



Full wwPDB X-ray Structure Validation Report ⓘ

Apr 18, 2026 – 01:43 PM UTC

PDB ID : 3ABG / pdb_00003abg
Title : X-ray Crystal Analysis of Bilirubin Oxidase from Myrothecium verrucaria at 2.3 angstrom Resolution using a Twin Crystal
Authors : Mizutani, K.; Toyoda, M.; Sagara, K.; Takahashi, N.; Sato, A.; Kamitaka, Y.; Tsujimura, S.; Nakanishi, Y.; Sugiura, T.; Yamaguchi, S.; Kano, K.; Mikami, B.
Deposited on : 2009-12-10
Resolution : 2.30 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](#) ①) were used in the production of this report:

MolProbity	:	4-5-2 with Phenix2.0
Mogul	:	2022.3.0, CSD as543be (2022)
Xtrriage (Phenix)	:	2.0
EDS	:	3.0
Buster-report	:	wwPDB partial adaption of 1.1.7 (2018)
Percentile statistics	:	20250101.v01 (using entries in the PDB archive January 1st 2025)
CCP4	:	9.0.010 (Gargrove)
Density-Fitness	:	1.0.12
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.49

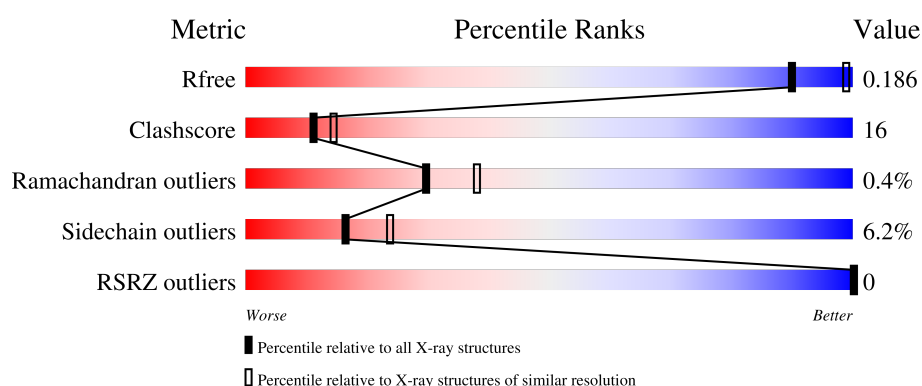
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.30 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	6319 (2.30-2.30)
Clashscore	190562	6919 (2.30-2.30)
Ramachandran outliers	187476	6854 (2.30-2.30)
Sidechain outliers	187428	6854 (2.30-2.30)
RSRZ outliers	180081	6325 (2.30-2.30)

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	534	62% 35% .
1	B	534	61% 35% .
2	C	3	67% 33%
3	D	2	50% 50%
3	F	2	100%

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Mol	Chain	Length	Quality of chain
4	E	5	

2 Entry composition [i](#)

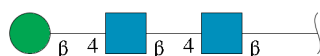
There are 8 unique types of molecules in this entry. The entry contains 8848 atoms, of which 0 are hydrogens and 0 are deuteriums.

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 Bilirubin oxidase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	533	Total	C	N	O	S	0	1	0
			4235	2703	720	798	14			
1	B	533	Total	C	N	O	S	0	1	0
			4235	2703	720	798	14			

- Molecule 2 is an oligosaccharide called beta-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose.



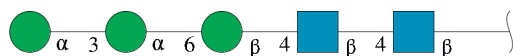
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
2	C	3	Total	C	N	O	0	0	0
			39	22	2	15			

- Molecule 3 is an oligosaccharide called 2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose.



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
3	D	2	Total	C	N	O	0	0	0
			28	16	2	10			
3	F	2	Total	C	N	O	0	0	0
			28	16	2	10			

- Molecule 4 is an oligosaccharide called alpha-D-mannopyranose-(1-3)-alpha-D-mannopyranose-(1-6)-beta-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose.

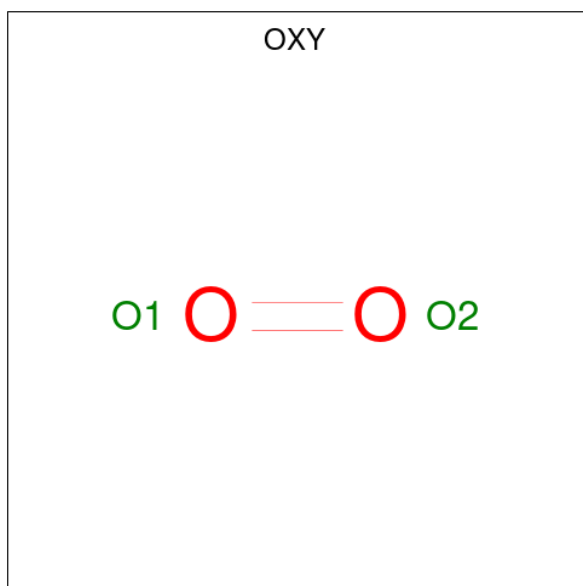


Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
4	E	5	Total	C	N	O	0	0	0
			61	34	2	25			

- Molecule 5 is COPPER (II) ION (CCD ID: CU) (formula: Cu) (labeled as "Ligand of Interest" by depositor).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	4	Total	Cu	0	0
			4	4		
5	B	4	Total	Cu	0	0
			4	4		

- Molecule 6 is OXYGEN MOLECULE (CCD ID: OXY) (formula: O₂) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	A	1	Total	O	0	0
			2	2		
6	B	1	Total	O	0	0
			2	2		

- Molecule 7 is GLYCEROL (CCD ID: GOL) (formula: C₃H₈O₃).



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

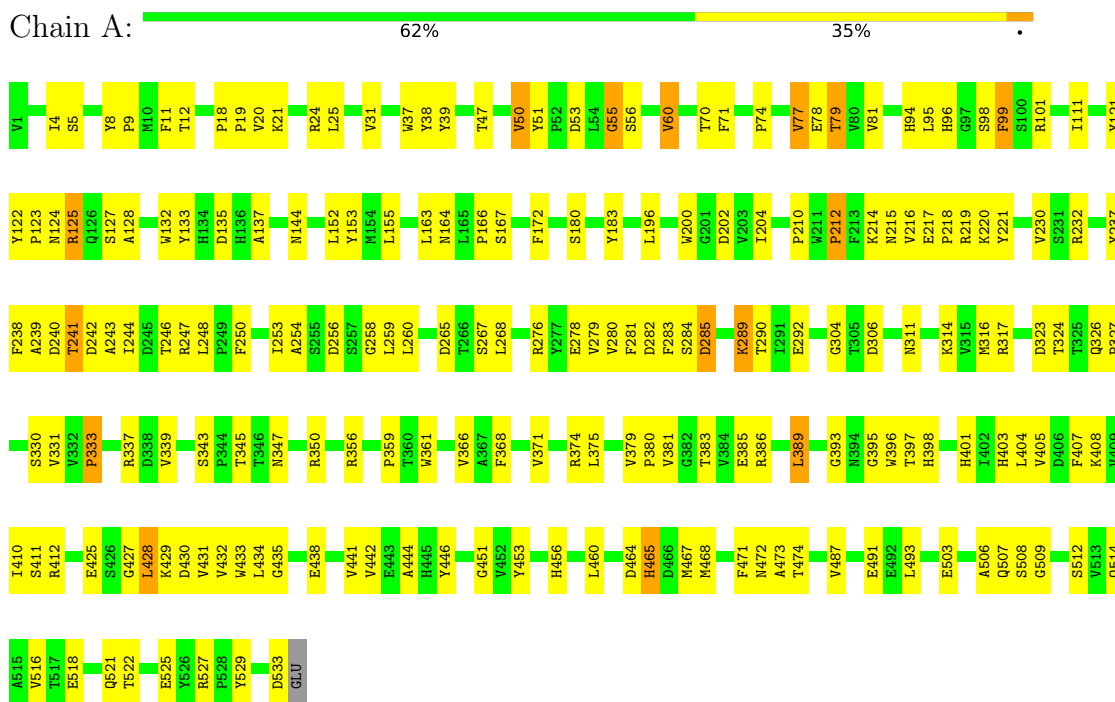
- Molecule 8 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
8	A	69	Total	O	0	0
			69	69		
8	B	93	Total	O	0	0
			93	93		

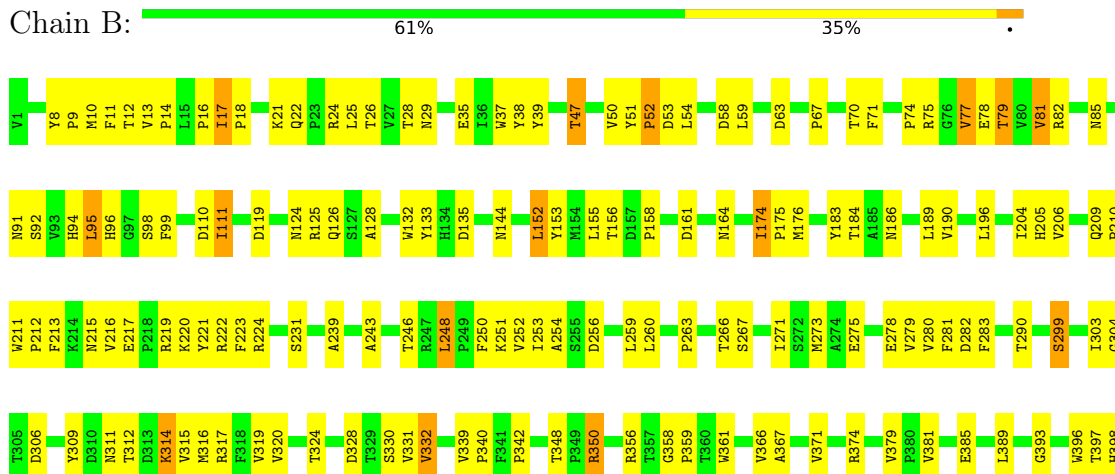
3 Residue-property plots

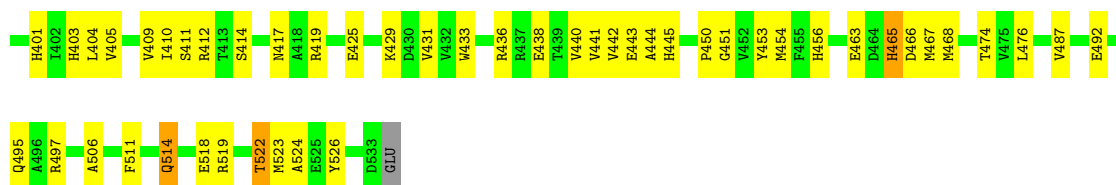
These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron density.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



• Molecule 1: Bilirubin oxidase





- Molecule 2: beta-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose

Chain C: 67% 33%



- Molecule 3: 2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose

Chain D: 50% 50%



- Molecule 3: 2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose

Chain F: 100%



- Molecule 4: alpha-D-mannopyranose-(1-3)-alpha-D-mannopyranose-(1-6)-beta-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose

Chain E: 40% 60%



4 Data and refinement statistics

Property	Value	Source
Space group	P 63	Depositor
Cell constants a, b, c, α , β , γ	139.74Å 139.74Å 135.56Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	33.56 – 2.30 33.56 – 2.30	Depositor EDS
% Data completeness (in resolution range)	96.7 (33.56-2.30) 96.8 (33.56-2.30)	Depositor EDS
R_{merge}	0.06	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.51 (at 2.29Å)	Xtriage
Refinement program	PHENIX 1.20.1_4487	Depositor
R, R_{free}	0.158 , 0.186 0.159 , 0.186	Depositor DCC
R_{free} test set	3361 reflections (5.04%)	wwPDB-VP
Wilson B-factor (Å ²)	42.7	Xtriage
Anisotropy	0.273	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.31 , 26.9	EDS
L-test for twinning ²	$\langle L \rangle = 0.40$, $\langle L^2 \rangle = 0.22$	Xtriage
Estimated twinning fraction	0.469 for h,-h-k,-l	Xtriage
Reported twinning fraction	0.487 for h,-h-k,-l	Depositor
Outliers	0 of 66357 reflections	Xtriage
F_o, F_c correlation	0.98	EDS
Total number of atoms	8848	wwPDB-VP
Average B, all atoms (Å ²)	41.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.03% 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: BMA, OXY, MAN, NAG, GOL, CU

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	0.62	3/4369 (0.1%)	0.62	3/5975 (0.1%)
1	B	0.46	0/4369	0.57	4/5975 (0.1%)
All	All	0.55	3/8738 (0.0%)	0.60	7/11950 (0.1%)

All (3) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	512	SER	C-O	-5.80	1.17	1.23
1	A	60	VAL	C-O	-5.57	1.17	1.24
1	A	239	ALA	C-O	-5.20	1.17	1.23

All (7) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	52	PRO	CB-CA-C	7.06	123.22	111.56
1	A	333	PRO	CB-CA-C	-5.79	101.36	110.96
1	B	217	GLU	CB-CA-C	5.45	116.70	108.86
1	B	465	HIS	CA-C-N	5.15	130.98	121.70
1	B	465	HIS	C-N-CA	5.15	130.98	121.70
1	A	465	HIS	CA-C-N	5.13	130.93	121.70
1	A	465	HIS	C-N-CA	5.13	130.93	121.70

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts [i](#)

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	4235	0	4011	134	0
1	B	4235	0	4011	142	0
2	C	39	0	34	1	0
3	D	28	0	25	1	0
3	F	28	0	25	2	0
4	E	61	0	52	3	0
5	A	4	0	0	0	0
5	B	4	0	0	0	0
6	A	2	0	0	0	0
6	B	2	0	0	0	0
7	A	24	0	32	4	0
7	B	24	0	32	2	0
8	A	69	0	0	0	0
8	B	93	0	0	1	0
All	All	8848	0	8222	276	0

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 16.

All (276) 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:396:TRP:CD1	1:B:398:HIS:HE2	1.81	0.99
1:A:218:PRO:HG2	1:A:324:THR:HG23	1.50	0.93
1:A:304:GLY:HA2	1:A:397:THR:HG21	1.55	0.86
1:B:396:TRP:CD1	1:B:398:HIS:NE2	2.46	0.84
1:B:396:TRP:HD1	1:B:398:HIS:NE2	1.76	0.84
1:A:31:VAL:HG11	1:A:527:ARG:HE	1.42	0.82
1:B:356:ARG:HH12	1:B:359:PRO:HA	1.50	0.76
1:B:304:GLY:HA2	1:B:397:THR:HG21	1.67	0.76
1:A:396:TRP:HD1	1:A:398:HIS:CD2	2.05	0.74
1:B:212:PRO:HG2	1:B:316:MET:HE3	1.70	0.73
1:A:99:PHE:HB2	1:A:404:LEU:HD12	1.69	0.72
1:A:79:THR:HB	1:A:124:ASN:HD21	1.54	0.72
1:A:311:ASN:OD1	1:A:314:LYS:NZ	2.23	0.72
1:B:21:LYS:NZ	1:B:63:ASP:OD2	2.23	0.71
1:B:79:THR:HB	1:B:124:ASN:HD21	1.55	0.71
1:A:350:ARG:NH2	1:A:385:GLU:OE2	2.23	0.70
1:B:252:VAL:HG22	1:B:279:VAL:HG12	1.73	0.70

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:240:ASP:O	1:A:242:ASP:N	2.25	0.70
1:A:396:TRP:CD1	1:A:398:HIS:HE2	2.09	0.70
1:B:95:LEU:HD23	1:B:133:TYR:HB3	1.73	0.69
1:A:407:PHE:HB3	1:A:444:ALA:HB2	1.74	0.68
1:B:176:MET:HE3	1:B:206:VAL:HG11	1.74	0.68
1:A:397:THR:HB	1:A:433:TRP:HE1	1.57	0.68
1:B:183:TYR:OH	1:B:205:HIS:NE2	2.22	0.68
1:A:396:TRP:CD1	1:A:398:HIS:NE2	2.62	0.67
1:B:361:TRP:HB3	1:B:467:MET:HE3	1.74	0.67
1:A:219:ARG:NH2	1:A:330:SER:OG	2.27	0.67
1:A:125:ARG:NH2	1:A:533:ASP:O	2.28	0.67
1:B:409:VAL:HG21	1:B:425:GLU:HB3	1.76	0.66
1:B:79:THR:HB	1:B:124:ASN:ND2	2.11	0.66
1:B:212:PRO:HD2	1:B:316:MET:HB3	1.78	0.65
1:A:20:VAL:O	1:B:22:GLN:NE2	2.30	0.64
1:B:222:ARG:HD2	1:B:253:ILE:HD11	1.79	0.64
1:B:414:SER:O	1:B:417:ASN:N	2.27	0.63
1:B:75:ARG:NH2	7:B:708:GOL:H2	2.13	0.63
1:A:70:THR:HG23	1:A:152:LEU:HB3	1.80	0.63
1:A:368:PHE:CD1	1:A:468:MET:HG2	2.34	0.62
1:A:396:TRP:CD1	1:A:398:HIS:CD2	2.87	0.62
1:A:361:TRP:HB3	1:A:467:MET:HE3	1.81	0.62
1:B:410:ILE:HD11	1:B:443:GLU:HB2	1.81	0.62
1:A:254:ALA:HA	1:A:260:LEU:HD22	1.81	0.61
1:A:410:ILE:HB	1:A:441:VAL:HG13	1.81	0.61
1:B:350:ARG:NH2	1:B:385:GLU:OE2	2.34	0.61
1:B:158:PRO:HA	1:B:161:ASP:HB3	1.81	0.61
1:B:24:ARG:NH2	1:B:511:PHE:O	2.33	0.60
1:A:337:ARG:HD2	1:A:339:VAL:HG22	1.82	0.60
1:A:412:ARG:NH2	1:A:425:GLU:OE1	2.34	0.60
1:A:221:TYR:O	1:A:280:VAL:HA	2.01	0.60
1:B:251:LYS:HD3	1:B:263:PRO:HB2	1.84	0.60
1:A:260:LEU:HD12	1:A:427:GLY:HA3	1.84	0.60
1:A:276:ARG:NH2	1:A:430:ASP:OD1	2.35	0.60
1:B:309:TYR:HB2	1:B:312:THR:HG23	1.84	0.59
1:B:39:TYR:HB2	1:B:81:VAL:HG13	1.84	0.59
1:A:219:ARG:HH22	1:A:330:SER:CB	2.16	0.58
1:B:174:ILE:HD12	1:B:175:PRO:HD2	1.84	0.58
1:B:356:ARG:NH1	1:B:358:GLY:O	2.36	0.58
1:A:240:ASP:C	1:A:242:ASP:H	2.12	0.58
1:B:311:ASN:HA	1:B:314:LYS:NZ	2.17	0.58

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:247:ARG:HD3	1:A:267:SER:HB2	1.86	0.58
4:E:4:MAN:O2	4:E:5:MAN:O6	2.20	0.58
1:B:254:ALA:HB2	1:B:259:LEU:HD23	1.85	0.57
1:A:111:ILE:HD11	1:A:137:ALA:HB1	1.85	0.57
1:A:212:PRO:O	1:A:316:MET:HB2	2.04	0.57
1:A:254:ALA:HB2	1:A:259:LEU:HD23	1.86	0.57
1:A:396:TRP:CZ3	7:A:707:GOL:H32	2.39	0.57
1:B:51:TYR:O	1:B:53:ASP:N	2.37	0.57
1:A:50:VAL:HG21	1:A:183:TYR:CE2	2.40	0.57
1:A:135:ASP:OD2	1:A:144:ASN:ND2	2.33	0.57
1:A:238:PHE:O	1:A:248:LEU:N	2.26	0.56
1:A:292:GLU:OE1	1:A:317:ARG:NE	2.39	0.56
1:B:396:TRP:HD1	1:B:398:HIS:CD2	2.23	0.56
1:B:311:ASN:HA	1:B:314:LYS:HZ3	1.71	0.56
1:B:419:ARG:NE	1:B:438:GLU:OE2	2.34	0.56
1:A:230:VAL:HG13	1:A:460:LEU:HB2	1.87	0.56
1:B:164:ASN:HB3	1:B:331:VAL:HG12	1.87	0.56
1:B:85:ASN:ND2	1:B:91:ASN:OD1	2.38	0.55
1:B:367:ALA:HB1	1:B:466:ASP:HB3	1.88	0.55
1:B:401:HIS:HB2	1:B:431:VAL:HG22	1.88	0.55
1:A:96:HIS:HB3	1:A:132:TRP:CD1	2.41	0.55
1:B:29:ASN:ND2	1:B:524:ALA:HB1	2.20	0.55
1:A:47:THR:O	1:B:506:ALA:HA	2.06	0.55
1:A:518:GLU:O	1:A:522:THR:OG1	2.23	0.55
1:B:283:PHE:HD2	1:B:320:VAL:HG22	1.72	0.55
1:A:24:ARG:N	1:A:38:TYR:O	2.39	0.55
1:A:95:LEU:HD12	1:A:98:SER:HB2	1.89	0.55
1:A:123:PRO:HB3	1:A:529:TYR:CG	2.42	0.55
1:B:371:VAL:HG12	1:B:374:ARG:NH1	2.22	0.54
1:A:71:PHE:HB2	1:A:153:TYR:HA	1.89	0.54
1:B:231:SER:HA	1:B:273:MET:HE3	1.91	0.53
1:A:217:GLU:O	1:A:219:ARG:N	2.40	0.53
1:A:371:VAL:HG22	1:A:374:ARG:NH2	2.23	0.53
1:A:525:GLU:O	3:D:1:NAG:H4	2.09	0.53
1:B:412:ARG:HH12	1:B:425:GLU:CD	2.17	0.53
1:B:239:ALA:HA	1:B:248:LEU:HD22	1.90	0.53
1:B:70:THR:HG23	1:B:152:LEU:HB3	1.92	0.52
1:A:79:THR:HG22	1:A:122:TYR:HB2	1.91	0.52
1:A:180:SER:OG	1:A:200:TRP:O	2.22	0.52
1:B:211:TRP:NE1	1:B:314:LYS:O	2.42	0.52
1:A:435:GLY:N	1:A:438:GLU:OE1	2.31	0.52

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:492:GLU:HA	1:B:495:GLN:HG3	1.92	0.52
1:A:381:VAL:HG22	1:A:473:ALA:HB1	1.90	0.52
1:A:258:GLY:HA3	1:A:337:ARG:HH22	1.75	0.52
1:A:94:HIS:O	1:A:133:TYR:HA	2.10	0.52
1:B:204:ILE:O	1:B:210:PRO:HA	2.10	0.52
1:A:204:ILE:O	1:A:210:PRO:HA	2.10	0.52
1:B:74:PRO:O	1:B:77:VAL:HG13	2.10	0.51
1:B:135:ASP:OD2	1:B:144:ASN:ND2	2.35	0.51
1:B:8:TYR:HD2	1:B:10:MET:HG2	1.75	0.51
1:B:176:MET:HE1	1:B:316:MET:SD	2.50	0.51
1:B:299:SER:O	1:B:299:SER:OG	2.28	0.51
1:A:78:GLU:HB3	1:A:121:TYR:HE1	1.75	0.51
1:A:326:GLN:OE1	1:A:327:PRO:HD2	2.12	0.50
1:B:78:GLU:HG2	1:B:125:ARG:HH12	1.76	0.50
4:E:4:MAN:O2	4:E:5:MAN:O5	2.30	0.50
1:A:39:TYR:HB2	1:A:81:VAL:HG13	1.93	0.50
1:A:411:SER:OG	1:A:441:VAL:HG12	2.11	0.50
1:B:350:ARG:HH21	1:B:385:GLU:CD	2.19	0.50
1:B:256:ASP:HB2	1:B:429:LYS:HA	1.94	0.50
1:A:389:LEU:HB3	1:A:434:LEU:HD11	1.93	0.50
1:B:18:PRO:HG3	1:B:67:PRO:HG2	1.93	0.49
1:A:247:ARG:HD3	1:A:267:SER:CB	2.43	0.49
1:B:51:TYR:O	1:B:52:PRO:C	2.53	0.49
3:F:1:NAG:O3	3:F:2:NAG:N2	2.46	0.49
1:B:356:ARG:HH11	1:B:356:ARG:HB3	1.77	0.49
1:A:125:ARG:NH2	1:A:529:TYR:O	2.45	0.49
1:A:393:GLY:HA3	1:A:396:TRP:CZ2	2.47	0.49
1:B:412:ARG:NH1	1:B:425:GLU:OE1	2.43	0.49
1:B:518:GLU:O	1:B:522:THR:OG1	2.27	0.49
1:A:506:ALA:HB2	1:B:47:THR:HG22	1.95	0.49
1:B:26:THR:HG1	1:B:35:GLU:CD	2.20	0.49
1:B:243:ALA:O	1:B:246:THR:HG22	2.13	0.49
1:A:412:ARG:HH22	1:A:425:GLU:CD	2.21	0.49
1:B:409:VAL:HA	1:B:442:VAL:HG12	1.95	0.49
1:A:55:GLY:N	7:A:708:GOL:H11	2.28	0.49
1:B:381:VAL:HG23	1:B:474:THR:O	2.13	0.49
1:A:11:PHE:CD1	1:A:317:ARG:HB2	2.48	0.48
1:A:20:VAL:HG12	1:B:22:GLN:HE22	1.78	0.48
1:B:328:ASP:OD1	1:B:330:SER:OG	2.26	0.48
1:A:403:HIS:O	1:A:404:LEU:HB3	2.13	0.48
1:B:350:ARG:NH2	1:B:379:VAL:HG22	2.28	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:397:THR:HB	1:B:433:TRP:HE1	1.78	0.48
1:A:55:GLY:H	7:A:708:GOL:H11	1.78	0.48
1:B:92:SER:HB2	1:B:111:ILE:HD13	1.94	0.48
1:B:250:PHE:HB3	1:B:281:PHE:CD1	2.48	0.48
1:A:453:TYR:HB2	1:A:471:PHE:CZ	2.49	0.48
1:B:184:THR:HG22	1:B:190:VAL:HG22	1.95	0.48
1:B:251:LYS:HD2	1:B:332:VAL:HG21	1.95	0.48
1:B:299:SER:OG	1:B:304:GLY:O	2.32	0.48
1:B:450:PRO:HB2	1:B:487:VAL:HG12	1.96	0.48
1:A:21:LYS:HG3	1:A:39:TYR:HD2	1.78	0.47
1:B:98:SER:HA	1:B:126:GLN:HE22	1.79	0.47
1:A:8:TYR:CD1	1:A:9:PRO:HD2	2.49	0.47
1:A:216:VAL:HG21	1:A:283:PHE:CE2	2.49	0.47
1:B:451:GLY:HA2	1:B:487:VAL:HA	1.95	0.47
1:A:96:HIS:N	1:A:132:TRP:O	2.41	0.47
1:A:487:VAL:HG11	2:C:1:NAG:H5	1.95	0.47
1:B:314:LYS:HE3	7:B:706:GOL:H2	1.95	0.47
1:B:37:TRP:CD1	1:B:37:TRP:N	2.80	0.47
1:B:96:HIS:HB3	1:B:132:TRP:CD1	2.50	0.47
1:B:111:ILE:HD13	1:B:111:ILE:HA	1.66	0.47
1:A:379:VAL:O	1:A:473:ALA:HA	2.15	0.47
1:A:166:PRO:HB3	1:A:172:PHE:HB3	1.97	0.47
1:A:25:LEU:HD21	1:A:516:VAL:HG11	1.97	0.46
1:A:506:ALA:O	1:A:507:GLN:HB2	2.14	0.46
1:A:241:THR:HG21	1:A:290:THR:HG23	1.97	0.46
1:A:407:PHE:CB	1:A:444:ALA:HB2	2.44	0.46
1:B:497:ARG:NH1	1:B:519:ARG:HE	2.13	0.46
1:A:215:ASN:OD1	1:A:215:ASN:N	2.47	0.46
1:A:503:GLU:CD	1:A:509:GLY:HA3	2.40	0.46
1:A:21:LYS:HG3	1:A:39:TYR:CD2	2.50	0.46
1:A:79:THR:HB	1:A:124:ASN:ND2	2.26	0.46
1:B:11:PHE:CD1	1:B:317:ARG:HB2	2.51	0.46
1:B:209:GLN:HG3	1:B:212:PRO:HB3	1.96	0.46
1:B:411:SER:O	1:B:440:VAL:HG13	2.15	0.46
1:A:5:SER:OG	1:A:202:ASP:OD1	2.30	0.46
1:B:17:ILE:HD12	1:B:174:ILE:CD1	2.46	0.46
1:B:223:PHE:N	1:B:279:VAL:O	2.37	0.46
4:E:3:BMA:H62	4:E:4:MAN:H2	1.62	0.45
1:B:164:ASN:HB3	1:B:331:VAL:CG1	2.45	0.45
1:A:256:ASP:HB2	1:A:429:LYS:HA	1.98	0.45
1:A:345:THR:OG1	1:A:347:ASN:OD1	2.34	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:306:ASP:OD1	1:B:306:ASP:N	2.49	0.45
1:A:243:ALA:O	1:A:246:THR:HG22	2.17	0.45
1:A:393:GLY:HA3	1:A:396:TRP:CE2	2.51	0.45
1:B:24:ARG:HD3	1:B:38:TYR:HE2	1.81	0.45
1:B:211:TRP:HA	1:B:315:VAL:O	2.15	0.45
1:A:356:ARG:HH21	1:A:361:TRP:NE1	2.15	0.45
1:A:451:GLY:HA2	1:A:487:VAL:HA	1.98	0.45
1:B:21:LYS:N	1:B:70:THR:O	2.49	0.45
1:A:395:GLY:HA3	7:A:707:GOL:H12	1.99	0.45
1:A:503:GLU:OE2	1:A:509:GLY:HA3	2.16	0.45
1:B:215:ASN:OD1	1:B:215:ASN:N	2.50	0.45
1:B:393:GLY:HA3	1:B:396:TRP:CZ2	2.52	0.45
1:A:196:LEU:HD11	1:A:359:PRO:HB2	1.98	0.45
1:B:215:ASN:HA	1:B:319:VAL:HG23	1.99	0.45
1:B:58:ASP:O	1:B:59:LEU:HD23	2.16	0.45
1:B:205:HIS:HA	1:B:210:PRO:HA	1.98	0.45
1:B:222:ARG:HD2	1:B:253:ILE:CD1	2.45	0.45
1:A:401:HIS:HB2	1:A:431:VAL:HG22	1.99	0.44
1:B:189:LEU:HA	1:B:189:LEU:HD23	1.83	0.44
1:A:18:PRO:HA	1:A:19:PRO:HD3	1.84	0.44
1:A:24:ARG:HH21	1:A:507:GLN:HG2	1.82	0.44
1:B:405:VAL:HG21	1:B:444:ALA:HB1	1.99	0.44
1:B:371:VAL:HG12	1:B:374:ARG:HH12	1.82	0.44
1:A:386:ARG:HA	1:A:442:VAL:O	2.17	0.44
1:B:128:ALA:HA	1:B:155:LEU:O	2.17	0.44
1:A:219:ARG:NH2	1:A:220:LYS:O	2.50	0.44
1:A:285:ASP:OD1	1:A:285:ASP:N	2.50	0.44
1:B:526:TYR:CE1	3:F:1:NAG:H62	2.52	0.44
1:B:110:ASP:OD1	1:B:495:GLN:NE2	2.50	0.44
1:B:222:ARG:HA	1:B:280:VAL:HA	2.00	0.44
1:A:221:TYR:O	1:A:280:VAL:HG23	2.18	0.44
1:A:380:PRO:O	1:A:383:THR:OG1	2.24	0.44
1:A:51:TYR:O	1:A:53:ASP:N	2.51	0.44
1:A:167:SER:O	1:A:172:PHE:HB2	2.17	0.43
1:B:410:ILE:HB	1:B:441:VAL:HG13	1.98	0.43
1:B:456:HIS:ND1	1:B:463:GLU:OE1	2.51	0.43
1:A:94:HIS:NE2	1:A:96:HIS:HA	2.33	0.43
1:A:219:ARG:NE	1:A:220:LYS:O	2.49	0.43
1:B:71:PHE:HB2	1:B:153:TYR:HA	2.00	0.43
1:B:220:LYS:HG2	1:B:282:ASP:CG	2.43	0.43
1:B:409:VAL:HG23	1:B:409:VAL:O	2.18	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:282:ASP:C	1:A:284:SER:H	2.26	0.43
1:A:276:ARG:HH22	1:A:430:ASP:CG	2.27	0.43
1:A:407:PHE:HE1	1:A:432:VAL:HG13	1.84	0.43
1:A:164:ASN:HB3	1:A:331:VAL:HG12	2.00	0.43
1:B:12:THR:HG23	1:B:13:VAL:HG23	2.00	0.43
1:A:232:ARG:HA	1:A:306:ASP:OD2	2.19	0.42
1:B:404:LEU:HD13	1:B:453:TYR:CZ	2.53	0.42
1:B:361:TRP:HB3	1:B:467:MET:HB2	2.01	0.42
1:B:210:PRO:O	1:B:211:TRP:C	2.61	0.42
1:B:342:PRO:HB3	1:B:445:HIS:HB2	2.01	0.42
1:A:95:LEU:HD23	1:A:133:TYR:HB3	2.02	0.42
1:A:385:GLU:HB2	1:A:446:TYR:CE2	2.54	0.42
1:B:16:PRO:C	1:B:17:ILE:HD13	2.44	0.42
1:B:219:ARG:HG3	1:B:221:TYR:HE1	1.83	0.42
1:A:163:LEU:HD22	1:A:333:PRO:HG3	2.02	0.42
1:B:519:ARG:O	1:B:523:MET:HG3	2.19	0.42
1:A:128:ALA:HA	1:A:155:LEU:O	2.20	0.42
1:A:250:PHE:HB3	1:A:281:PHE:CD1	2.55	0.42
1:B:8:TYR:CD1	1:B:9:PRO:HD2	2.54	0.42
1:B:176:MET:HE3	1:B:176:MET:HB3	1.77	0.42
1:B:271:ILE:HG13	1:B:275:GLU:HB2	2.01	0.42
1:B:514:GLN:H	1:B:514:GLN:HG3	1.55	0.42
1:B:78:GLU:CG	1:B:125:ARG:HH12	2.33	0.42
1:A:323:ASP:OD1	1:A:323:ASP:N	2.52	0.41
1:A:428:LEU:HD12	1:A:428:LEU:HA	1.94	0.41
1:B:94:HIS:NE2	1:B:96:HIS:HA	2.35	0.41
1:B:224:ARG:HG2	1:B:278:GLU:HG2	2.02	0.41
1:B:303:ILE:HD12	1:B:419:ARG:HD3	2.03	0.41
1:B:50:VAL:HG23	1:B:51:TYR:H	1.85	0.41
1:B:53:ASP:HB2	1:B:54:LEU:HD12	2.03	0.41
1:B:411:SER:O	1:B:440:VAL:HA	2.19	0.41
1:A:253:ILE:HG12	1:A:278:GLU:O	2.20	0.41
1:B:176:MET:CE	1:B:206:VAL:HG11	2.47	0.41
1:B:403:HIS:CE1	1:B:454:MET:HE3	2.55	0.41
1:A:289:LYS:HA	1:A:289:LYS:HD3	1.54	0.41
1:B:212:PRO:O	1:B:316:MET:HB2	2.21	0.41
1:A:37:TRP:N	1:A:37:TRP:CD1	2.88	0.41
1:B:271:ILE:HD11	1:B:275:GLU:O	2.20	0.41
1:A:375:LEU:HD11	1:A:472:ASN:HB2	2.02	0.41
1:A:456:HIS:HB3	1:A:468:MET:HA	2.03	0.41
1:B:454:MET:HE3	1:B:454:MET:HB2	1.80	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:82:ARG:HB2	1:B:119:ASP:OD1	2.21	0.41
1:A:74:PRO:O	1:A:77:VAL:HG13	2.20	0.41
1:B:304:GLY:O	1:B:436[A]:ARG:HD2	2.20	0.41
1:B:339:VAL:HA	1:B:340:PRO:HD3	1.89	0.40
1:A:237:TYR:HB3	1:A:268:LEU:HD12	2.03	0.40
1:A:408:LYS:HD3	1:A:410:ILE:HD13	2.03	0.40
1:A:491:GLU:HG3	1:A:493:LEU:H	1.86	0.40
1:B:468:MET:HE1	8:B:833:HOH:O	2.21	0.40
1:A:401:HIS:CD2	1:A:403:HIS:CD2	3.10	0.40
1:A:464:ASP:C	1:A:465:HIS:CG	3.00	0.40
1:A:521:GLN:O	1:A:525:GLU:HG3	2.21	0.40
1:A:101:ARG:HG2	1:A:529:TYR:CE1	2.57	0.40
1:B:14:PRO:HA	1:B:213:PHE:O	2.22	0.40

There are no symmetry-related clashes.

5.3 Torsion angles ⓘ

5.3.1 Protein backbone ⓘ

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	532/534 (100%)	489 (92%)	39 (7%)	4 (1%)	16	20
1	B	532/534 (100%)	490 (92%)	42 (8%)	0	100	100
All	All	1064/1068 (100%)	979 (92%)	81 (8%)	4 (0%)	30	38

All (4) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	55	GLY
1	A	241	THR
1	A	212	PRO
1	A	60	VAL

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	451/453 (100%)	428 (95%)	23 (5%)	21	32
1	B	451/453 (100%)	418 (93%)	33 (7%)	13	18
All	All	902/906 (100%)	846 (94%)	56 (6%)	16	24

All (56) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	4	ILE
1	A	12	THR
1	A	50	VAL
1	A	56	SER
1	A	77	VAL
1	A	79	THR
1	A	99	PHE
1	A	125	ARG
1	A	127	SER
1	A	214	LYS
1	A	244	ILE
1	A	265	ASP
1	A	279	VAL
1	A	285	ASP
1	A	289	LYS
1	A	343	SER
1	A	366	VAL
1	A	389	LEU
1	A	405	VAL
1	A	428	LEU
1	A	474	THR
1	A	508	SER
1	A	514	GLN
1	B	17	ILE
1	B	25	LEU
1	B	28	THR
1	B	47	THR

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Mol	Chain	Res	Type
1	B	77	VAL
1	B	79	THR
1	B	81	VAL
1	B	95	LEU
1	B	99	PHE
1	B	111	ILE
1	B	152	LEU
1	B	156	THR
1	B	174	ILE
1	B	186	ASN
1	B	196	LEU
1	B	216	VAL
1	B	248	LEU
1	B	260	LEU
1	B	266	THR
1	B	267	SER
1	B	290	THR
1	B	299	SER
1	B	314	LYS
1	B	324	THR
1	B	332	VAL
1	B	348	THR
1	B	350	ARG
1	B	366	VAL
1	B	389	LEU
1	B	465	HIS
1	B	476	LEU
1	B	514	GLN
1	B	522	THR

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (7) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	164	ASN
1	A	197	ASN
1	B	48	HIS
1	B	139	HIS
1	B	149	GLN
1	B	373	ASN
1	B	510	GLN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates ⓘ

12 monosaccharides are modelled in this entry.

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\# Z > 2$	Counts	RMSZ	$\# Z > 2$
2	NAG	C	1	1,2	14,14,15	0.86	1 (7%)	17,19,21	0.61	0
2	NAG	C	2	2	14,14,15	0.49	0	17,19,21	0.66	0
2	BMA	C	3	2	11,11,12	0.42	0	15,15,17	0.66	0
3	NAG	D	1	1,3	14,14,15	0.75	1 (7%)	17,19,21	1.46	2 (11%)
3	NAG	D	2	3	14,14,15	0.52	0	17,19,21	0.68	1 (5%)
4	NAG	E	1	1,4	14,14,15	0.94	1 (7%)	17,19,21	0.53	0
4	NAG	E	2	4	14,14,15	0.68	1 (7%)	17,19,21	0.56	0
4	BMA	E	3	4	11,11,12	1.22	1 (9%)	15,15,17	1.20	1 (6%)
4	MAN	E	4	4	11,11,12	1.61	2 (18%)	15,15,17	1.26	1 (6%)
4	MAN	E	5	4	11,11,12	0.81	0	15,15,17	1.50	2 (13%)
3	NAG	F	1	1,3	14,14,15	0.47	0	17,19,21	0.55	0
3	NAG	F	2	3	14,14,15	0.44	0	17,19,21	0.70	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
2	NAG	C	1	1,2	-	0/6/23/26	0/1/1/1

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	NAG	C	2	2	-	2/6/23/26	0/1/1/1
2	BMA	C	3	2	-	1/2/19/22	0/1/1/1
3	NAG	D	1	1,3	-	2/6/23/26	0/1/1/1
3	NAG	D	2	3	-	1/6/23/26	0/1/1/1
4	NAG	E	1	1,4	-	0/6/23/26	0/1/1/1
4	NAG	E	2	4	-	0/6/23/26	0/1/1/1
4	BMA	E	3	4	-	2/2/19/22	0/1/1/1
4	MAN	E	4	4	-	1/2/19/22	0/1/1/1
4	MAN	E	5	4	-	2/2/19/22	1/1/1/1
3	NAG	F	1	1,3	-	0/6/23/26	0/1/1/1
3	NAG	F	2	3	-	2/6/23/26	0/1/1/1

All (7) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	E	4	MAN	C2-C3	4.52	1.59	1.52
4	E	1	NAG	O5-C1	-3.40	1.38	1.43
2	C	1	NAG	O5-C1	-3.04	1.38	1.43
4	E	3	BMA	C4-C5	2.82	1.59	1.53
4	E	4	MAN	C1-C2	2.42	1.58	1.52
4	E	2	NAG	O5-C1	-2.27	1.39	1.43
3	D	1	NAG	O5-C1	2.13	1.47	1.43

All (7) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	E	5	MAN	C1-O5-C5	4.16	117.76	112.19
3	D	1	NAG	O4-C4-C5	3.98	119.14	109.32
4	E	4	MAN	O3-C3-C2	3.33	116.85	110.05
3	D	1	NAG	C1-O5-C5	3.32	116.64	112.19
4	E	3	BMA	C3-C4-C5	2.75	115.22	110.23
4	E	5	MAN	O5-C5-C6	-2.17	103.44	107.66
3	D	2	NAG	C1-O5-C5	2.16	115.08	112.19

There are no chirality outliers.

All (13) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
4	E	5	MAN	O5-C5-C6-O6
3	D	1	NAG	C4-C5-C6-O6

Continued on next page...

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Mol	Chain	Res	Type	Atoms
4	E	3	BMA	C4-C5-C6-O6
3	F	2	NAG	O5-C5-C6-O6
2	C	2	NAG	C4-C5-C6-O6
2	C	2	NAG	O5-C5-C6-O6
4	E	3	BMA	O5-C5-C6-O6
3	D	1	NAG	O5-C5-C6-O6
4	E	5	MAN	C4-C5-C6-O6
3	F	2	NAG	C4-C5-C6-O6
4	E	4	MAN	O5-C5-C6-O6
2	C	3	BMA	C4-C5-C6-O6
3	D	2	NAG	C3-C2-N2-C7

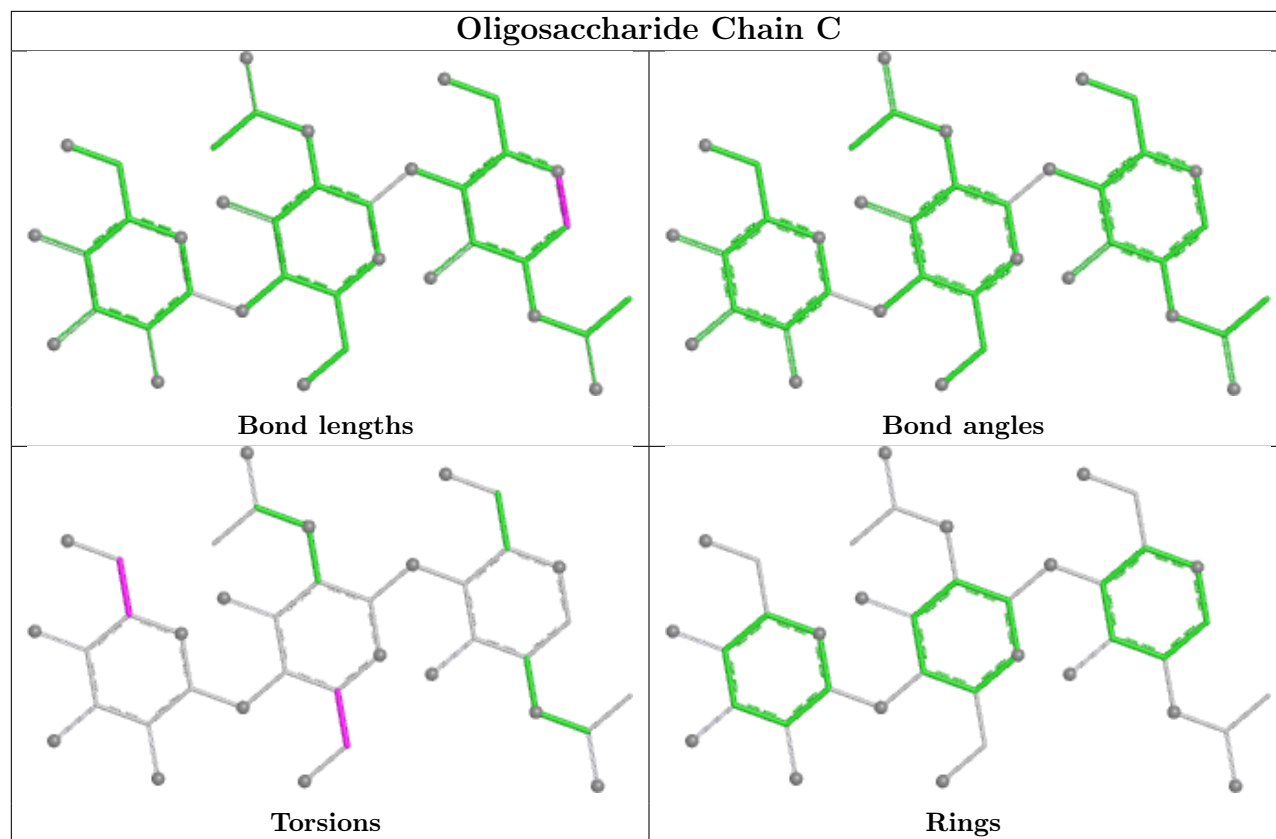
All (1) ring outliers are listed below:

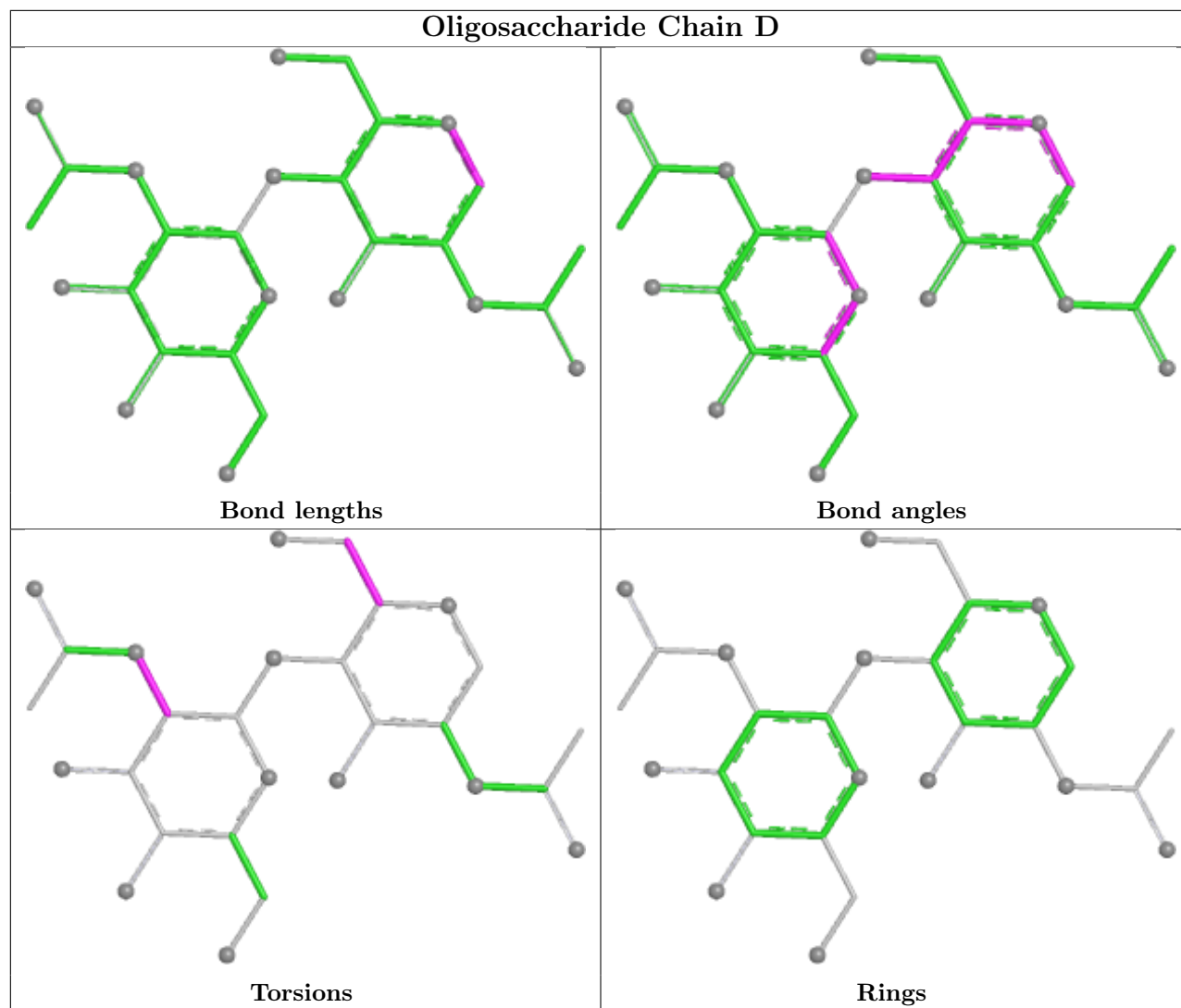
Mol	Chain	Res	Type	Atoms
4	E	5	MAN	C1-C2-C3-C4-C5-O5

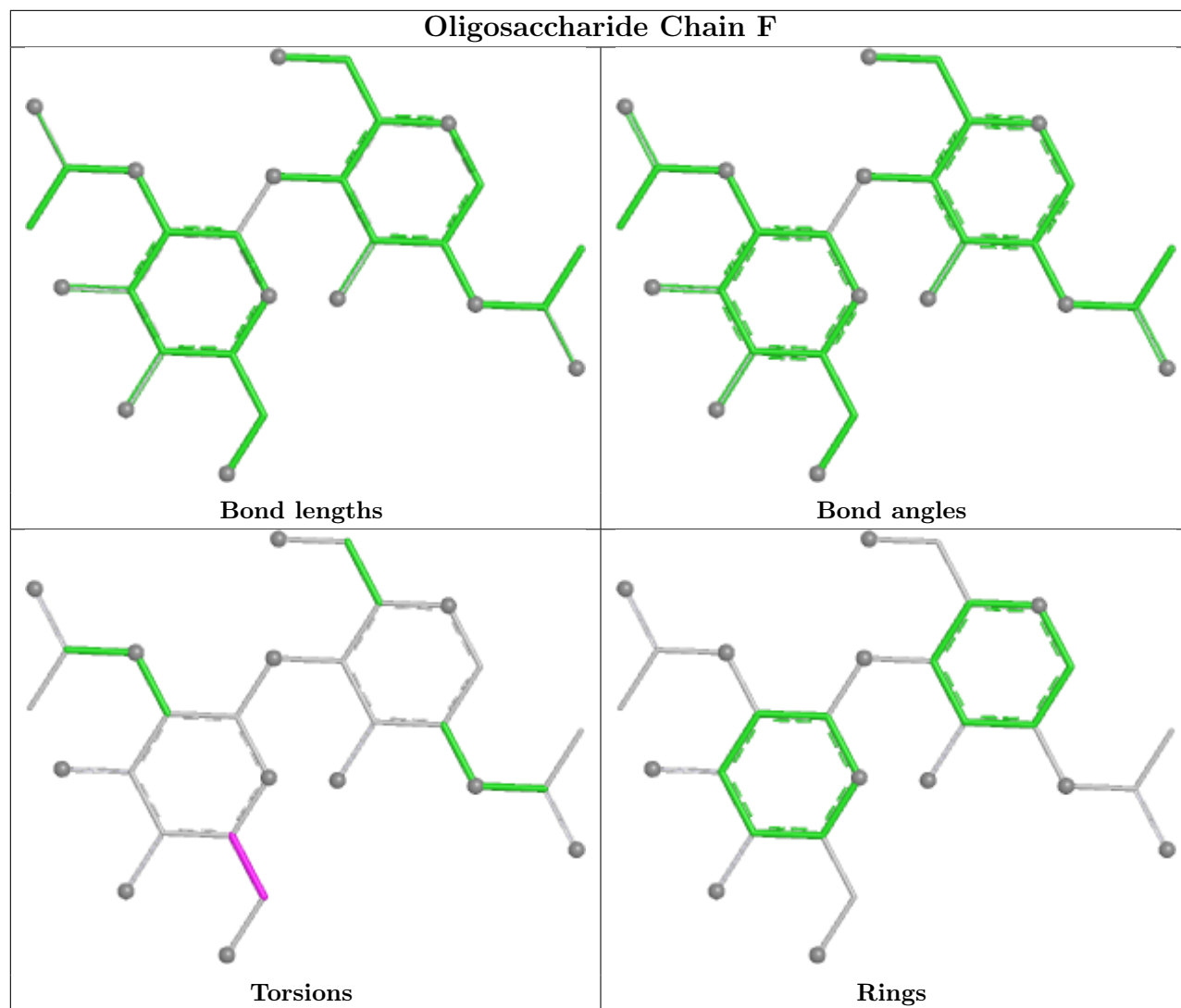
7 monomers are involved in 7 short contacts:

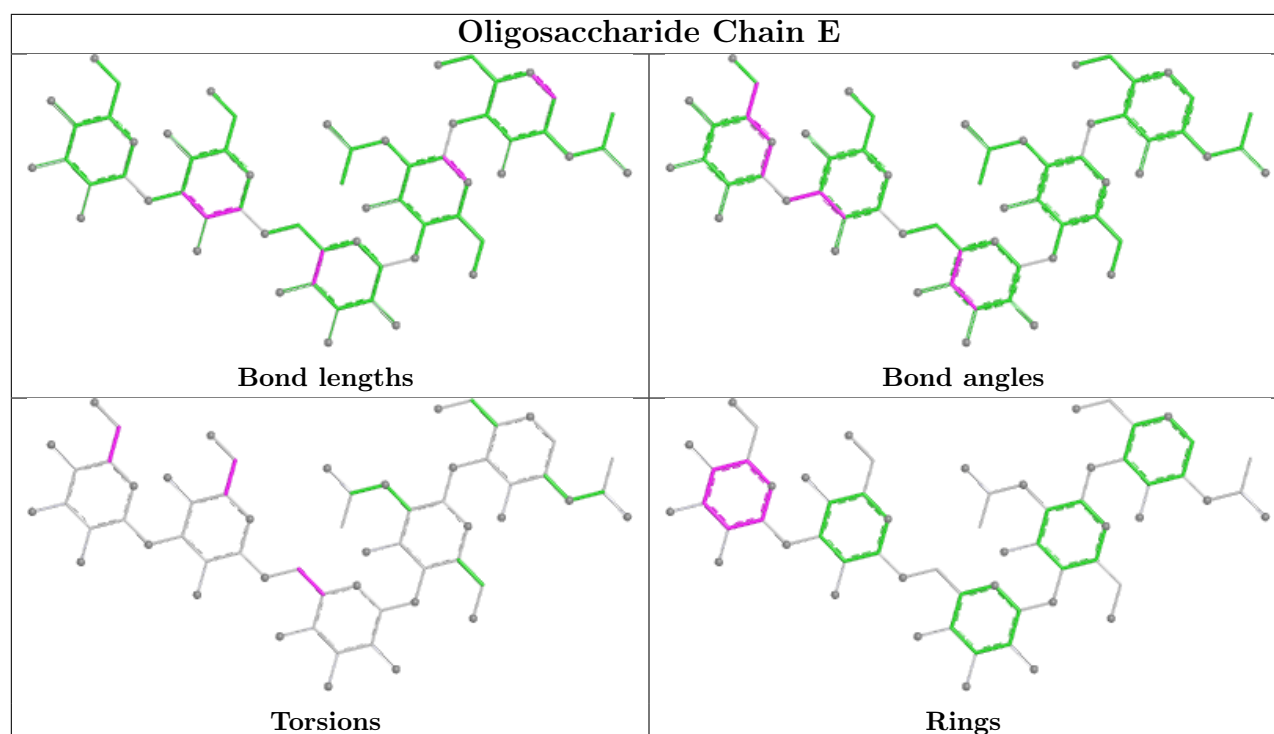
Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	F	1	NAG	2	0
4	E	3	BMA	1	0
3	D	1	NAG	1	0
2	C	1	NAG	1	0
3	F	2	NAG	1	0
4	E	5	MAN	2	0
4	E	4	MAN	3	0

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for oligosaccharide.









5.6 Ligand geometry [i](#)

Of 18 ligands modelled in this entry, 8 are monoatomic - leaving 10 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	$\# Z > 2$
7	GOL	B	707	-	5,5,5	0.90	0	5,5,5	1.15	0
7	GOL	B	708	-	5,5,5	0.88	0	5,5,5	1.12	0
6	OXY	B	705	5	1,1,1	0.07	0	-		
7	GOL	A	709	-	5,5,5	1.06	0	5,5,5	0.96	0
7	GOL	B	706	-	5,5,5	0.94	0	5,5,5	1.17	0
7	GOL	A	707	-	5,5,5	0.79	0	5,5,5	1.25	1 (20%)
7	GOL	B	709	-	5,5,5	1.01	0	5,5,5	1.18	1 (20%)
7	GOL	A	708	-	5,5,5	0.88	0	5,5,5	0.99	0
7	GOL	A	706	-	5,5,5	0.93	0	5,5,5	1.03	0
6	OXY	A	705	5	1,1,1	0.16	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
7	GOL	B	707	-	-	2/4/4/4	-
7	GOL	B	708	-	-	2/4/4/4	-
7	GOL	A	709	-	-	1/4/4/4	-
7	GOL	B	706	-	-	0/4/4/4	-
7	GOL	A	707	-	-	2/4/4/4	-
7	GOL	A	708	-	-	4/4/4/4	-
7	GOL	A	706	-	-	0/4/4/4	-
7	GOL	B	709	-	-	2/4/4/4	-

There are no bond length outliers.

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed($^{\circ}$)	Ideal($^{\circ}$)
7	A	707	GOL	C3-C2-C1	-2.28	103.45	111.80
7	B	709	GOL	C3-C2-C1	-2.08	104.15	111.80

There are no chirality outliers.

All (13) torsion outliers are listed below:

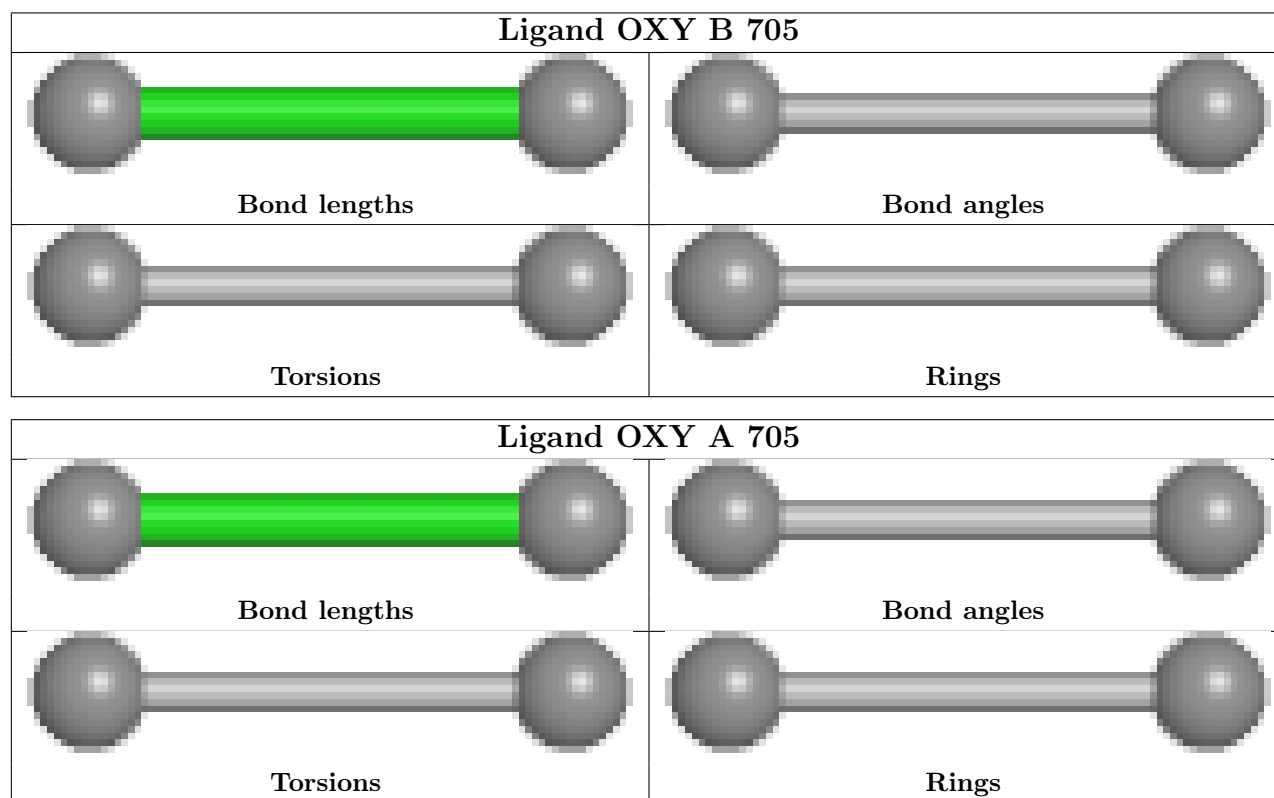
Mol	Chain	Res	Type	Atoms
7	A	708	GOL	O1-C1-C2-C3
7	A	708	GOL	C1-C2-C3-O3
7	A	708	GOL	O2-C2-C3-O3
7	B	707	GOL	C1-C2-C3-O3
7	A	707	GOL	C1-C2-C3-O3
7	B	708	GOL	C1-C2-C3-O3
7	A	708	GOL	O1-C1-C2-O2
7	A	707	GOL	O2-C2-C3-O3
7	B	707	GOL	O2-C2-C3-O3
7	B	709	GOL	O1-C1-C2-O2
7	A	709	GOL	O1-C1-C2-C3
7	B	708	GOL	O2-C2-C3-O3
7	B	709	GOL	O1-C1-C2-C3

There are no ring outliers.

4 monomers are involved in 6 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
7	B	708	GOL	1	0
7	B	706	GOL	1	0
7	A	707	GOL	2	0
7	A	708	GOL	2	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 ⓘ

There are no such residues in this entry.

5.8 Polymer linkage issues

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	533/534 (99%)	-1.42	0 100 100	21, 40, 58, 70	1 (0%)
1	B	533/534 (99%)	-1.44	0 100 100	18, 39, 56, 68	1 (0%)
All	All	1066/1068 (99%)	-1.43	0 100 100	18, 40, 57, 70	2 (0%)

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](#)

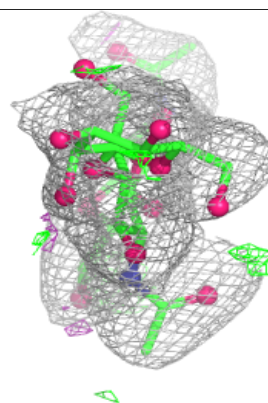
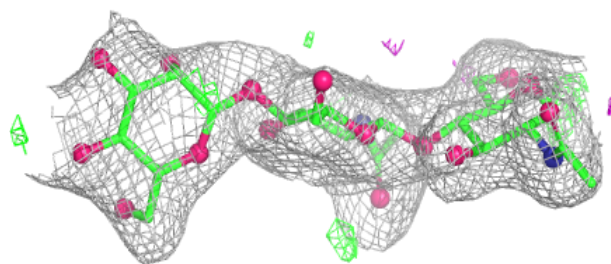
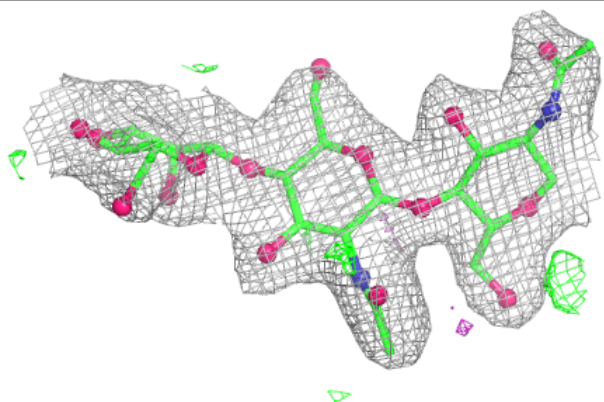
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled ‘Q< 0.9’ lists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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
2	BMA	C	3	11/12	0.98	0.04	61,67,70,75	0
3	NAG	D	1	14/15	0.98	0.05	42,55,62,65	0
3	NAG	D	2	14/15	0.98	0.05	56,60,64,68	0
3	NAG	F	2	14/15	0.98	0.04	44,51,59,60	0
4	BMA	E	3	11/12	0.98	0.03	62,66,69,70	0
4	MAN	E	5	11/12	0.98	0.04	53,62,67,69	0
2	NAG	C	2	14/15	0.99	0.03	38,50,62,63	0
4	NAG	E	1	14/15	0.99	0.02	33,38,44,44	0
4	NAG	E	2	14/15	0.99	0.04	32,42,48,60	0
2	NAG	C	1	14/15	0.99	0.03	31,40,43,44	0
4	MAN	E	4	11/12	0.99	0.04	55,61,66,67	0
3	NAG	F	1	14/15	0.99	0.03	39,46,50,54	0

The following is a graphical depiction of the model fit to experimental electron density for oligosaccharide. Each fit is shown from different orientation to approximate a three-dimensional view.

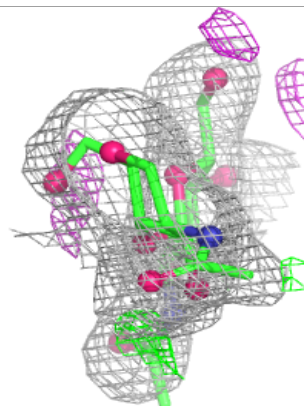
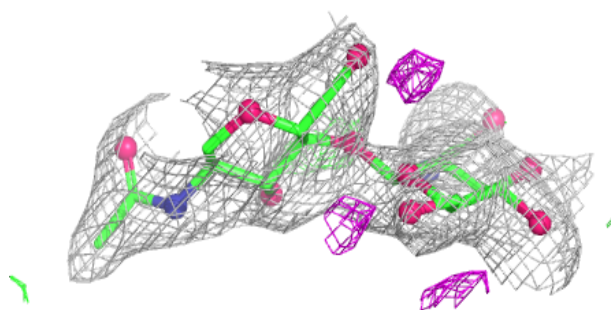
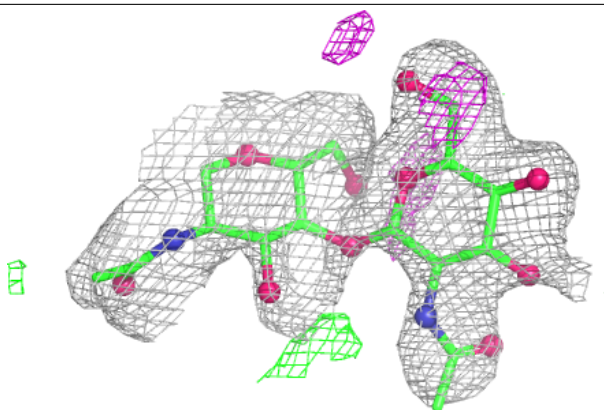
Electron density around Chain C:

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



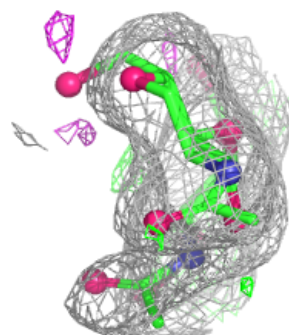
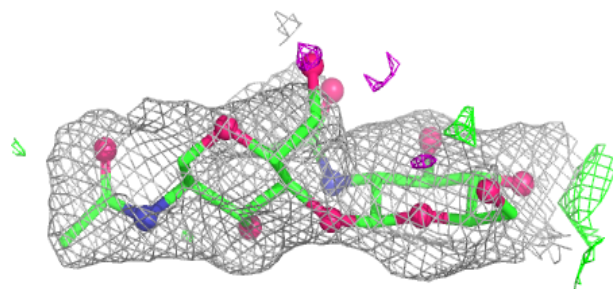
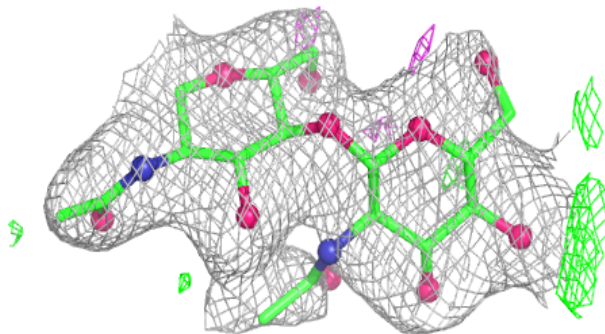
Electron density around Chain D:

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

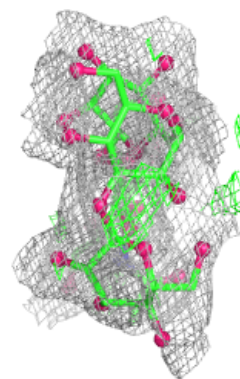
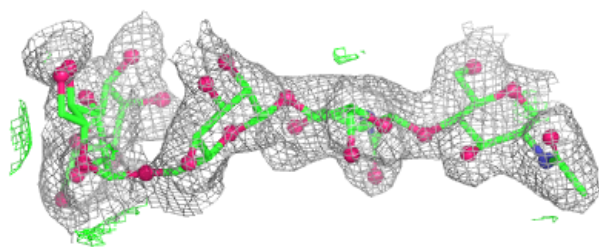
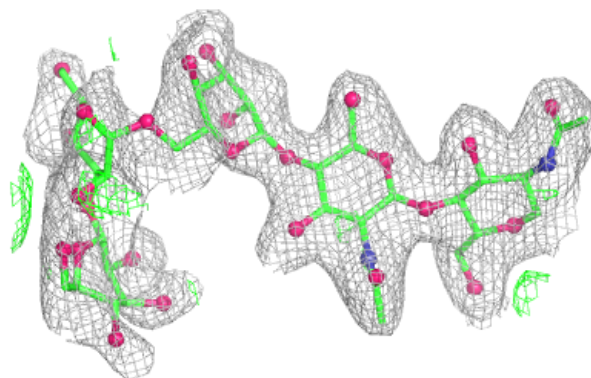


Electron density around Chain F:

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

**Electron density around Chain E:**

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



6.4 Ligands

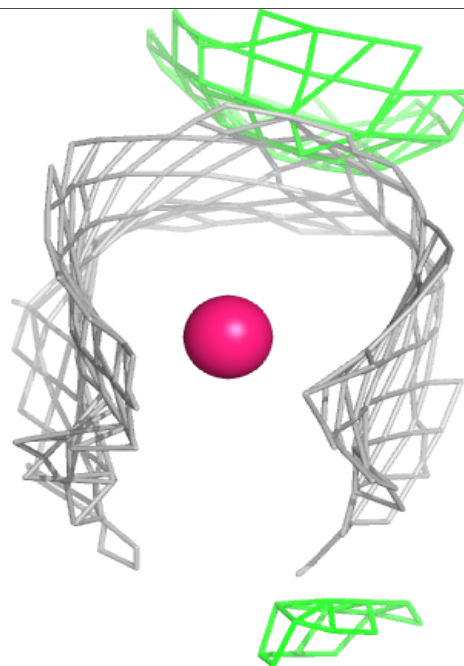
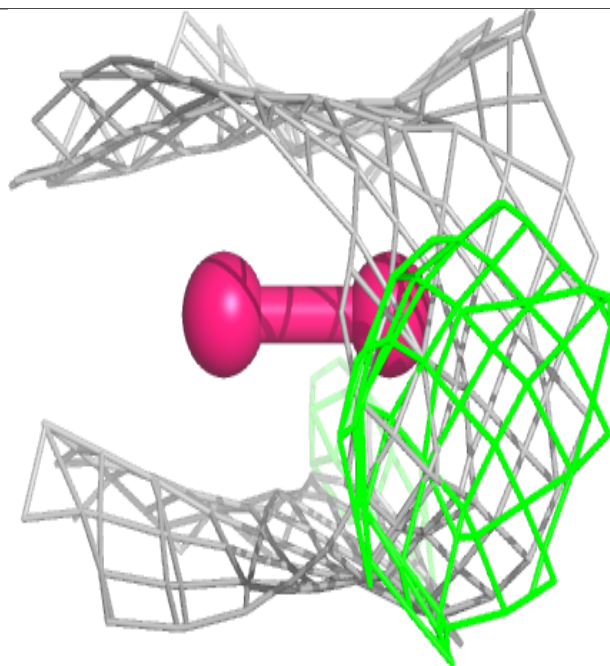
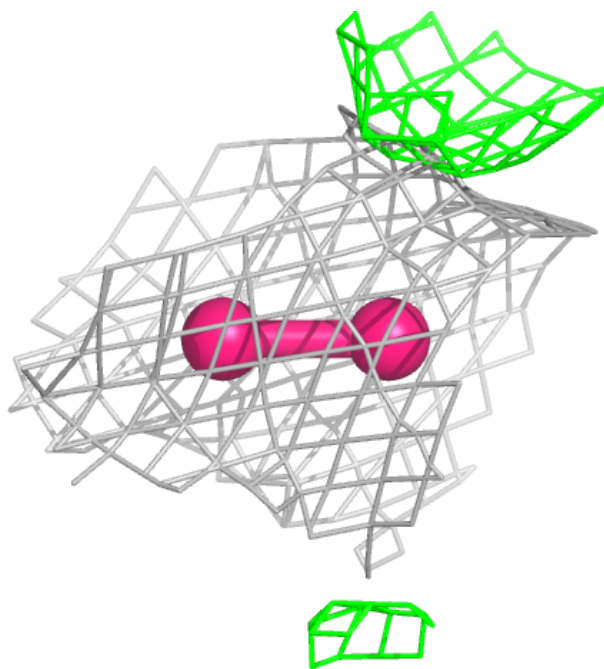
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
7	GOL	A	706	6/6	0.96	0.07	62,65,67,70	0
7	GOL	A	708	6/6	0.97	0.04	47,50,53,56	0
7	GOL	B	708	6/6	0.97	0.05	48,51,52,54	0
7	GOL	A	709	6/6	0.98	0.04	42,44,53,54	0
7	GOL	B	706	6/6	0.98	0.04	42,46,49,52	0
7	GOL	A	707	6/6	0.98	0.05	37,40,44,51	0
7	GOL	B	709	6/6	0.98	0.09	37,42,46,46	0
7	GOL	B	707	6/6	0.99	0.04	40,46,47,48	0
6	OXY	A	705	2/2	1.00	0.02	33,33,33,34	0
6	OXY	B	705	2/2	1.00	0.03	36,36,36,38	0
5	CU	A	701	1/1	1.00	0.01	37,37,37,37	0
5	CU	A	702	1/1	1.00	0.01	40,40,40,40	0
5	CU	A	703	1/1	1.00	0.01	47,47,47,47	0
5	CU	A	704	1/1	1.00	0.01	33,33,33,33	0
5	CU	B	701	1/1	1.00	0.01	35,35,35,35	0
5	CU	B	702	1/1	1.00	0.01	36,36,36,36	0
5	CU	B	703	1/1	1.00	0.01	40,40,40,40	0
5	CU	B	704	1/1	1.00	0.01	32,32,32,32	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.

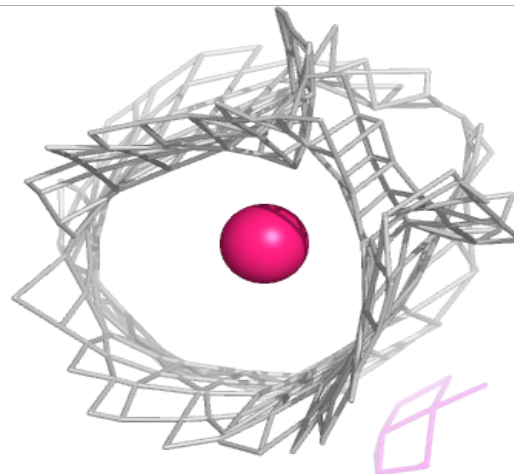
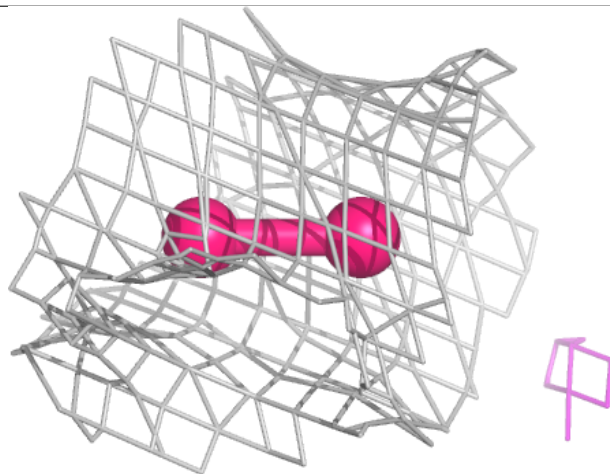
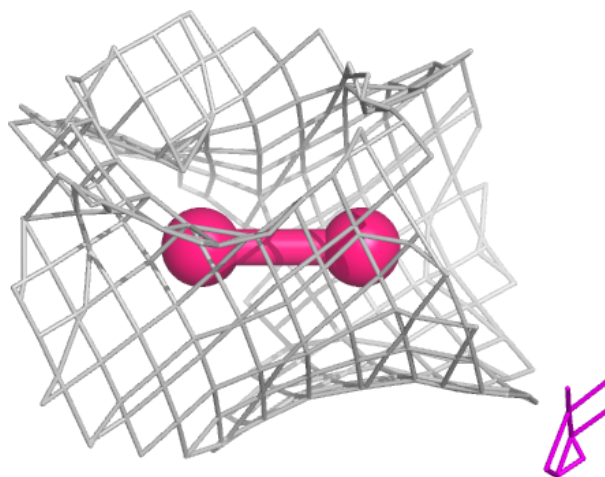
Electron density around OXY A 705:

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



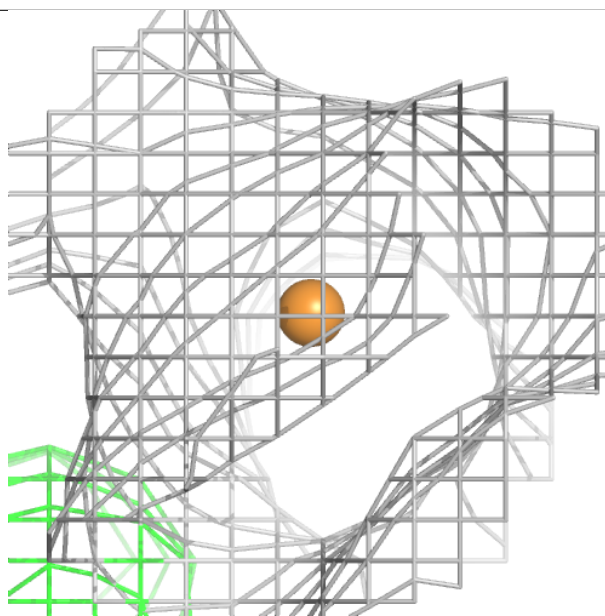
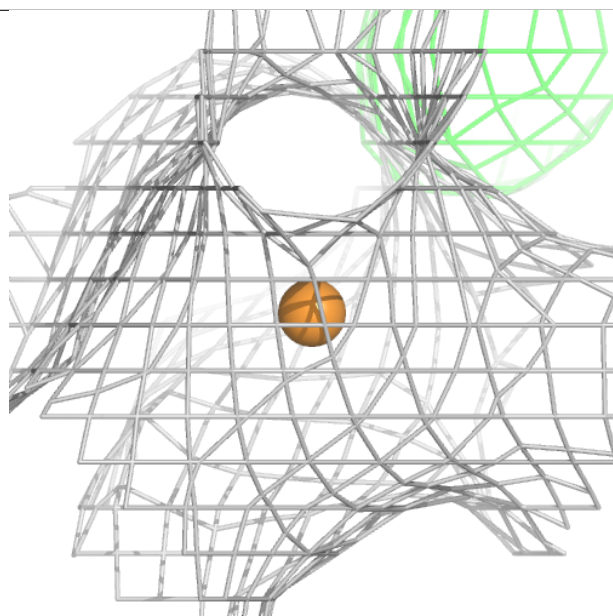
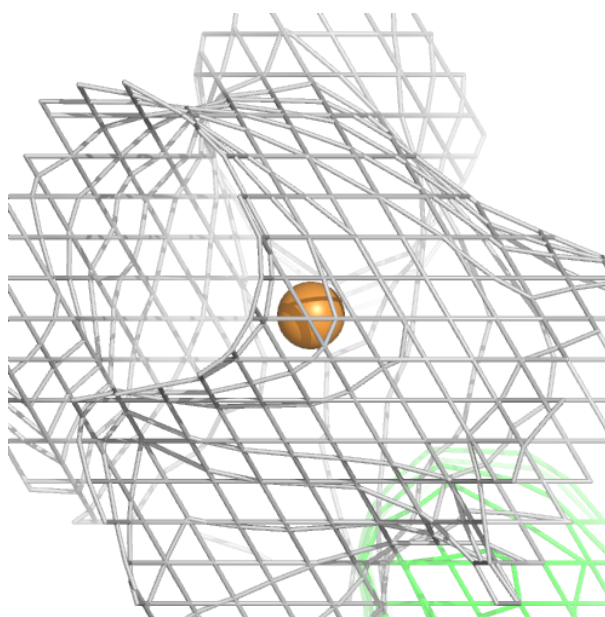
Electron density around OXY B 705:

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



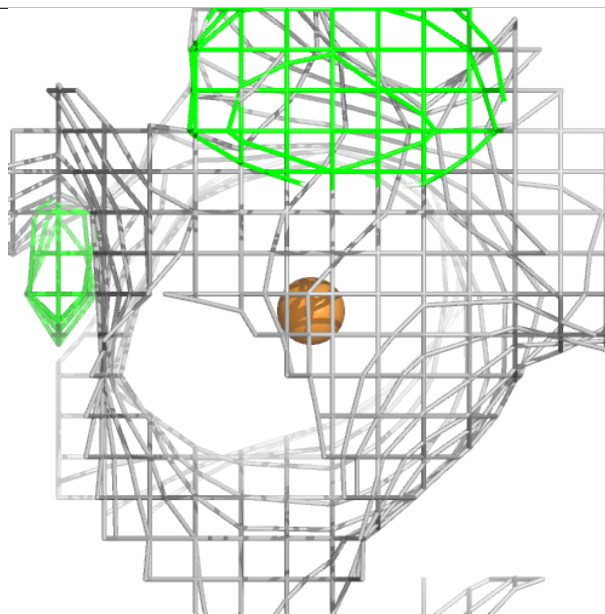
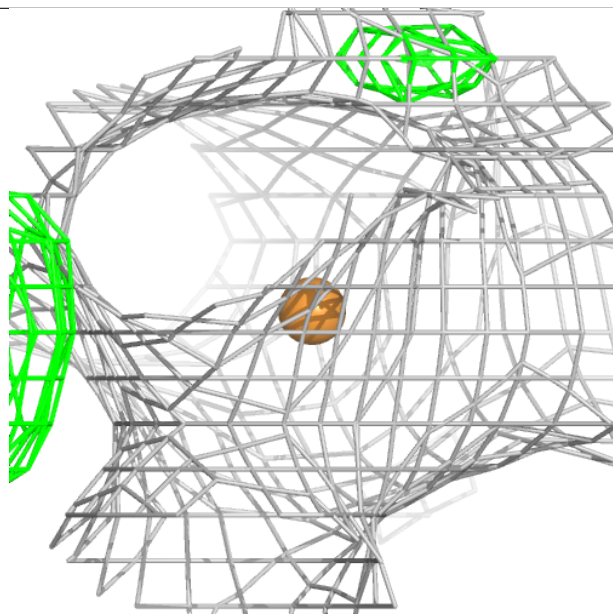
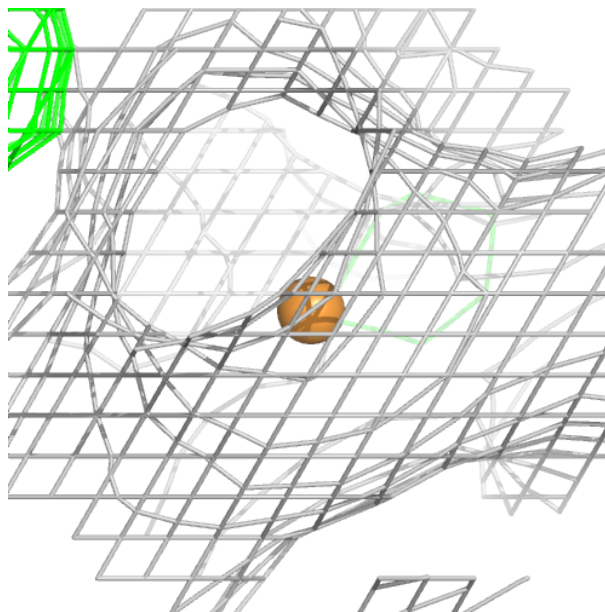
Electron density around CU A 701:

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



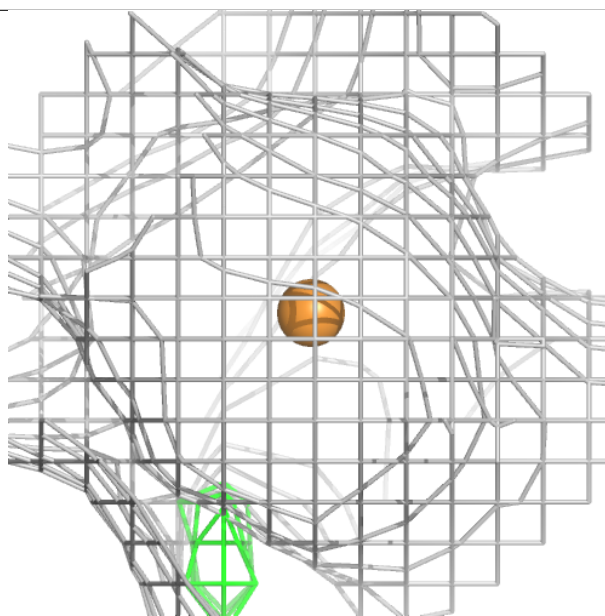
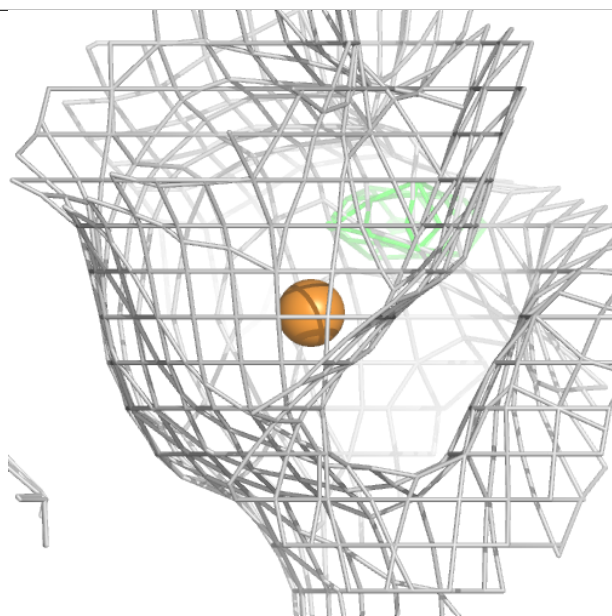
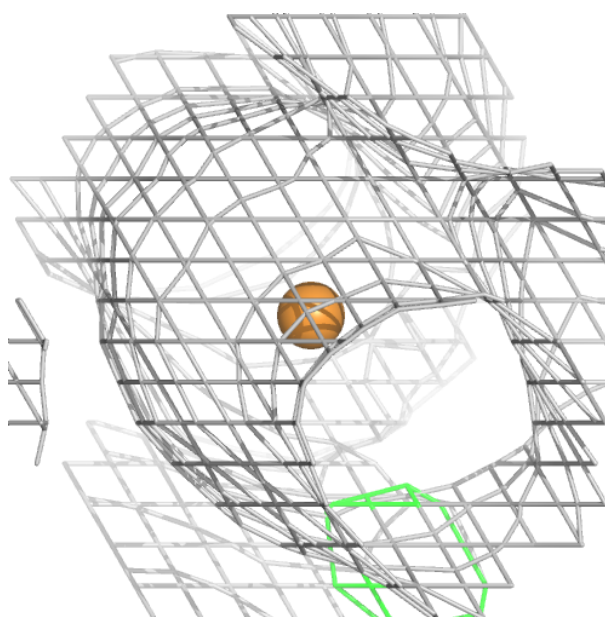
Electron density around CU A 702:

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



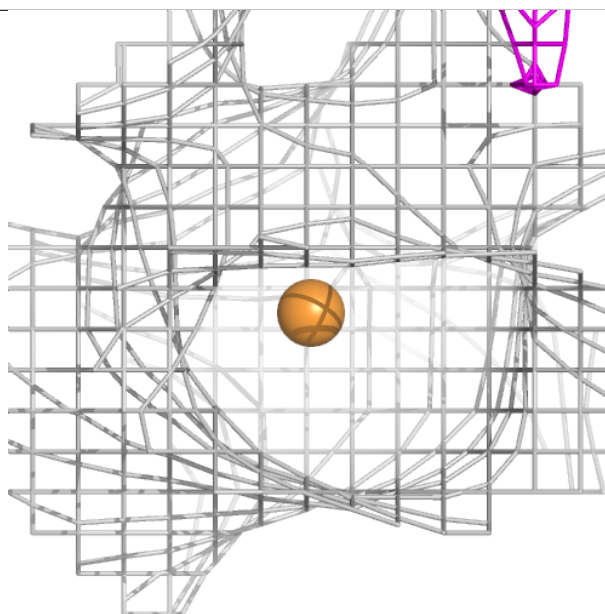
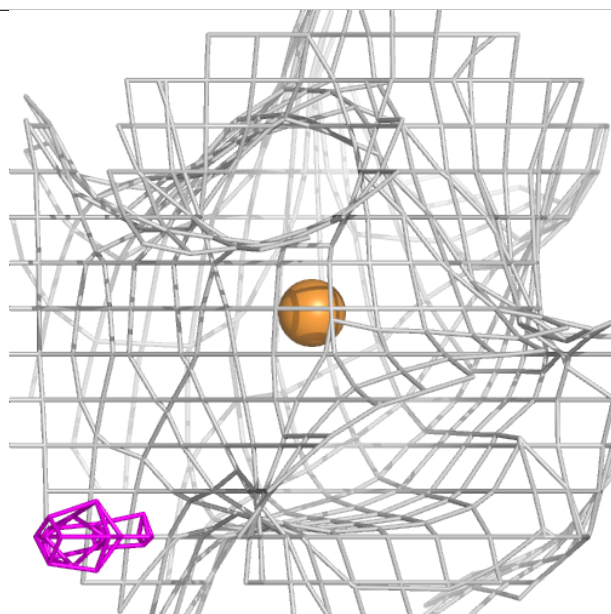
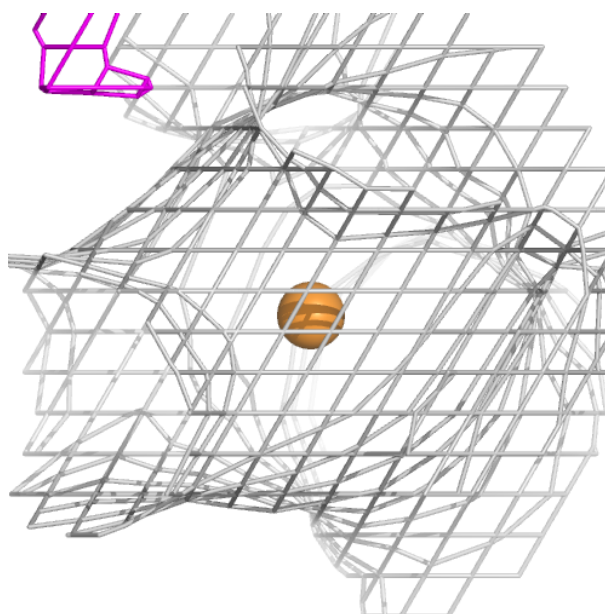
Electron density around CU A 703:

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



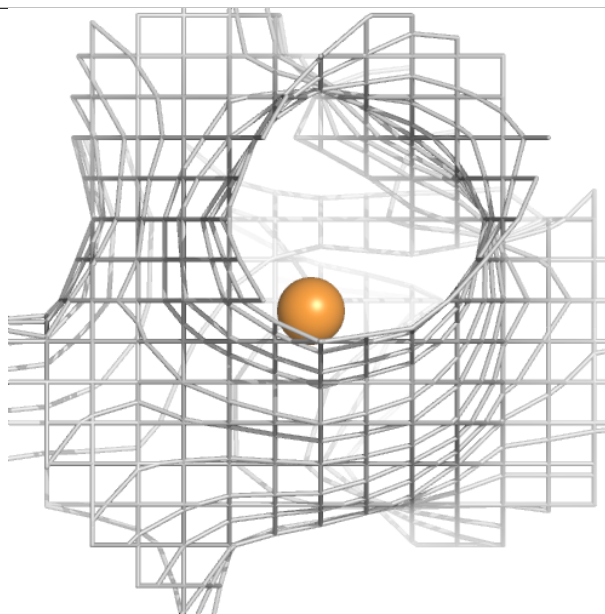
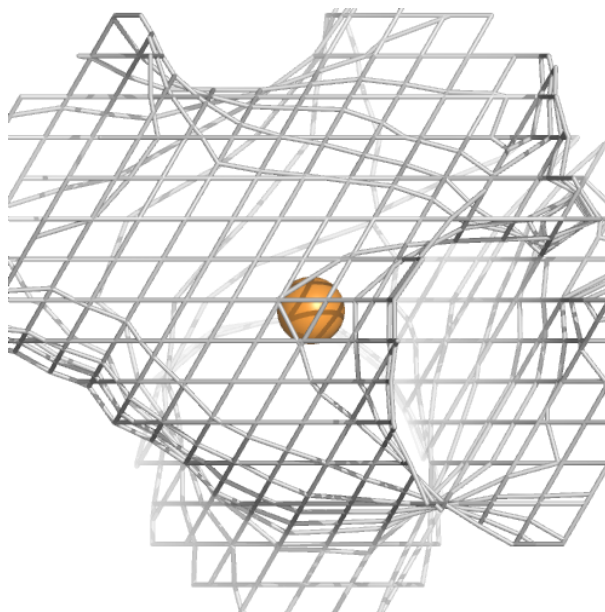
Electron density around CU A 704:

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



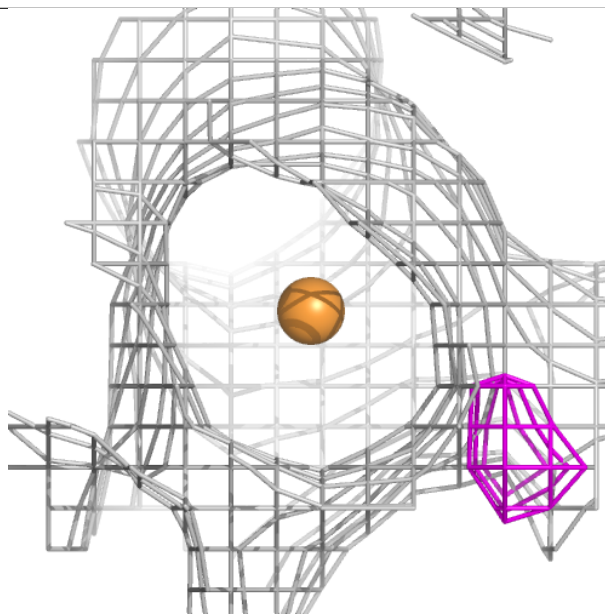
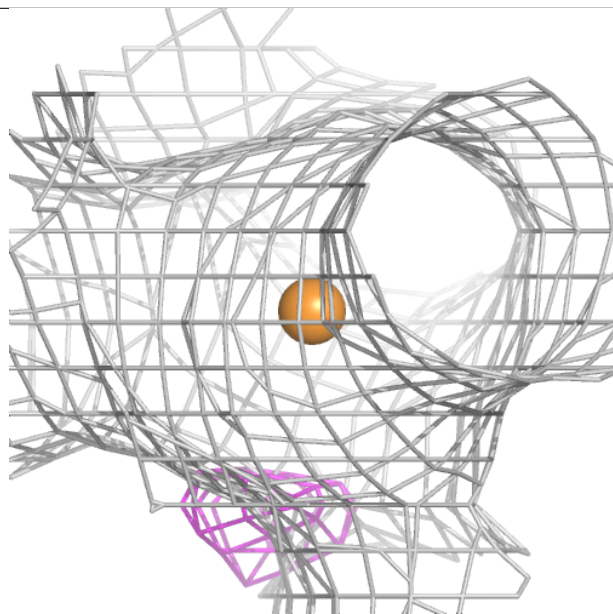
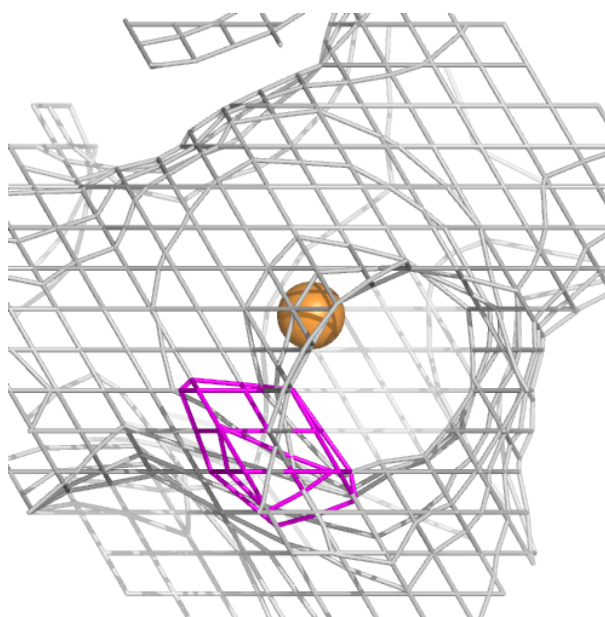
Electron density around CU B 701:

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



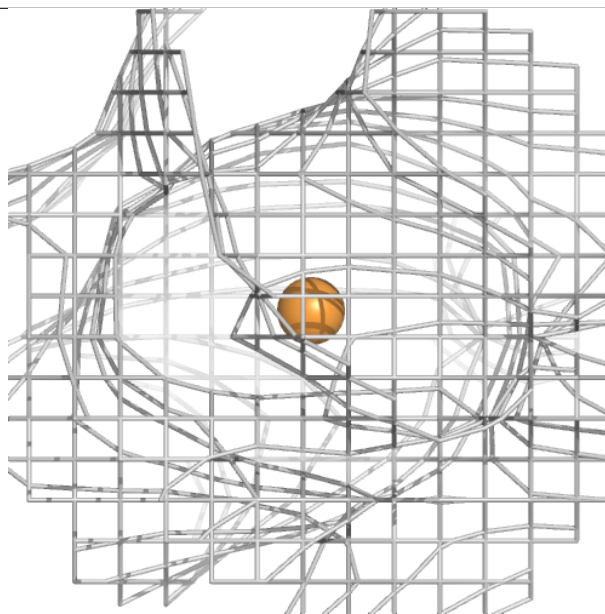
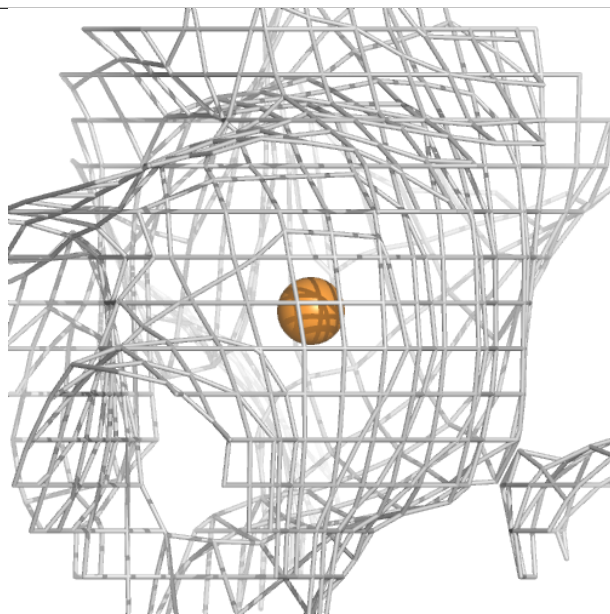
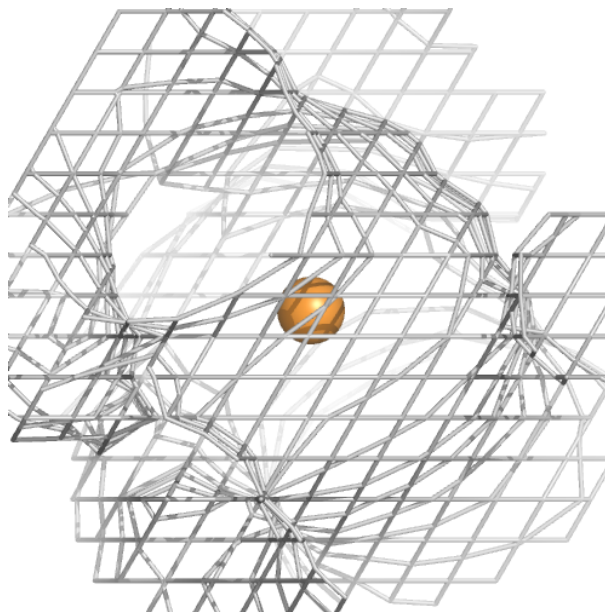
Electron density around CU B 702:

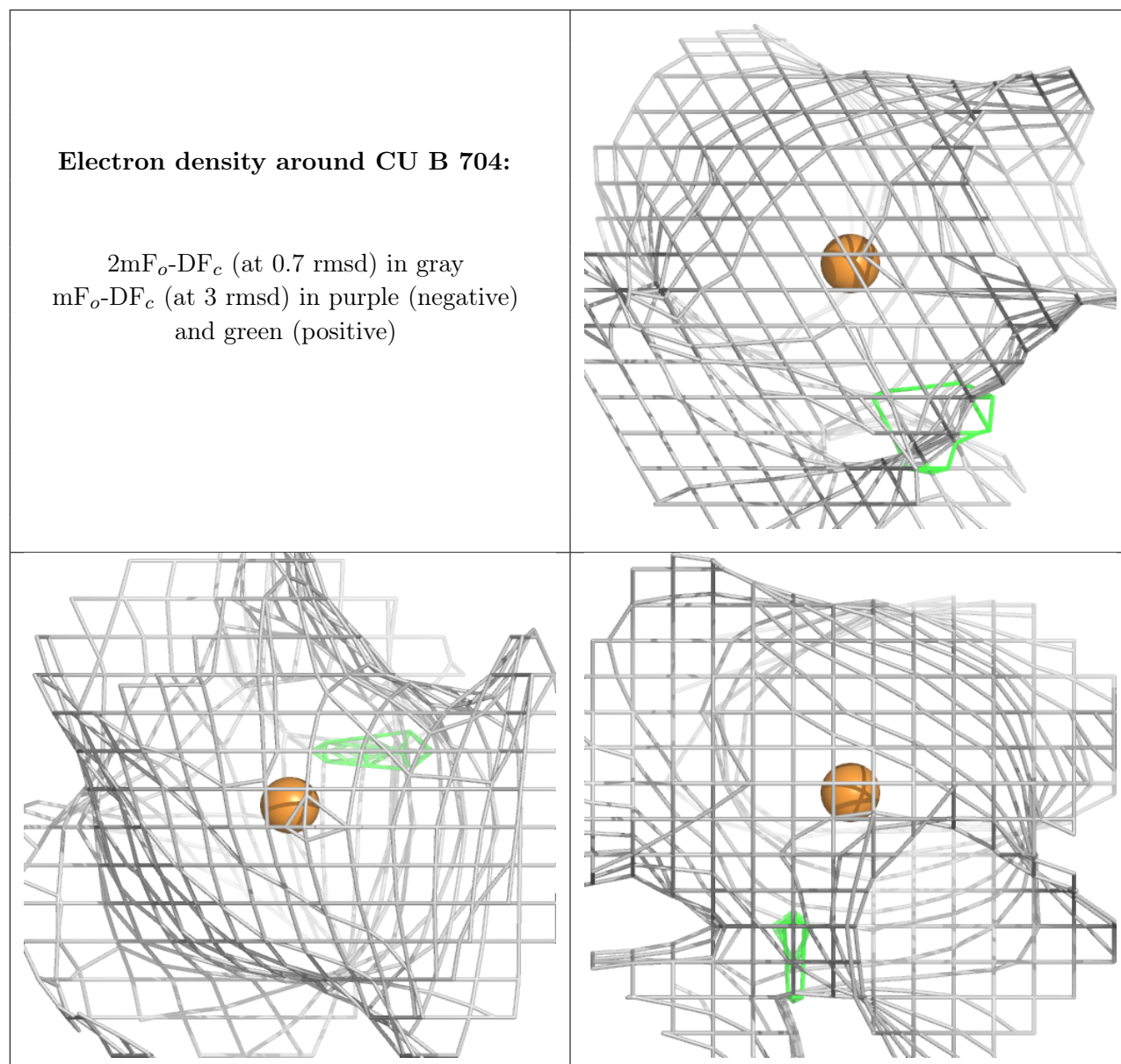
$2mF_o-DF_c$ (at 0.7 rmsd) in gray
 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)



Electron density around CU B 703:

$2mF_o-DF_c$ (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.