Full wwPDB X-ray Structure Validation Report (i)

Oct 17, 2023 – 09:04 PM EDT

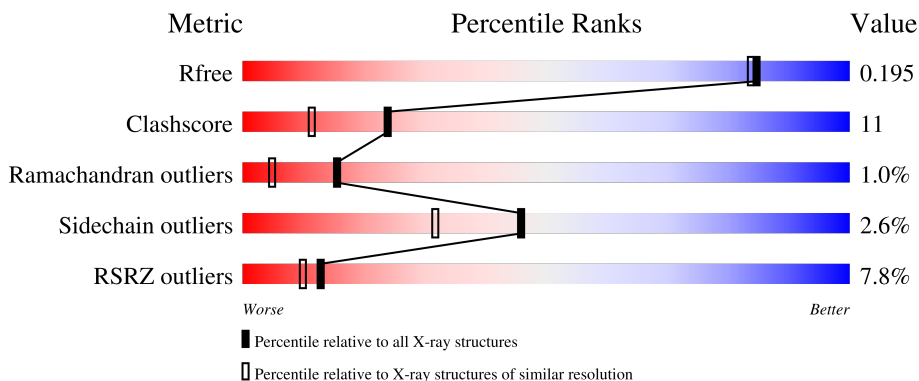|		
PDB ID	:	1V84
Title	:	Crystal structure of human GlcAT-P in complex with N-acetyllactosamine, Udp, and Mn2+
Authors	:	Kakuda, S.; Shiba, T.; Ishiguro, M.; Tagawa, H.; Oka, S.; Kajihara, Y.; Kawasaki, T.; Wakatsuki, S.; Kato, R.
Deposited on	:	2003-12-27
Resolution	:	1.82 Å(reported)

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 1.82 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	Percentile Ranks	Value
Rfree		0.195
Clashscore		11
Ramachandran outliers		1.0%
Sidechain outliers		2.6%
RSRZ outliers		7.8%

Worse   *Better*

▮ Percentile relative to all X-ray structures

▯ Percentile relative to X-ray structures of similar resolution

Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	130704	7484 (1.84-1.80)
Clashscore	141614	8401 (1.84-1.80)
Ramachandran outliers	138981	8290 (1.84-1.80)
Sidechain outliers	138945	8290 (1.84-1.80)
RSRZ outliers	127900	7371 (1.84-1.80)

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 <=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	253	7% / 75% 20% · ·
1	B	253	8% / 75% 19% · ·
2	C	2	100%
3	D	2	100%

2 Entry composition ⓘ

There are 7 unique types of molecules in this entry. The entry contains 4418 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 Galactosylgalactosylxylosylprotein 3-beta-glucuronosyltransferase 1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	245	Total	C	N	O	S	0	0	0
			1984	1266	365	348	5			
1	B	243	Total	C	N	O	S	0	0	0
			1960	1248	362	345	5			

There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	82	ALA	-	cloning artifact	UNP Q9P2W7
B	82	ALA	-	cloning artifact	UNP Q9P2W7

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

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
2	C	2	Total	C	N	O	0	0	0
			26	14	1	11			

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

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
3	D	2	Total 26	C 14	N 1	O 11	0	0	0

- Molecule 4 is MANGANESE (II) ION (three-letter code: MN) (formula: Mn).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	1	Total 1	Mn 1	0	0
4	B	1	Total 1	Mn 1	0	0

- Molecule 5 is L(+)-TARTARIC ACID (three-letter code: TLA) (formula: $C_4H_6O_6$).
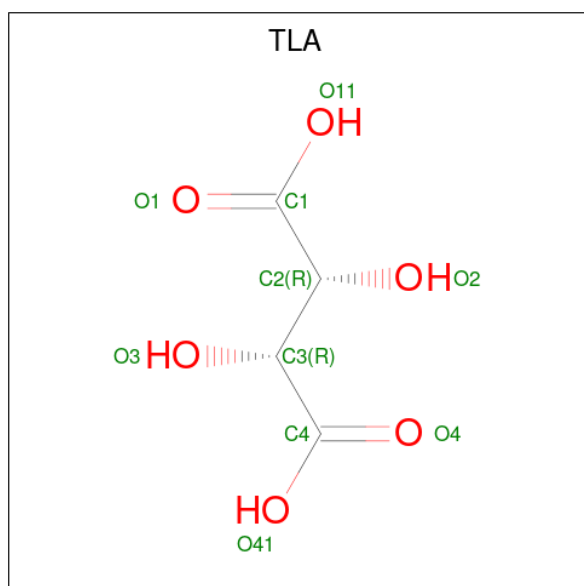
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
5	A	1	Total 10	C 4	O 6	0	0

- Molecule 6 is URIDINE-5'-DIPHOSPHATE (three-letter code: UDP) (formula: $C_9H_{14}N_2O_{12}P_2$).

UDP
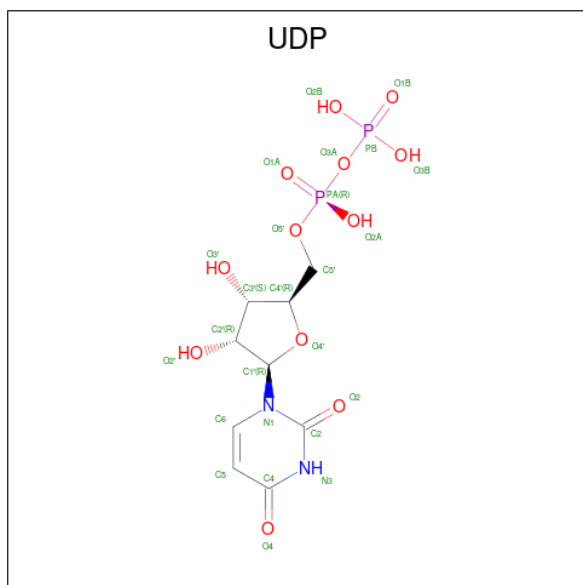
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
6	A	1	Total	C	N	O	P	0	0
			25	9	2	12	2		
6	B	1	Total	C	N	O	P	0	0
			25	9	2	12	2		

• Molecule 7 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
7	A	156	Total	O	0	0
			156	156		
7	B	204	Total	O	0	0
			204	204		

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 consecutiv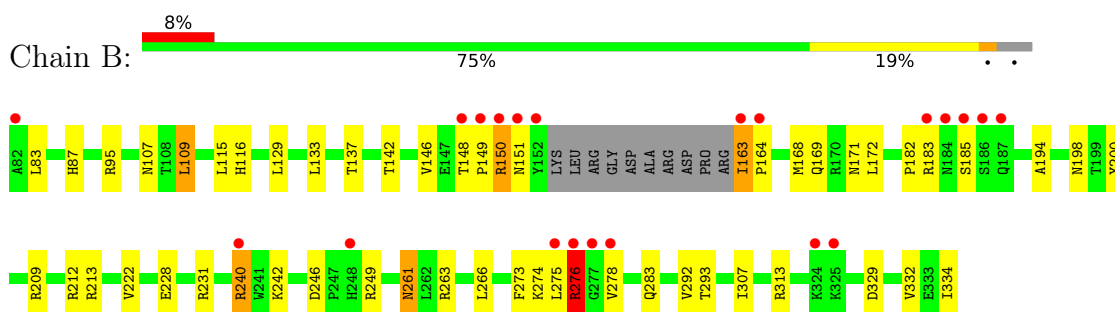e residues without any outlier are shown as a green connector. Residues present in the sample, but not in the model, are shown in grey.
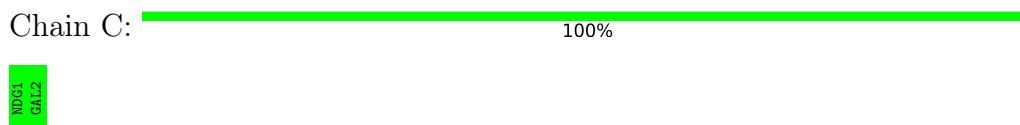
- Molecule 1: Galactosylgalactosylxylosylprotein 3-beta-glucuronosyltransferase 1
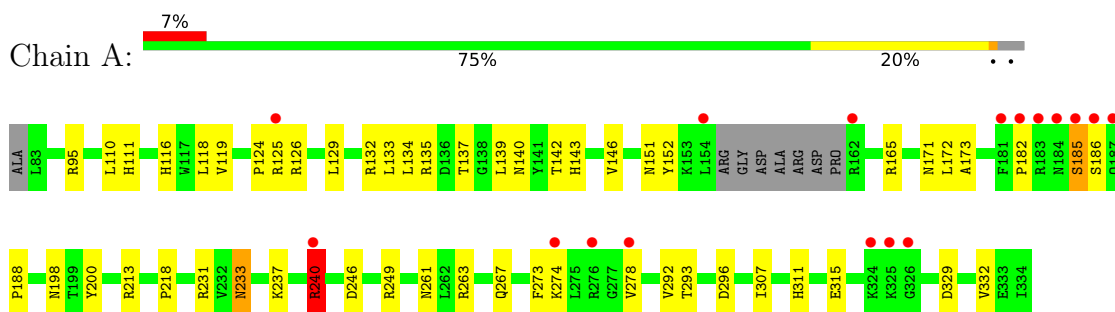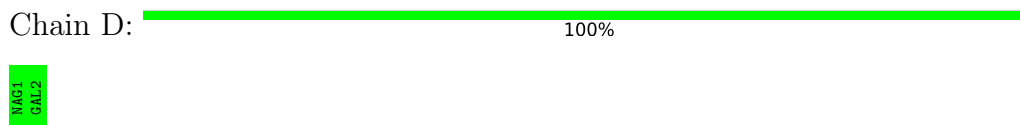

Chain A:

- Molecule 1: Galactosylgalactosylxylosylprotein 3-beta-glucuronosyltransferase 1

Chain B:

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

Chain C:

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

Chain D:

4 Data and refinement statistics ⓘ

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α, β, γ	61.31Å 85.78Å 122.77Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	40.00 – 1.82 42.89 – 1.82	Depositor EDS
% Data completeness (in resolution range)	97.1 (40.00-1.82) 97.1 (42.89-1.82)	Depositor EDS
R_{merge}	0.07	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	3.15 (at 1.82Å)	Xtriage
Refinement program	CNS	Depositor
R, R_{free}	0.205 , 0.244 0.199 , 0.195	Depositor DCC
R_{free} test set	2892 reflections (5.07%)	wwPDB-VP
Wilson B-factor (Å^2)	19.2	Xtriage
Anisotropy	0.864	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.38 , 46.3	EDS
L-test for twinning[2]	$< |L| > = 0.50, < L^2 > = 0.33$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.95	EDS
Total number of atoms	4418	wwPDB-VP
Average B, all atoms (Å^2)	23.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.12% of the height of the origin peak. No significant pseudotranslation is detected.*

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[1]Intensities estimated from amplitudes.
[2]Theoretical values of $< |L| >$, $< L^2 >$ 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: NAG, GAL, TLA, MN, UDP, NDG

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	0.32	0/2033	0.57	0/2764
1	B	0.31	0/2008	0.56	0/2731
All	All	0.32	0/4041	0.57	0/5495

There are no bond length outliers.

There are no bond angle outliers.

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	1984	0	2012	51	0
1	B	1960	0	1984	42	0
2	C	26	0	21	0	0
3	D	26	0	24	0	0
4	A	1	0	0	0	0
4	B	1	0	0	0	0
5	A	10	0	4	0	0
6	A	25	0	11	2	0
6	B	25	0	11	0	0
7	A	156	0	0	4	0
7	B	204	0	0	3	0
All	All	4418	0	4067	90	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 11.

All (90) 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:274:LYS:HD2	1:A:278:VAL:HG13	1.38	0.99
1:A:171:ASN:HD21	1:A:273:PHE:H	1.28	0.79
1:B:171:ASN:HD21	1:B:273:PHE:H	1.33	0.76
1:B:212:ARG:HD2	7:B:610:HOH:O	1.85	0.75
1:A:261:ASN:ND2	1:A:263:ARG:HB3	2.02	0.73
1:B:261:ASN:HD22	1:B:263:ARG:H	1.34	0.73
1:B:150:ARG:HD3	1:B:150:ARG:H	1.54	0.72
1:A:133:LEU:O	1:A:137:THR:HG23	1.95	0.67
1:B:149:PRO:HD3	1:B:168:MET:SD	2.37	0.65
1:A:231:ARG:NH2	1:A:240:ARG:CB	2.61	0.64
1:A:118:LEU:HD23	1:A:173:ALA:HB1	1.80	0.64
1:B:150:ARG:HD3	1:B:150:ARG:N	2.11	0.64
1:A:274:LYS:HD2	1:A:278:VAL:CG1	2.22	0.62
1:A:218:PRO:HB2	1:A:307:ILE:HD13	1.81	0.62
1:A:261:ASN:HD21	1:A:263:ARG:HB3	1.63	0.62
1:B:275:LEU:H	1:B:275:LEU:HD23	1.66	0.60
1:A:233:ASN:C	1:A:233:ASN:HD22	2.05	0.60
1:A:292:VAL:HG22	1:A:296:ASP:HB2	1.85	0.59
1:B:261:ASN:ND2	1:B:263:ARG:H	2.00	0.59
1:A:111:HIS:HE1	1:B:107:ASN:O	1.85	0.59
1:A:146:VAL:HB	1:A:172:LEU:HD22	1.85	0.58
1:A:315:GLU:HB2	1:B:313:ARG:HB2	1.84	0.58
1:A:292:VAL:HG22	1:A:293:THR:H	1.70	0.57
1:A:118:LEU:HD12	1:A:142:THR:HB	1.87	0.56
1:A:274:LYS:CD	1:A:278:VAL:HG13	2.26	0.55
1:B:246:ASP:O	1:B:249:ARG:HG2	2.05	0.55
1:A:307:ILE:HG13	1:B:334:ILE:HG22	1.88	0.54
1:A:274:LYS:HB2	7:A:602:HOH:O	2.07	0.54
1:A:132:ARG:HD2	7:A:634:HOH:O	2.06	0.54
1:A:263:ARG:O	1:A:267:GLN:HG3	2.10	0.52
1:B:148:THR:HG23	1:B:149:PRO:HD2	1.93	0.51
1:A:116:HIS:HE1	1:A:142:THR:OG1	1.94	0.50
1:A:182:PRO:HG2	1:A:185:SER:HB2	1.93	0.49
1:A:198:ASN:ND2	1:A:311:HIS:HA	2.28	0.49
1:B:169:GLN:NE2	1:B:169:GLN:H	2.09	0.49
1:B:213:ARG:HD2	7:B:611:HOH:O	2.12	0.49
1:B:146:VAL:HB	1:B:172:LEU:HD22	1.95	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:87:HIS:ND1	1:B:116:HIS:HD2	2.11	0.48
1:B:292:VAL:HG22	1:B:293:THR:N	2.29	0.48
1:B:116:HIS:HE1	1:B:142:THR:OG1	1.97	0.48
1:B:275:LEU:HD23	1:B:275:LEU:N	2.28	0.48
1:B:133:LEU:O	1:B:137:THR:HG23	2.14	0.47
1:A:292:VAL:CG2	1:A:296:ASP:HB2	2.44	0.47
1:A:231:ARG:NH2	1:A:240:ARG:HB3	2.30	0.47
1:A:110:LEU:HA	1:A:139:LEU:HD21	1.96	0.47
1:B:240:ARG:HH11	1:B:240:ARG:HG2	1.80	0.47
1:B:182:PRO:HG2	1:B:185:SER:HB3	1.97	0.46
1:A:292:VAL:HG22	1:A:293:THR:N	2.29	0.46
1:A:292:VAL:HG23	7:A:606:HOH:O	2.15	0.46
1:A:171:ASN:HD21	1:A:273:PHE:N	2.07	0.46
1:A:165:ARG:HB2	6:A:503:UDP:H5'2	1.98	0.46
1:A:233:ASN:ND2	1:A:237:LYS:H	2.13	0.46
1:A:274:LYS:HE3	7:A:602:HOH:O	2.17	0.45
1:A:129:LEU:HD23	1:A:129:LEU:C	2.36	0.45
1:A:233:ASN:C	1:A:233:ASN:ND2	2.70	0.45
1:A:116:HIS:CE1	1:A:142:THR:OG1	2.70	0.45
1:A:329:ASP:HB3	1:A:332:VAL:HG23	1.99	0.45
1:B:329:ASP:HB3	1:B:332:VAL:HG23	1.98	0.44
1:B:129:LEU:C	1:B:129:LEU:HD23	2.37	0.44
1:A:119:VAL:HG21	1:A:134:LEU:HD21	2.00	0.44
1:A:240:ARG:HG2	1:A:240:ARG:HH21	1.83	0.44
1:B:274:LYS:C	1:B:278:VAL:HG21	2.39	0.44
1:A:231:ARG:NH2	1:A:240:ARG:HB2	2.32	0.43
1:B:198:ASN:HB2	1:B:200:TYR:CZ	2.52	0.43
1:A:151:ASN:HD22	1:A:152:TYR:HD2	1.66	0.43
1:B:249:ARG:HG2	1:B:249:ARG:H	1.61	0.43
1:A:132:ARG:HG3	1:A:135:ARG:NH1	2.34	0.43
1:A:240:ARG:HG2	1:A:240:ARG:NH2	2.33	0.43
1:A:126:ARG:HB3	1:A:143:HIS:CE1	2.54	0.43
1:B:275:LEU:HG	1:B:276:ARG:HE	1.84	0.43
1:B:148:THR:CG2	1:B:149:PRO:HD2	2.49	0.42
1:A:198:ASN:HB2	1:A:200:TYR:CZ	2.55	0.42
1:B:283:GLN:NE2	7:B:525:HOH:O	2.52	0.42
1:B:109:LEU:HG	1:B:115:LEU:HD11	2.02	0.42
1:B:183:ARG:HA	1:B:266:LEU:HB3	2.02	0.42
1:A:124:PRO:O	1:A:125:ARG:HG2	2.20	0.41
1:B:231:ARG:HA	1:B:242:LYS:NZ	2.34	0.41
1:B:307:ILE:HD12	1:B:307:ILE:N	2.36	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:246:ASP:O	1:A:249:ARG:HG2	2.20	0.41
1:B:133:LEU:C	1:B:133:LEU:HD23	2.41	0.41
1:A:165:ARG:HE	6:A:503:UDP:H5	1.69	0.41
1:B:116:HIS:CE1	1:B:142:THR:OG1	2.73	0.41
1:B:163:ILE:HD13	1:B:163:ILE:HG21	1.91	0.41
1:B:274:LYS:O	1:B:278:VAL:HG21	2.20	0.41
1:A:186:SER:O	1:A:188:PRO:HD3	2.21	0.40
1:B:194:ALA:HB1	1:B:200:TYR:CZ	2.57	0.40
1:A:133:LEU:HD23	1:A:133:LEU:C	2.42	0.40
1:A:213:ARG:HD2	1:A:296:ASP:HB3	2.03	0.40
1:B:222:VAL:HG23	1:B:228:GLU:HG3	2.02	0.40
1:B:83:LEU:HG	1:B:209:ARG:HD3	2.04	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	241/253 (95%)	234 (97%)	5 (2%)	2 (1%)	19	7
1	B	239/253 (94%)	224 (94%)	12 (5%)	3 (1%)	12	3
All	All	480/506 (95%)	458 (95%)	17 (4%)	5 (1%)	15	5

All (5) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	164	PRO
1	B	276	ARG
1	A	185	SER
1	A	240	ARG
1	B	240	ARG

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	216/222 (97%)	212 (98%)	4 (2%)	57	45
1	B	213/222 (96%)	206 (97%)	7 (3%)	38	23
All	All	429/444 (97%)	418 (97%)	11 (3%)	46	32

All (11) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	95	ARG
1	A	140	ASN
1	A	233	ASN
1	A	240	ARG
1	B	95	ARG
1	B	109	LEU
1	B	150	ARG
1	B	151	ASN
1	B	163	ILE
1	B	261	ASN
1	B	276	ARG

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (22) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	107	ASN
1	A	111	HIS
1	A	116	HIS
1	A	140	ASN
1	A	151	ASN
1	A	171	ASN
1	A	187	GLN
1	A	198	ASN
1	A	233	ASN
1	A	261	ASN
1	A	283	GLN

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Mol	Chain	Res	Type
1	B	107	ASN
1	B	114	ASN
1	B	116	HIS
1	B	151	ASN
1	B	169	GLN
1	B	171	ASN
1	B	187	GLN
1	B	198	ASN
1	B	261	ASN
1	B	267	GLN
1	B	283	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 ⓘ

4 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	NDG	C	1	2	15,15,15	0.41	0	21,21,21	0.59	0
2	GAL	C	2	2	11,11,12	0.47	0	15,15,17	0.49	0
3	NAG	D	1	3	15,15,15	0.46	0	21,21,21	0.61	0
3	GAL	D	2	3	11,11,12	0.42	0	15,15,17	0.48	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	NDG	C	1	2	-	0/6/26/26	0/1/1/1
2	GAL	C	2	2	-	1/2/19/22	0/1/1/1
3	NAG	D	1	3	-	2/6/26/26	0/1/1/1
3	GAL	D	2	3	-	1/2/19/22	0/1/1/1

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (4) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	D	1	NAG	C4-C5-C6-O6
3	D	2	GAL	O5-C5-C6-O6
2	C	2	GAL	O5-C5-C6-O6
3	D	1	NAG	O5-C5-C6-O6

There are no ring outliers.

No monomer is involved in short contacts.

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

Oligosaccharide Chain C

Bond lengths

Bond angles

Torsions

Rings

Oligosaccharide Chain D

Bond lengths

Bond angles

Torsions

Rings
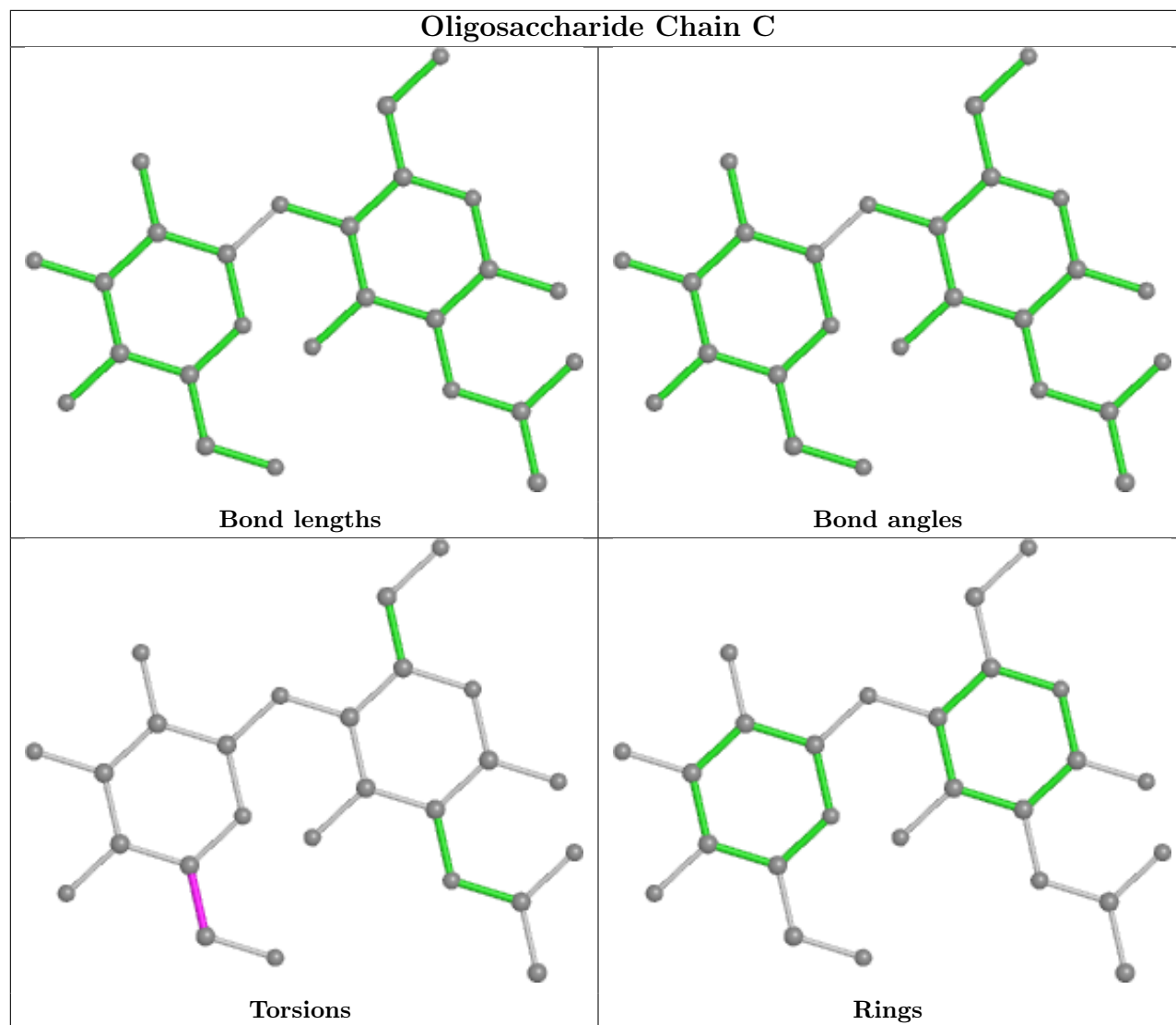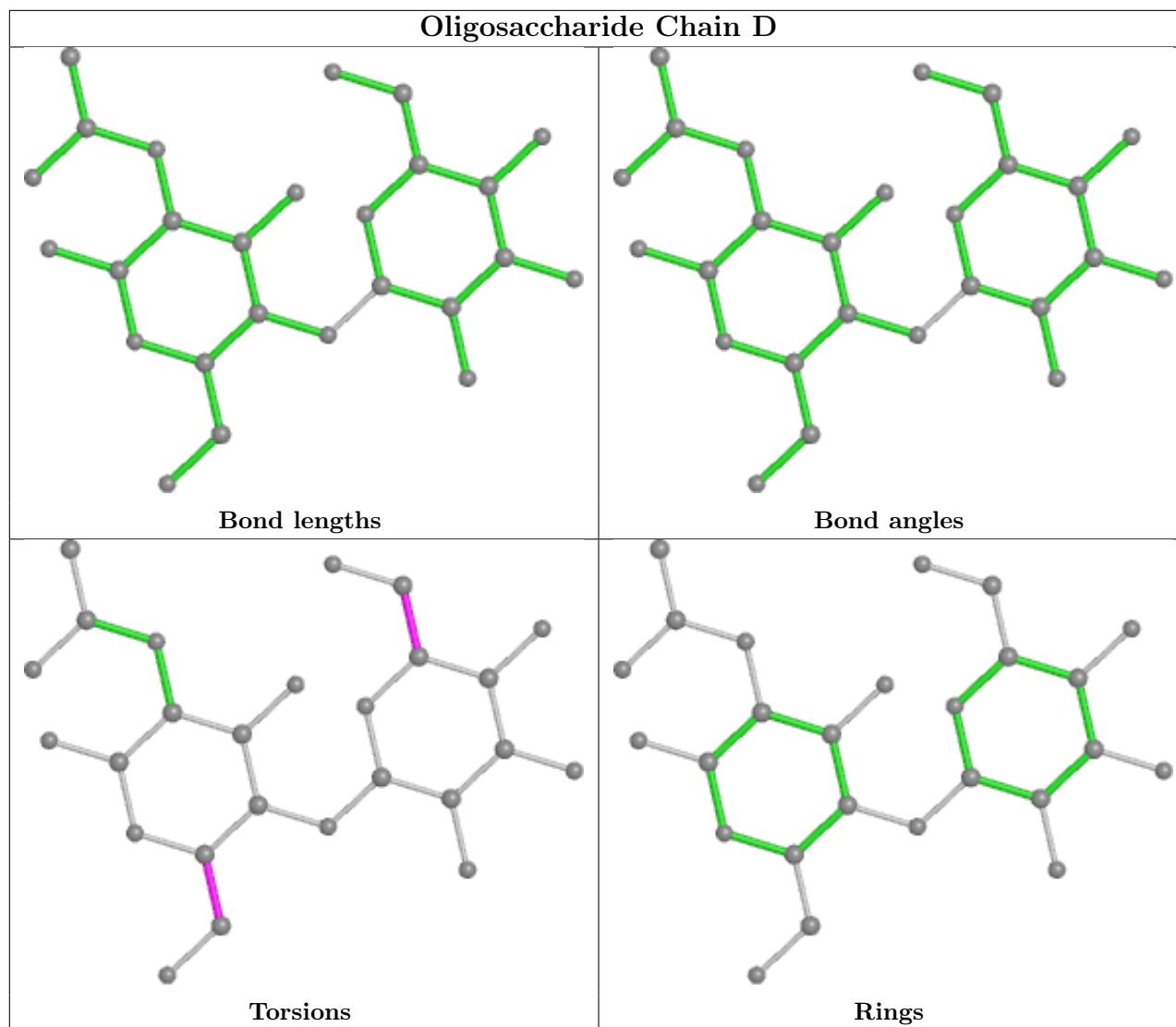
5.6 Ligand geometry ⓘ

Of 5 ligands modelled in this entry, 2 are monoatomic - leaving 3 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	$\#|Z| > 2$
6	UDP	A	503	4	24,26,26	2.37	5 (20%)	37,40,40	1.41	4 (10%)
6	UDP	B	504	4	24,26,26	2.45	6 (25%)	37,40,40	1.41	5 (13%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	#|Z| > 2	Counts	RMSZ	#|Z| > 2
5	TLA	A	500	-	9,9,9	0.99	0	12,12,12	1.03	1 (8%)

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
6	UDP	A	503	4	-	4/16/32/32	0/2/2/2
6	UDP	B	504	4	-	4/16/32/32	0/2/2/2
5	TLA	A	500	-	-	0/12/12/12	-

All (11) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
6	B	504	UDP	C6-C5	7.56	1.52	1.35
6	A	503	UDP	C6-C5	7.35	1.52	1.35
6	B	504	UDP	C5-C4	6.64	1.58	1.43
6	A	503	UDP	C5-C4	6.45	1.57	1.43
6	B	504	UDP	PB-O1B	2.89	1.59	1.50
6	A	503	UDP	PB-O1B	2.74	1.59	1.50
6	B	504	UDP	C4-N3	2.51	1.43	1.38
6	B	504	UDP	C6-N1	2.44	1.43	1.38
6	A	503	UDP	C6-N1	2.39	1.43	1.38
6	B	504	UDP	C2-N1	2.23	1.42	1.38
6	A	503	UDP	C4-N3	2.12	1.42	1.38

All (10) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
6	A	503	UDP	C6-C5-C4	-4.40	113.50	119.52
6	B	504	UDP	C6-C5-C4	-4.39	113.52	119.52
6	B	504	UDP	O5'-PA-O1A	3.45	122.54	109.07
6	A	503	UDP	O5'-PA-O1A	3.44	122.52	109.07
6	A	503	UDP	O3B-PB-O2B	2.83	118.47	107.64
6	B	504	UDP	O3B-PB-O2B	2.78	118.27	107.64
5	A	500	TLA	O41-C4-C3	2.21	119.26	113.27
6	A	503	UDP	O2A-PA-O1A	2.07	122.47	112.24
6	B	504	UDP	O2A-PA-O1A	2.03	122.25	112.24
6	B	504	UDP	N3-C2-N1	2.02	117.58	114.89

There are no chirality outliers.
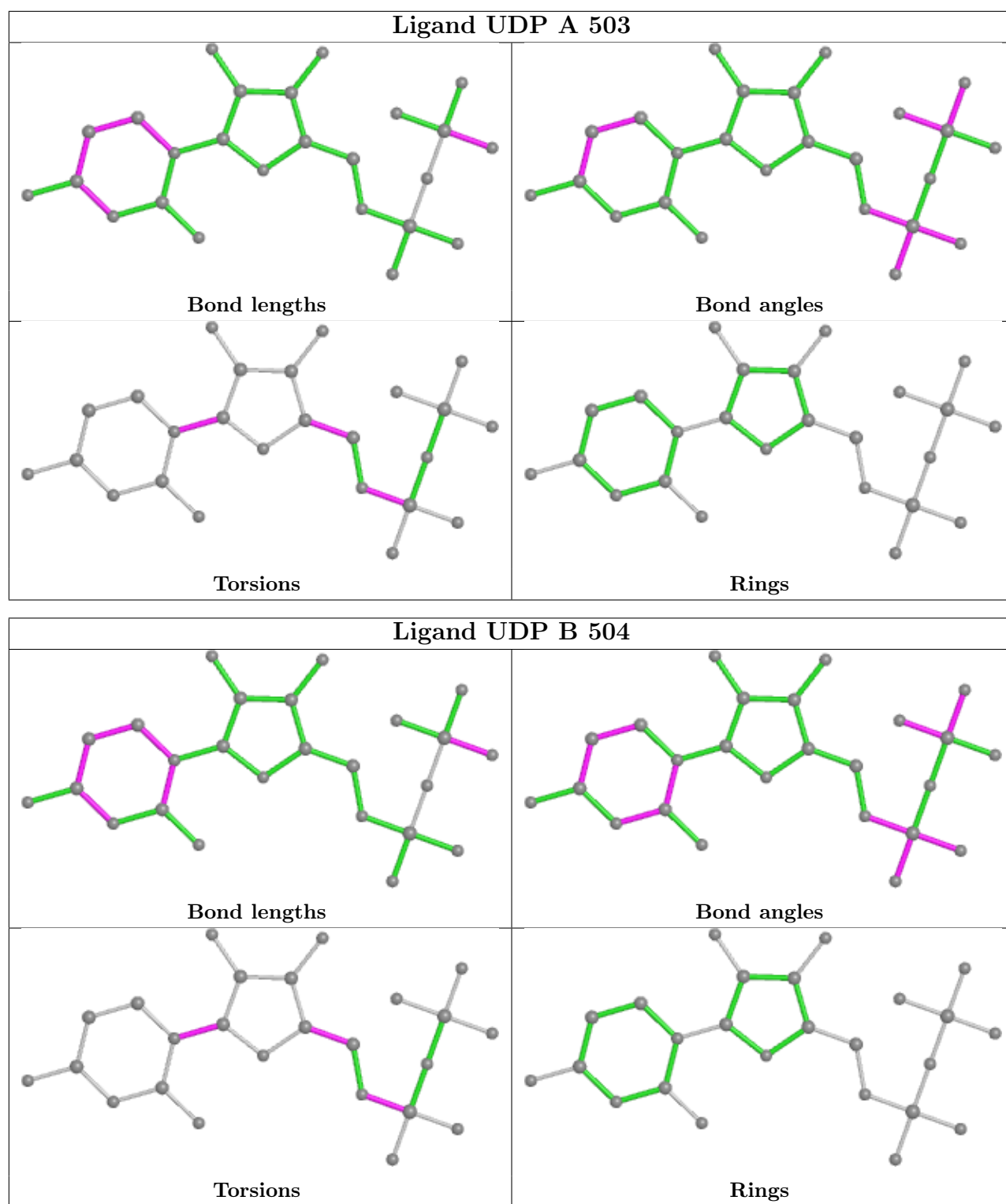
All (8) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
6	A	503	UDP	C3'-C4'-C5'-O5'
6	A	503	UDP	O4'-C4'-C5'-O5'
6	B	504	UDP	C3'-C4'-C5'-O5'
6	B	504	UDP	O4'-C4'-C5'-O5'
6	A	503	UDP	C5'-O5'-PA-O3A
6	B	504	UDP	C5'-O5'-PA-O3A
6	A	503	UDP	O4'-C1'-N1-C6
6	B	504	UDP	O4'-C1'-N1-C6

There are no ring outliers.

1 monomer is involved in 2 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
6	A	503	UDP	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 then 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 UDP A 503

Bond lengths

Bond angles

Torsions

Rings

Ligand UDP B 504

Bond lengths

Bond angles

Torsions

Rings

5.7 Other polymers ⓘ

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(Å²)	Q<0.9
1	A	245/253 (96%)	0.09	17 (6%)	16	13	13, 21, 39, 53	0
1	B	243/253 (96%)	0.41	21 (8%)	10	8	13, 20, 43, 54	0
All	All	488/506 (96%)	0.25	38 (7%)	13	10	13, 21, 41, 54	0

All (38) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	152	TYR	10.8
1	B	163	ILE	10.5
1	A	186	SER	9.9
1	B	151	ASN	7.2
1	B	276	ARG	7.2
1	A	185	SER	7.0
1	B	150	ARG	7.0
1	A	184	ASN	6.9
1	B	82	ALA	6.2
1	B	186	SER	6.0
1	B	185	SER	5.8
1	B	277	GLY	5.1
1	A	187	GLN	5.1
1	B	149	PRO	4.8
1	B	278	VAL	4.8
1	B	275	LEU	4.6
1	A	324	LYS	4.5
1	B	240	ARG	4.2
1	B	248	HIS	4.1
1	A	325	LYS	3.9
1	B	184	ASN	3.3
1	B	324	LYS	3.2
1	A	240	ARG	3.2
1	A	162	ARG	3.1

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Mol	Chain	Res	Type	RSRZ
1	A	326	GLY	2.9
1	B	325	LYS	2.9
1	B	187	GLN	2.9
1	B	164	PRO	2.9
1	A	278	VAL	2.8
1	A	182	PRO	2.7
1	A	276	ARG	2.7
1	B	183	ARG	2.6
1	A	183	ARG	2.4
1	A	154	LEU	2.4
1	B	148	THR	2.3
1	A	125	ARG	2.3
1	A	274	LYS	2.2
1	A	181	PHE	2.1

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

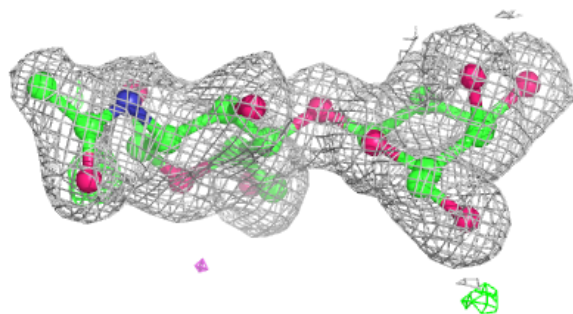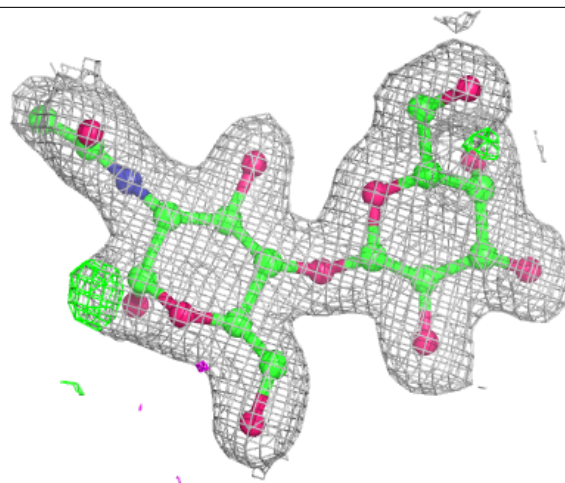There are no non-standard protein/DNA/RNA residues in this entry.

6.3 Carbohydrates ⓘ

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.
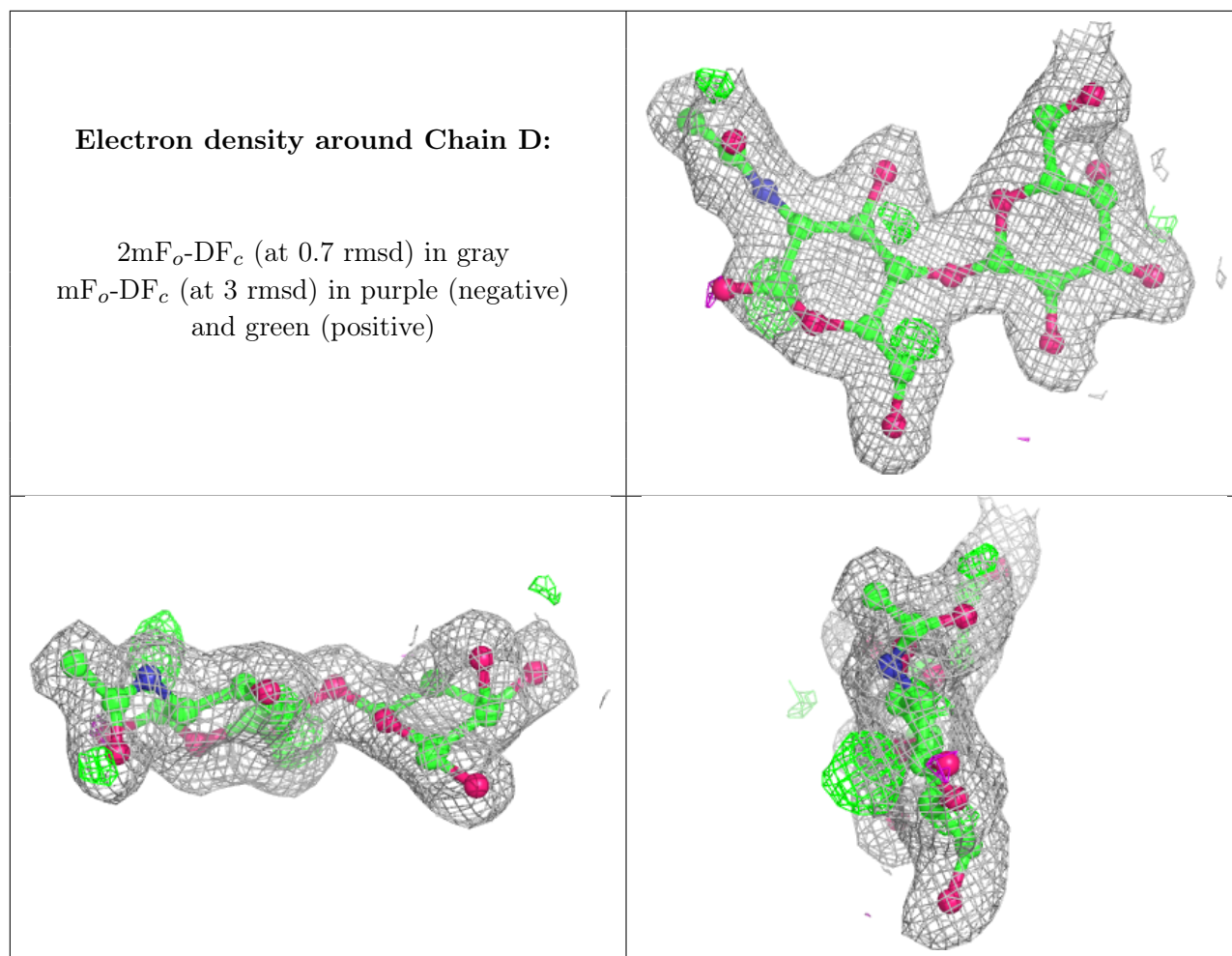
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
3	NAG	D	1	15/15	0.87	0.12	29,33,34,40	0
2	NDG	C	1	15/15	0.94	0.10	23,27,29,30	0
3	GAL	D	2	11/12	0.95	0.08	20,22,24,25	0
2	GAL	C	2	11/12	0.97	0.06	16,18,20,20	0

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:

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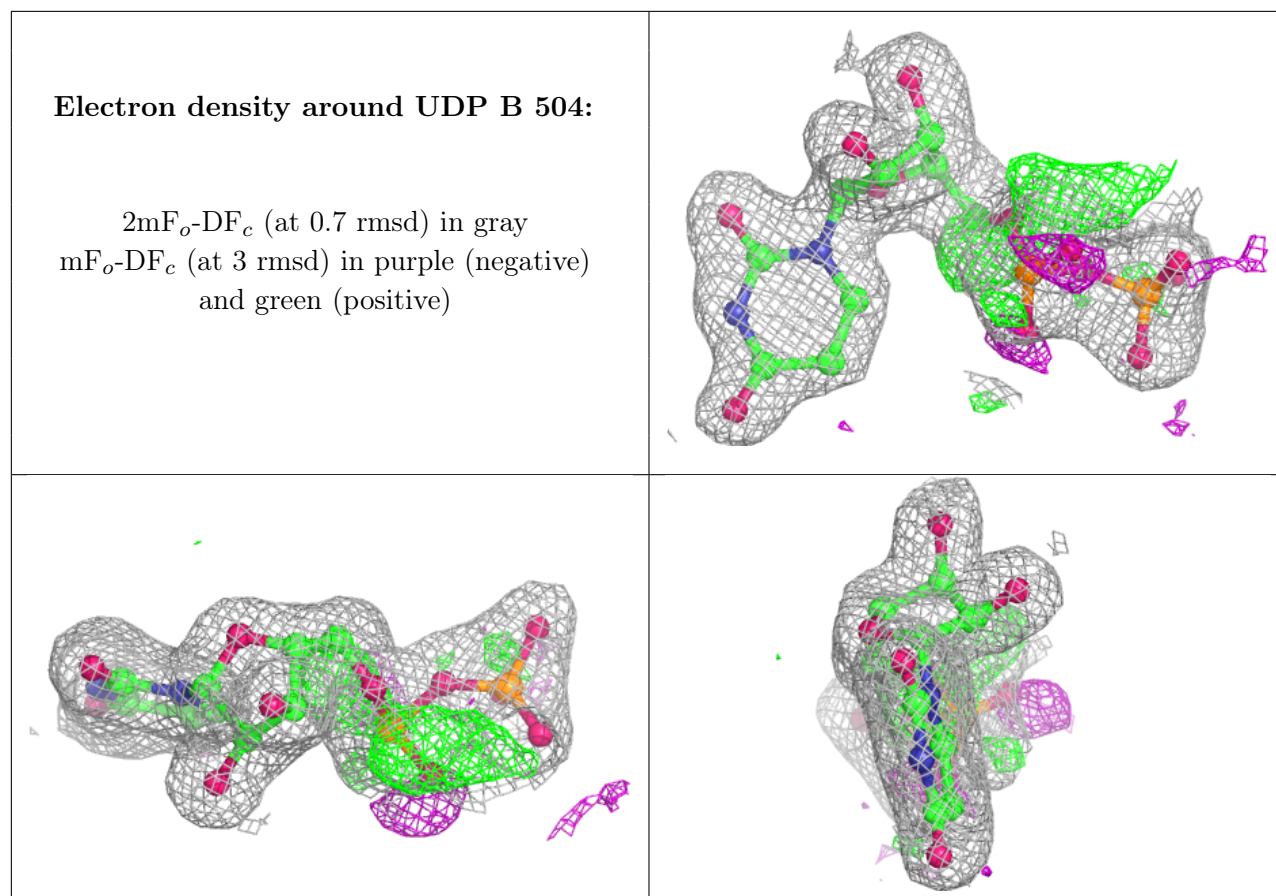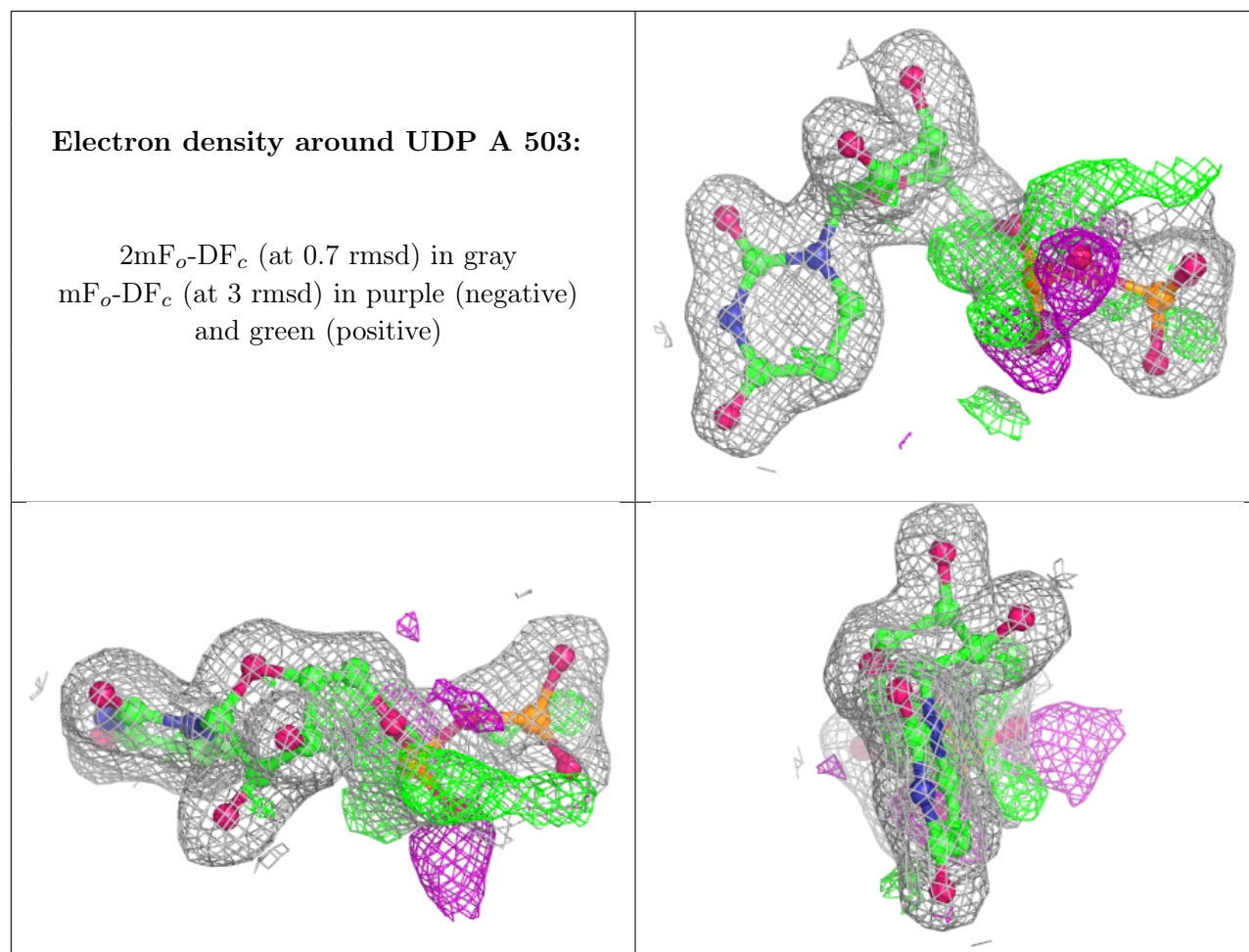$mF_o\text{-}DF_c$ (at 3 rmsd) in purple (negative)
and green (positive)

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
6	UDP	B	504	25/25	0.92	0.13	16,22,34,42	0
6	UDP	A	503	25/25	0.93	0.13	16,21,31,40	0
5	TLA	A	500	10/10	0.96	0.07	21,23,24,25	0
4	MN	B	502	1/1	0.99	0.10	18,18,18,18	0
4	MN	A	501	1/1	1.00	0.10	18,18,18,18	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 UDP B 504:

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

Electron density around UDP A 503:

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

6.5 Other polymers ⓘ

There are no such residues in this entry.