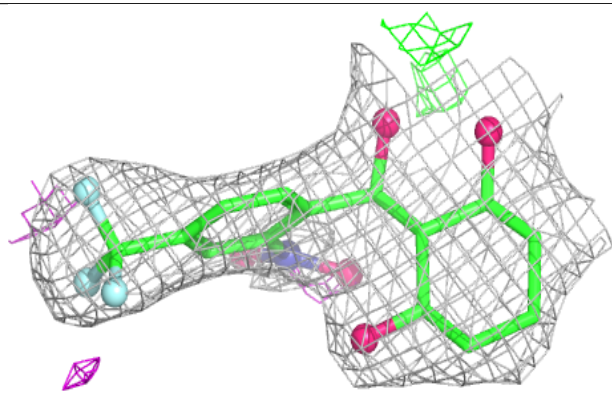
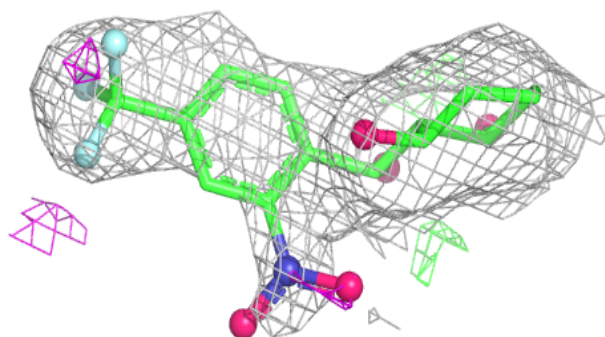


Electron density around NTD A 402:

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

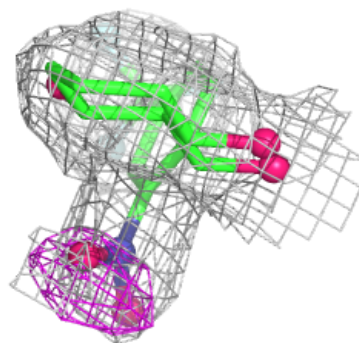
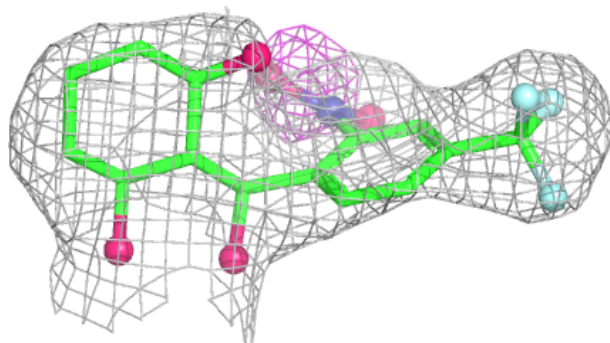
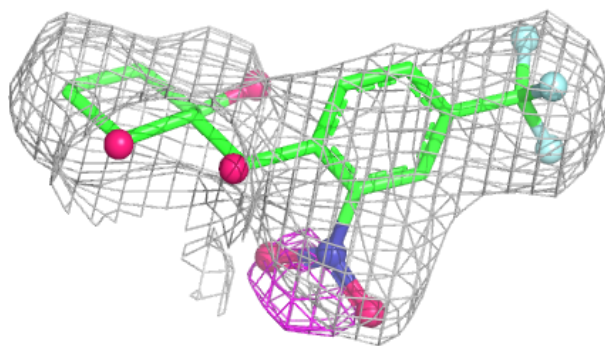
**Electron density around NTD D 403:**

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

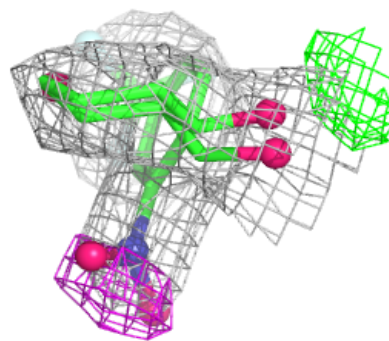
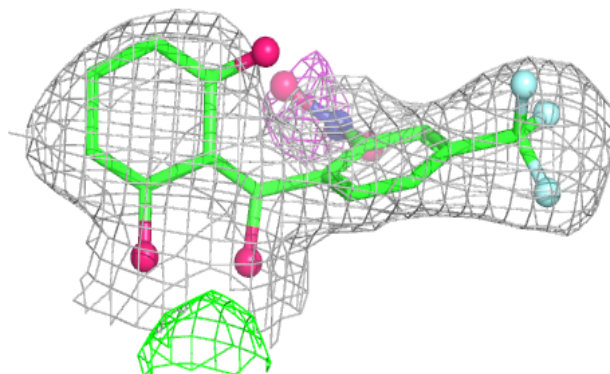
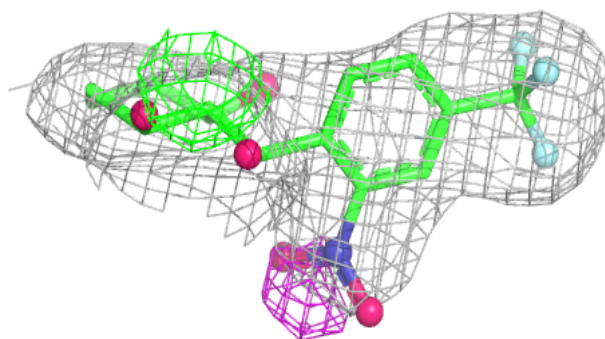


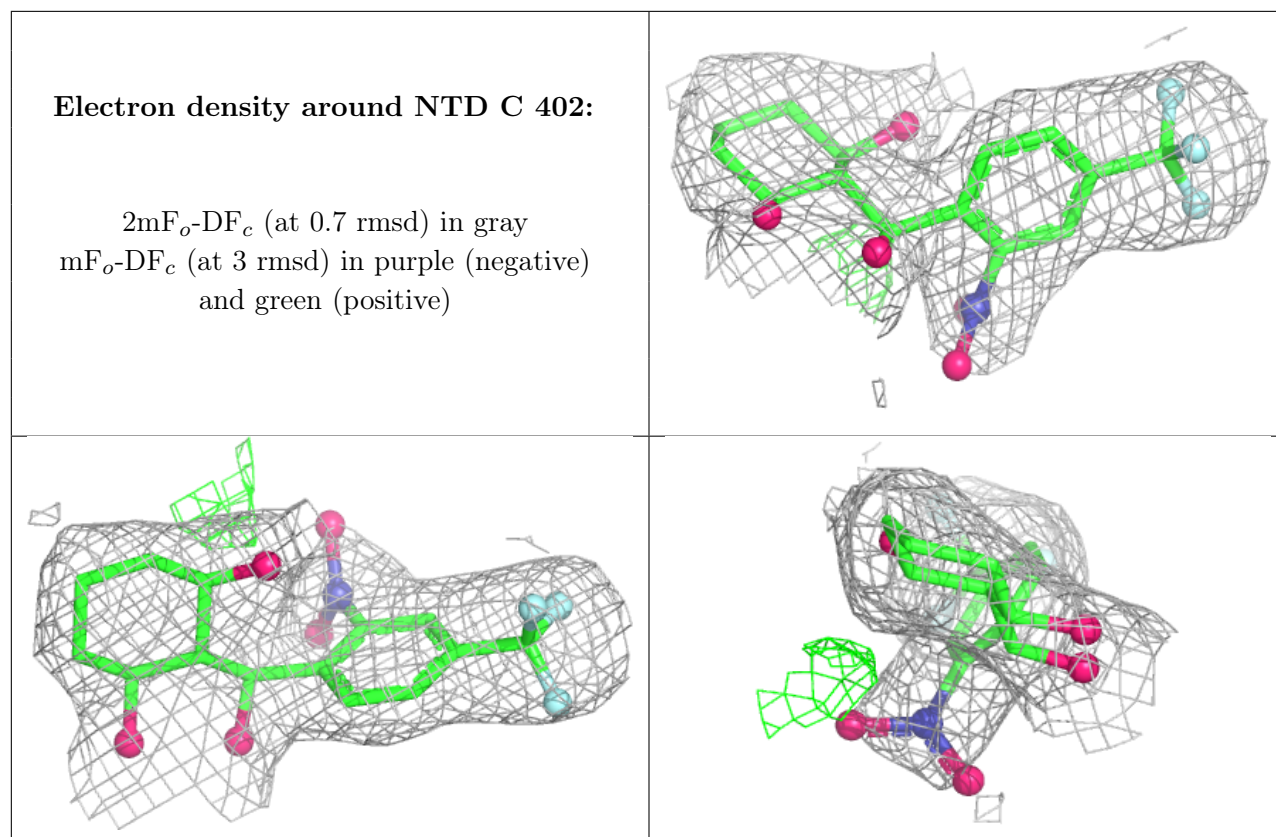
Electron density around NTD E 402:

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

**Electron density around NTD F 402:**

$2mF_o-DF_c$ (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.