wwPDB X-ray Structure Validation Summary Report (i)

Aug 15, 2023 – 07:33 AM EDT

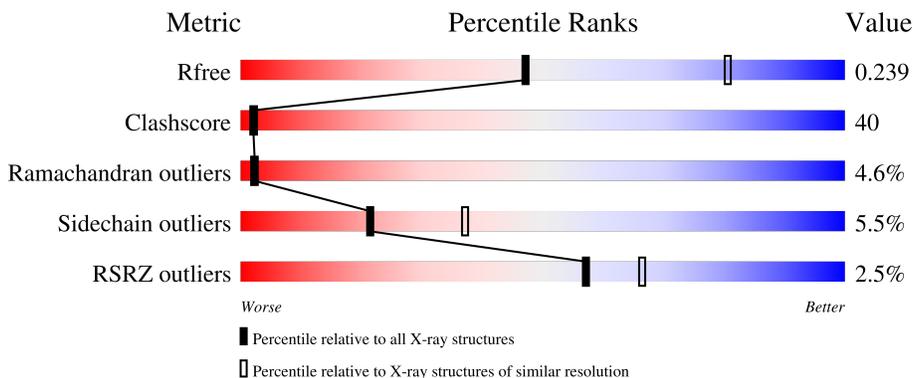|		
PDB ID	:	1T1F
Title	:	Crystal Structure of Native Antithrombin in its Monomeric Form
Authors	:	Johnson, D.J.D.; Huntington, J.A.
Deposited on	:	2004-04-16
Resolution	:	2.75 Å(reported)

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 2.75 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.
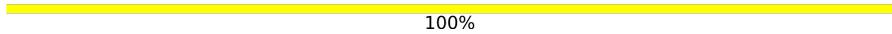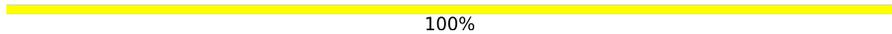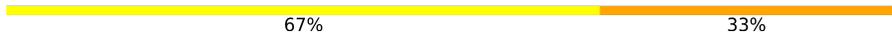
Metric	Percentile Ranks	Value
Rfree		0.239
Clashscore		40
Ramachandran outliers		4.6%
Sidechain outliers		5.5%
RSRZ outliers		2.5%

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	1235 (2.78-2.74)
Clashscore	141614	1277 (2.78-2.74)
Ramachandran outliers	138981	1257 (2.78-2.74)
Sidechain outliers	138945	1257 (2.78-2.74)
RSRZ outliers	127900	1207 (2.78-2.74)

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	432	2% / 43% 48% 6% ·
1	B	432	2% / 41% 49% 6% ·
1	C	432	3% / 42% 49% 6% ·
2	D	2	50% 50%
2	F	2	100%

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Mol	Chain	Length	Quality of chain
2	G	2	50% 50%
2	I	2	100%
2	J	2	50% 50%
2	L	2	100%
3	E	3	67% 33%
3	H	3	67% 33%
3	K	3	67% 33%

The following table lists non-polymeric compounds, carbohydrate monomers and non-standard residues in protein, DNA, RNA chains that are outliers for geometric or electron-density-fit criteria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
2	NAG	D	2	-	-	-	X
2	NAG	G	2	-	-	-	X
2	NAG	J	2	-	-	-	X
2	NAG	L	2	-	-	-	X
3	NAG	E	1	-	-	X	X
3	NAG	E	2	-	-	X	-
3	NAG	H	1	-	-	X	-
3	NAG	H	2	-	-	X	-
3	NAG	K	1	-	-	X	-
3	NAG	K	2	-	-	X	-

2 Entry composition ⓘ

There are 6 unique types of molecules in this entry. The entry contains 10296 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 Antithrombin-III.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	419	Total	C	N	O	S	0	0	0
			3252	2077	540	615	20			
1	B	419	Total	C	N	O	S	0	0	0
			3252	2077	540	615	20			
1	C	419	Total	C	N	O	S	0	0	0
			3252	2077	540	615	20			

There are 9 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	137	ALA	SER	engineered mutation	UNP P01008
A	317	CYS	VAL	engineered mutation	UNP P01008
A	401	CYS	THR	engineered mutation	UNP P01008
B	137	ALA	SER	engineered mutation	UNP P01008
B	317	CYS	VAL	engineered mutation	UNP P01008
B	401	CYS	THR	engineered mutation	UNP P01008
C	137	ALA	SER	engineered mutation	UNP P01008
C	317	CYS	VAL	engineered mutation	UNP P01008
C	401	CYS	THR	engineered mutation	UNP P01008

- Molecule 2 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
2	D	2	Total	C	N	O	0	0	0
			28	16	2	10			
2	F	2	Total	C	N	O	0	0	0
			28	16	2	10			

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Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
2	G	2	Total 28	C 16	N 2	O 10	0	0	0
2	I	2	Total 28	C 16	N 2	O 10	0	0	0
2	J	2	Total 28	C 16	N 2	O 10	0	0	0
2	L	2	Total 28	C 16	N 2	O 10	0	0	0

- Molecule 3 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.
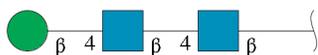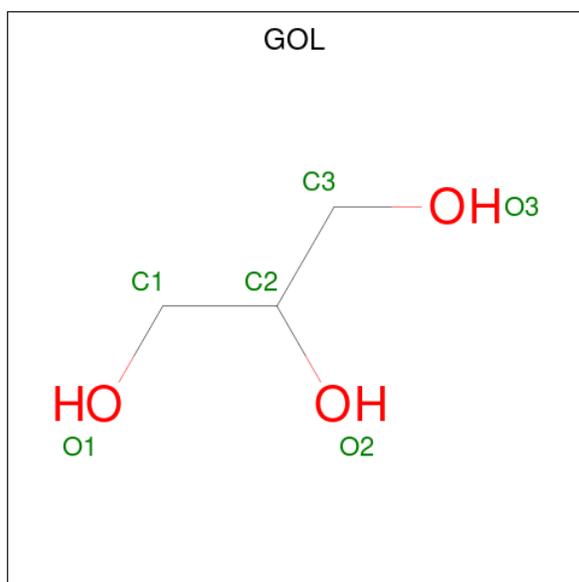

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
3	E	3	Total 39	C 22	N 2	O 15	0	0	0
3	H	3	Total 39	C 22	N 2	O 15	0	0	0
3	K	3	Total 39	C 22	N 2	O 15	0	0	0

- Molecule 4 is IODIDE ION (three-letter code: IOD) (formula: I).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	7	Total 7	I 7	0	0
4	B	7	Total 7	I 7	0	0
4	C	7	Total 7	I 7	0	0

- Molecule 5 is GLYCEROL (three-letter code: GOL) (formula: $C_3H_8O_3$).

GOL

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

• Molecule 6 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	A	70	Total 70	O 70	0	0
6	B	72	Total 72	O 72	0	0
6	C	74	Total 74	O 74	0	0

3   Residue-property plots ⓘ

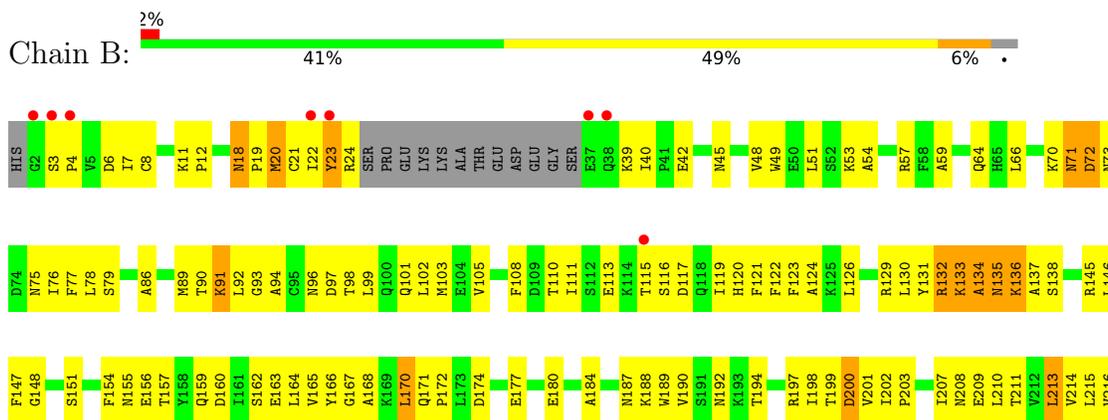These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron density.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

• Molecule 1: Antithrombin-III

Y220 G223 L224 W225 K226 S227 K228 F229 S230 N233 T234 R235 K236 E237 D243 G244 E245 S248 Y253 Q254 K257 F258 R259 Y260 R261 R262 V263 A264 T267 Q268 F274 K275 G276 D277 D278 I279 I284 K287 P288 E289 L292 E296 T300 P301 E302 V303

L308 L311 M314 M315 L316 C317 R324 I325 E326 D327 G328 F329 S330 L331 K332 E333 Q334 L335 Q336 L340 V341 D342 L343 P346 S349 K350 L351 P352 G353 I354 V355 A356 E357 G358 R359 D360 D361 L362 Y363 V364 S365 H369 K370 A371 F372 L373 E374 V375 N376 E377 E378 G379

S380 E381 A382 A383 T386 A387 V388 V389 I390 A391 G392 S394 L395 N396 P397 N398 R399 V400 C401 A404 F408 L409 V410 F411 I412 R413 E414 V415 P416 L417 F422 M423 G424 R425 V426 A427 V431 K432

● Molecule 1: Antithrombin-III

Chain C:

HIS G2 S3 P4 V5 D6 I7 C8 K11 P12 N18 P19 M20 C21 I22 Y23 R24 SER PRO GLU LYS LYS ALA THR GLU ASP GLU GLY SER E37 Q38 K39 I40 P41 E42 N45 V48 W49 E50 L51 S52 K53 A54 R57 F58 A59 L66 K70 N71 D72 N73 D74 N75

I76 F77 L78 S79 A86 M89 T90 K91 L92 G93 A94 C95 N96 D97 T98 L99 Q100 Q101 L102 M103 E104 V105 F108 D109 T110 I111 S112 E113 K114 T115 S116 D117 Q118 I119 H120 F121 F122 F123 A124 K125 L126 R129 L130 Y131 R132 K133 A134 N135 K136 A137 S138 R145 L146 F147 G148

S151 F154 N155 E156 T157 Y158 Q159 D160 E163 L164 V165 Y166 G167 A168 K169 L170 Q171 P172 L173 D174 E177 E180 R183 A184 N187 K188 W189 V190 S191 N192 K193 T194 E195 I198 T199 D200 V201 I202 I207 N208 E209 L210 T211 V212 L213 V214 L215 V216 Y220

G223 L224 W225 K226 S227 K228 F229 S230 N233 T234 R235 K236 E237 D243 G244 E245 S248 Y253 Q254 K257 F258 R259 Y260 R261 R262 V263 A264 Q268 F274 K275 G276 D277 D278 I279 I284 L285 P286 K287 P288 E289 L292 E296 T300 P301 E302 V303 L308

L311 M314 M315 L316 C317 I325 E326 D327 G328 F329 S330 L331 K332 Q334 L335 Q336 L340 V341 D342 L343 P346 S349 K350 L351 P352 G353 I354 V355 A356 E357 G358 R359 D360 D361 L362 Y363 V364 S365 H369 K370 A371 F372 L373 E374 V375 N376 E377 E378 G379 S380 E381 A382 A383

T386 A387 V388 V389 I390 A391 G392 R393 S394 L395 N396 P397 N398 R399 V400 C401 A404 N405 R406 P407 F408 L409 V410 F411 I412 R413 E414 V415 P416 L417 F422 M423 G424 R425 V426 A427 V431 K432

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

Chain D:

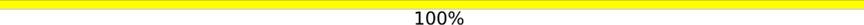NAG1 NAG2

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

Chain F:

NAG1 NAG2

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

Chain G:

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

Chain I:

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

Chain J:

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

Chain L:

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

Chain E:

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

Chain H:

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

Chain K:

NAG1 NAG2 BMA3

4 Data and refinement statistics ⓘ

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α, β, γ	153.83Å 43.71Å 153.93Å 90.00° 120.01° 90.00°	Depositor
Resolution (Å)	38.46 – 2.75	Depositor
	38.46 – 2.75	EDS
% Data completeness	93.6 (38.46-2.75)	Depositor
(in resolution range)	93.3 (38.46-2.75)	EDS
R_{merge}	0.11	Depositor
R_{sym}	0.11	Depositor
$< I/\sigma(I) >$ [1]	1.73 (at 2.77Å)	Xtriage
Refinement program	CNS 1.0	Depositor
R, R_{free}	0.225 , 0.239	Depositor
	0.220 , 0.239	DCC
R_{free} test set	1802 reflections (4.07%)	wwPDB-VP
Wilson B-factor (Å^2)	59.4	Xtriage
Anisotropy	0.336	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.31 , 40.3	EDS
L-test for twinning[2]	$< |L| > = 0.48, < L^2 > = 0.31$	Xtriage
Estimated twinning fraction	0.457 for l,k,-h-l 0.457 for -h-l,k,h 0.039 for h,-k,-h-l 0.040 for l,-k,h 0.038 for -h-l,-k,l	Xtriage
F_o,F_c correlation	0.93	EDS
Total number of atoms	10296	wwPDB-VP
Average B, all atoms (Å^2)	59.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.64% 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, GOL, IOD, BMA

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	0.38	0/3318	0.67	2/4496 (0.0%)
1	B	0.38	0/3318	0.67	2/4496 (0.0%)
1	C	0.38	0/3318	0.67	2/4496 (0.0%)
All	All	0.38	0/9954	0.67	6/13488 (0.0%)

There are no bond length outliers.

The worst 5 of 6 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	C	134	ALA	N-CA-C	-5.53	96.06	111.00
1	A	134	ALA	N-CA-C	-5.52	96.08	111.00
1	B	134	ALA	N-CA-C	-5.52	96.09	111.00
1	B	317	CYS	CA-CB-SG	5.06	123.11	114.00
1	A	317	CYS	CA-CB-SG	5.05	123.08	114.00

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	3252	0	3155	268	1
1	B	3252	0	3155	259	1
1	C	3252	0	3155	275	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	D	28	0	25	2	0
2	F	28	0	25	3	0
2	G	28	0	25	2	0
2	I	28	0	25	3	0
2	J	28	0	25	2	0
2	L	28	0	25	3	0
3	E	39	0	34	14	0
3	H	39	0	34	14	0
3	K	39	0	34	14	0
4	A	7	0	0	2	0
4	B	7	0	0	2	0
4	C	7	0	0	2	0
5	A	6	0	8	1	0
5	B	6	0	8	2	0
5	C	6	0	8	2	0
6	A	70	0	0	8	0
6	B	72	0	0	8	0
6	C	74	0	0	8	0
All	All	10296	0	9741	799	1

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 40.

The worst 5 of 799 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:C:170:LEU:HD12	1:C:171:GLN:H	1.18	1.08
1:B:170:LEU:HD12	1:B:171:GLN:H	1.18	1.05
1:B:137:ALA:HB1	1:B:224:LEU:HG	1.41	1.02
1:A:170:LEU:HD12	1:A:171:GLN:H	1.18	1.01
1:A:235:ARG:NH2	1:C:184:ALA:HB2	1.74	1.01

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

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:180:GLU:OE1	1:B:394:SER:N[1_545]	2.14	0.06

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	415/432 (96%)	336 (81%)	60 (14%)	19 (5%)	2	2
1	B	415/432 (96%)	336 (81%)	60 (14%)	19 (5%)	2	2
1	C	415/432 (96%)	336 (81%)	60 (14%)	19 (5%)	2	2
All	All	1245/1296 (96%)	1008 (81%)	180 (14%)	57 (5%)	2	2

5 of 57 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	135	ASN
1	A	136	LYS
1	A	357	GLU
1	A	398	ASN
1	A	400	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	347/382 (91%)	328 (94%)	19 (6%)	21	37
1	B	347/382 (91%)	328 (94%)	19 (6%)	21	37
1	C	347/382 (91%)	328 (94%)	19 (6%)	21	37
All	All	1041/1146 (91%)	984 (94%)	57 (6%)	21	37

5 of 57 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	B	213	LEU
1	C	401	CYS
1	B	398	ASN
1	C	398	ASN
1	C	315	MET

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 30 such sidechains are listed below:

Mol	Chain	Res	Type
1	B	233	ASN
1	C	336	GLN
1	B	336	GLN
1	C	396	ASN
1	C	233	ASN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates ⓘ

21 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	D	1	2,1	14,14,15	0.69	0	17,19,21	0.73	0
2	NAG	D	2	2	14,14,15	0.67	0	17,19,21	0.58	0
3	NAG	E	1	3,1	14,14,15	0.73	0	17,19,21	0.69	0
3	NAG	E	2	3	14,14,15	0.75	1 (7%)	17,19,21	0.68	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	#|Z| > 2	Counts	RMSZ	#|Z| > 2
3	BMA	E	3	3	11,11,12	0.58	0	15,15,17	0.26	0
2	NAG	F	1	2,1	14,14,15	0.82	0	17,19,21	0.84	0
2	NAG	F	2	2	14,14,15	0.57	0	17,19,21	0.58	0
2	NAG	G	1	2,1	14,14,15	0.68	0	17,19,21	0.73	0
2	NAG	G	2	2	14,14,15	0.64	0	17,19,21	0.58	0
3	NAG	H	1	3,1	14,14,15	0.72	0	17,19,21	0.68	0
3	NAG	H	2	3	14,14,15	0.75	1 (7%)	17,19,21	0.68	0
3	BMA	H	3	3	11,11,12	0.58	0	15,15,17	0.26	0
2	NAG	I	1	2,1	14,14,15	0.81	0	17,19,21	0.83	0
2	NAG	I	2	2	14,14,15	0.56	0	17,19,21	0.59	0
2	NAG	J	1	2,1	14,14,15	0.70	0	17,19,21	0.73	0
2	NAG	J	2	2	14,14,15	0.65	0	17,19,21	0.57	0
3	NAG	K	1	3,1	14,14,15	0.74	0	17,19,21	0.68	0
3	NAG	K	2	3	14,14,15	0.77	1 (7%)	17,19,21	0.68	0
3	BMA	K	3	3	11,11,12	0.60	0	15,15,17	0.26	0
2	NAG	L	1	2,1	14,14,15	0.84	0	17,19,21	0.84	0
2	NAG	L	2	2	14,14,15	0.57	0	17,19,21	0.58	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	D	1	2,1	-	4/6/23/26	0/1/1/1
2	NAG	D	2	2	-	5/6/23/26	0/1/1/1
3	NAG	E	1	3,1	-	1/6/23/26	0/1/1/1
3	NAG	E	2	3	-	4/6/23/26	0/1/1/1
3	BMA	E	3	3	-	2/2/19/22	0/1/1/1
2	NAG	F	1	2,1	-	3/6/23/26	0/1/1/1
2	NAG	F	2	2	-	4/6/23/26	0/1/1/1
2	NAG	G	1	2,1	-	4/6/23/26	0/1/1/1
2	NAG	G	2	2	-	5/6/23/26	0/1/1/1
3	NAG	H	1	3,1	-	1/6/23/26	0/1/1/1
3	NAG	H	2	3	-	4/6/23/26	0/1/1/1
3	BMA	H	3	3	-	2/2/19/22	0/1/1/1
2	NAG	I	1	2,1	-	3/6/23/26	0/1/1/1
2	NAG	I	2	2	-	4/6/23/26	0/1/1/1
2	NAG	J	1	2,1	-	4/6/23/26	0/1/1/1

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	NAG	J	2	2	-	5/6/23/26	0/1/1/1
3	NAG	K	1	3,1	-	1/6/23/26	0/1/1/1
3	NAG	K	2	3	-	4/6/23/26	0/1/1/1
3	BMA	K	3	3	-	2/2/19/22	0/1/1/1
2	NAG	L	1	2,1	-	3/6/23/26	0/1/1/1
2	NAG	L	2	2	-	4/6/23/26	0/1/1/1

All (3) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	H	2	NAG	C1-C2	2.13	1.55	1.52
3	K	2	NAG	C1-C2	2.12	1.55	1.52
3	E	2	NAG	C1-C2	2.06	1.55	1.52

There are no bond angle outliers.

There are no chirality outliers.

5 of 69 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	D	1	NAG	C8-C7-N2-C2
2	D	1	NAG	O7-C7-N2-C2
2	D	2	NAG	C3-C2-N2-C7
2	D	2	NAG	C8-C7-N2-C2
2	D	2	NAG	O7-C7-N2-C2

There are no ring outliers.

18 monomers are involved in 57 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	H	1	NAG	9	0
3	E	2	NAG	7	0
2	L	2	NAG	2	0
3	E	1	NAG	9	0
3	K	3	BMA	1	0
3	H	3	BMA	1	0
2	G	1	NAG	2	0
3	H	2	NAG	7	0
2	F	1	NAG	2	0
2	F	2	NAG	2	0
3	E	3	BMA	1	0

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Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	J	1	NAG	2	0
2	I	2	NAG	2	0
2	I	1	NAG	2	0
3	K	2	NAG	7	0
3	K	1	NAG	9	0
2	D	1	NAG	2	0
2	L	1	NAG	2	0

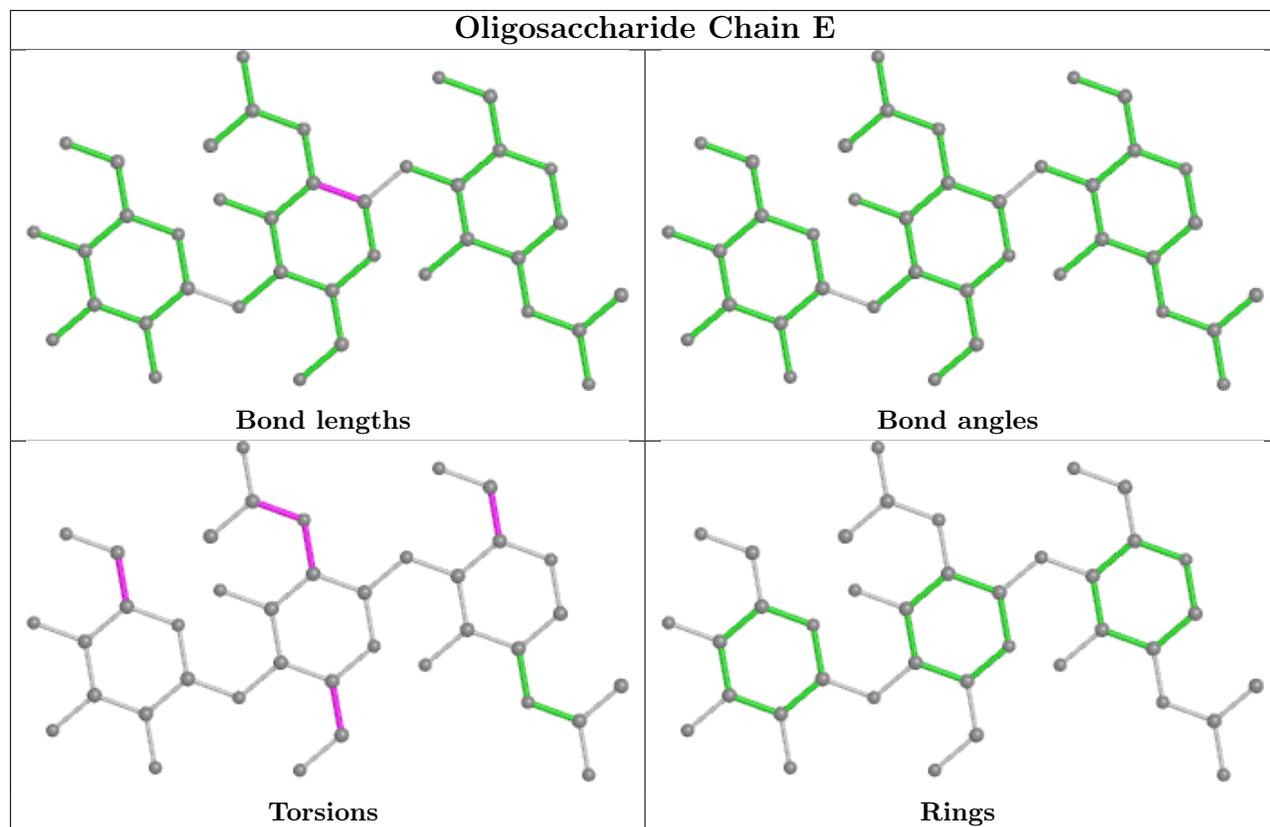The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for oligosaccharide.
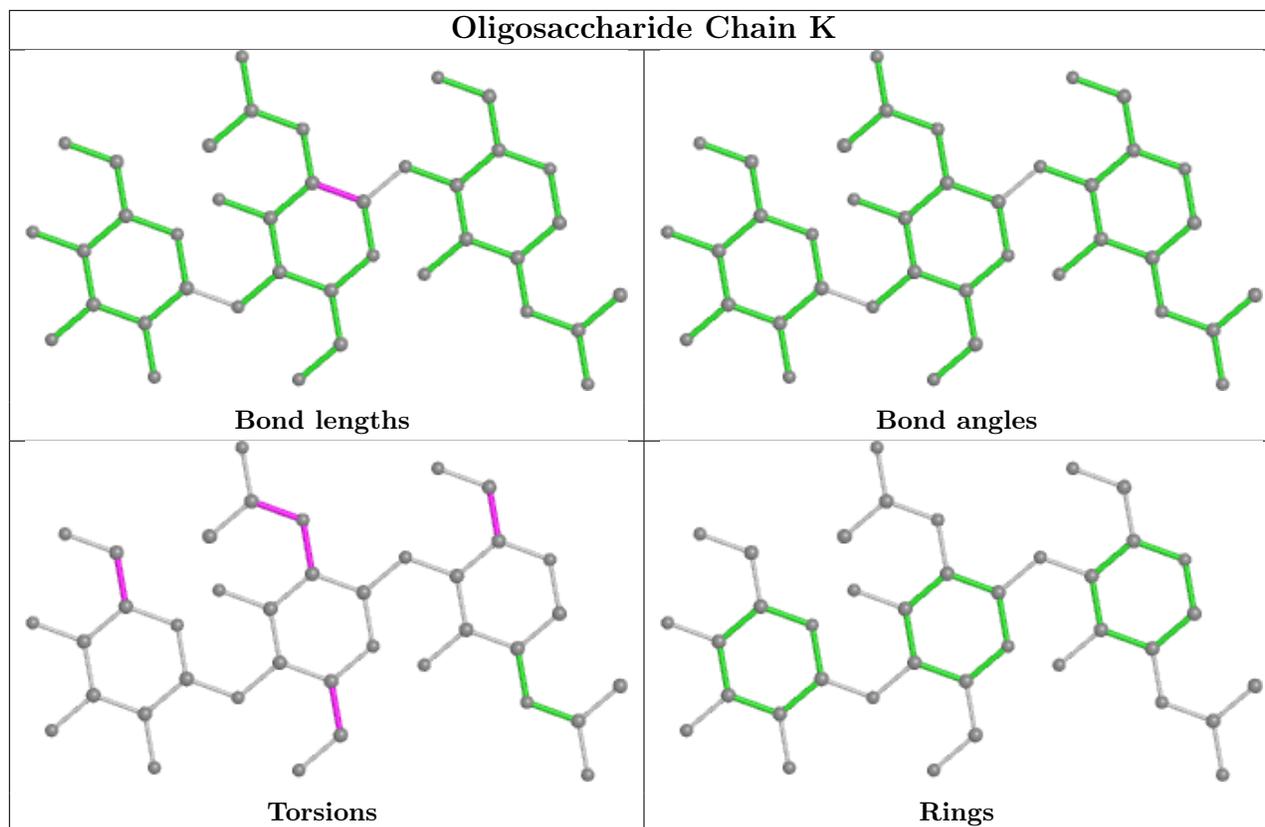

Oligosaccharide Chain D

Bond lengths

Bond angles

Torsions

Rings

Oligosaccharide Chain F

Bond lengths

Bond angles

Torsions

Rings

Oligosaccharide Chain G

Bond lengths

Bond angles

Torsions

Rings

Oligosaccharide Chain I

Bond lengths

Bond angles

Torsions

Rings

Oligosaccharide Chain J

Bond lengths

Bond angles

Torsions

Rings

Oligosaccharide Chain L

Bond lengths

Bond angles

Torsions

Rings

Oligosaccharide Chain E

Bond lengths

Bond angles

Torsions

Rings

Oligosaccharide Chain H

Bond lengths

Bond angles

Torsions

Rings

Oligosaccharide Chain K

Bond lengths

Bond angles

Torsions

Rings

5.6 Ligand geometry ⓘ

Of 24 ligands modelled in this entry, 21 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	$\#|Z| > 2$
5	GOL	A	1001	-	5,5,5	0.80	0	5,5,5	0.43	0
5	GOL	B	1002	-	5,5,5	0.77	0	5,5,5	0.50	0
5	GOL	C	1003	-	5,5,5	0.78	0	5,5,5	0.50	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
5	GOL	A	1001	-	-	4/4/4/4	-
5	GOL	B	1002	-	-	4/4/4/4	-
5	GOL	C	1003	-	-	4/4/4/4	-

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

5 of 12 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
5	A	1001	GOL	O2-C2-C3-O3
5	A	1001	GOL	O1-C1-C2-C3
5	A	1001	GOL	C1-C2-C3-O3
5	B	1002	GOL	C1-C2-C3-O3
5	C	1003	GOL	O1-C1-C2-C3

There are no ring outliers.

3 monomers are involved in 5 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
5	A	1001	GOL	1	0
5	B	1002	GOL	2	0
5	C	1003	GOL	2	0

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 ⓘ

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	419/432 (96%)	0.01	7 (1%)	70	78	27, 55, 97, 125	0
1	B	419/432 (96%)	0.05	10 (2%)	59	68	27, 55, 97, 125	0
1	C	419/432 (96%)	0.08	15 (3%)	42	51	27, 55, 97, 125	0
All	All	1257/1296 (96%)	0.05	32 (2%)	57	66	27, 55, 97, 125	0

The worst 5 of 32 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	C	4	PRO	5.6
1	C	358	GLY	5.5
1	B	2	GLY	4.1
1	C	115	THR	3.7
1	B	4	PRO	3.6

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(Å²)	Q<0.9
2	NAG	L	1	14/15	0.40	0.22	106,111,115,120	0
2	NAG	J	2	14/15	0.43	0.44	129,132,133,133	0
3	BMA	H	3	11/12	0.45	0.32	128,130,131,132	0

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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
2	NAG	F	1	14/15	0.46	0.24	106,111,115,120	0
2	NAG	G	2	14/15	0.53	0.42	129,132,133,133	0
2	NAG	I	1	14/15	0.57	0.24	106,111,115,120	0
3	BMA	K	3	11/12	0.59	0.21	128,130,131,132	0
3	BMA	E	3	11/12	0.61	0.35	128,129,131,131	0
2	NAG	D	2	14/15	0.64	0.40	129,131,133,133	0
3	NAG	E	1	14/15	0.65	0.48	107,110,114,117	0
2	NAG	L	2	14/15	0.70	0.40	125,128,129,130	0
3	NAG	K	1	14/15	0.76	0.32	108,111,114,118	0
3	NAG	E	2	14/15	0.79	0.25	119,121,123,126	0
2	NAG	I	2	14/15	0.80	0.39	125,128,129,130	0
2	NAG	F	2	14/15	0.80	0.37	125,128,129,129	0
2	NAG	J	1	14/15	0.82	0.16	113,116,120,125	0
3	NAG	H	1	14/15	0.82	0.34	108,111,114,118	0
3	NAG	H	2	14/15	0.82	0.15	120,121,124,127	0
3	NAG	K	2	14/15	0.83	0.14	120,121,124,127	0
2	NAG	G	1	14/15	0.83	0.19	113,116,120,125	0
2	NAG	D	1	14/15	0.86	0.14	113,115,120,125	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.
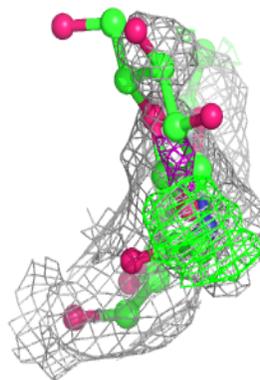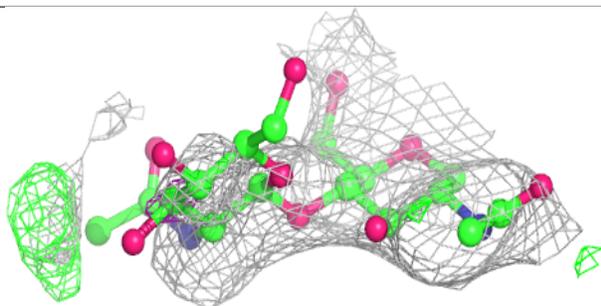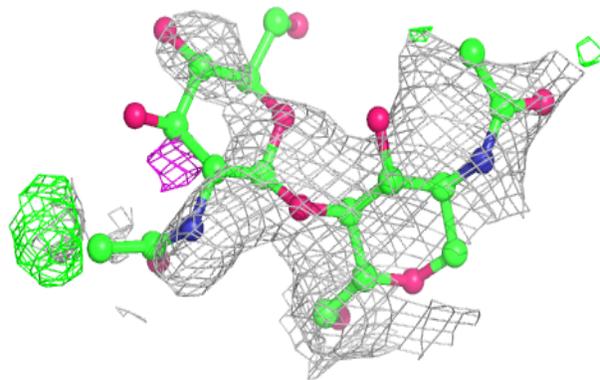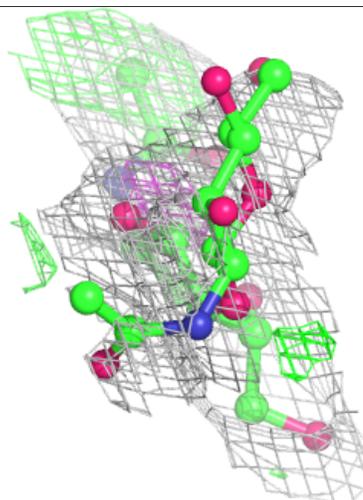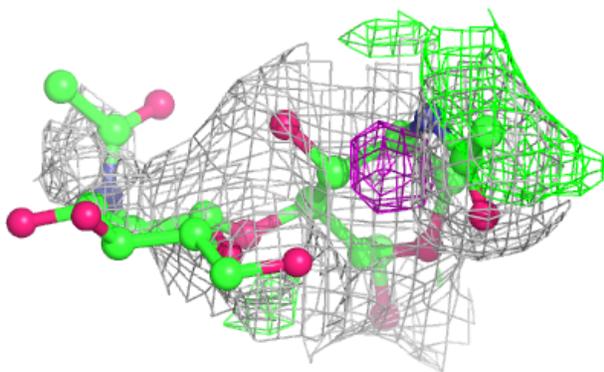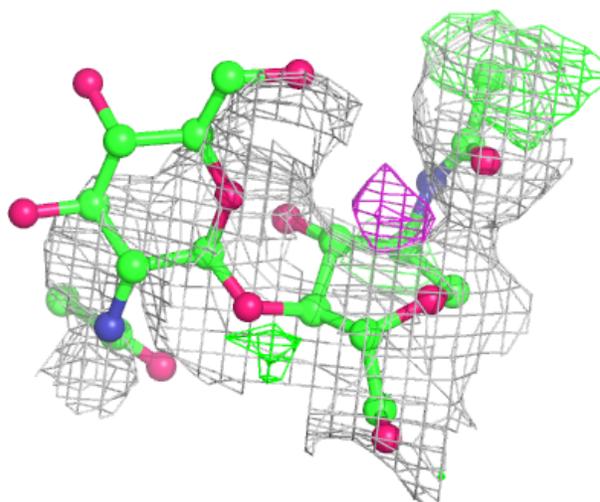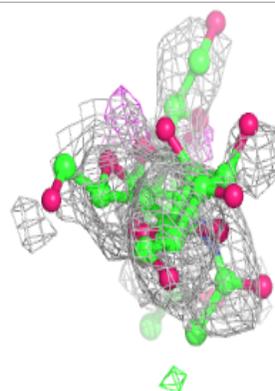

Electron density around Chain D:

2mF$_o$-DF$_c$ (at 0.7 rmsd) in gray
mF$_o$-DF$_c$ (at 3 rmsd) in purple (negative)
and green (positive)
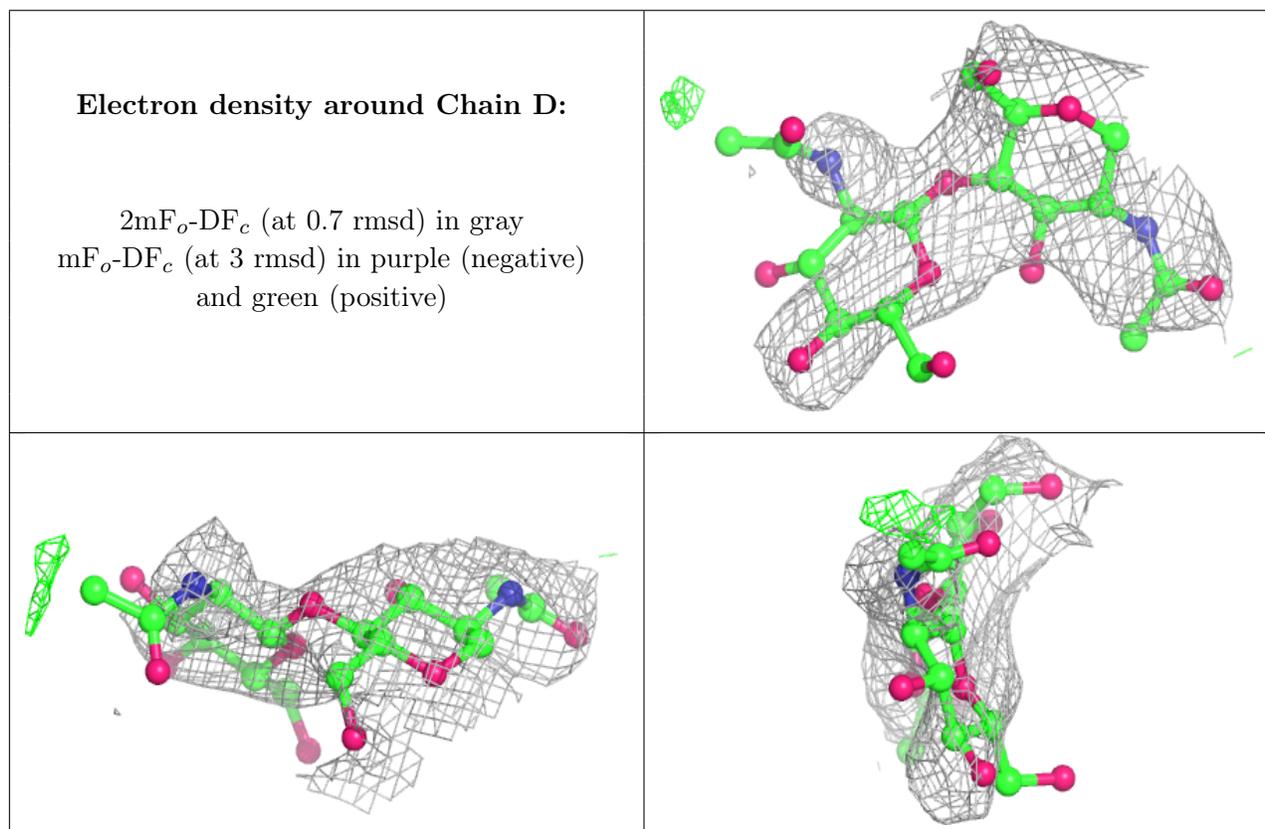
Electron density around Chain F:

2mF$_o$-DF$_c$ (at 0.7 rmsd) in gray
mF$_o$-DF$_c$ (at 3 rmsd) in purple (negative)
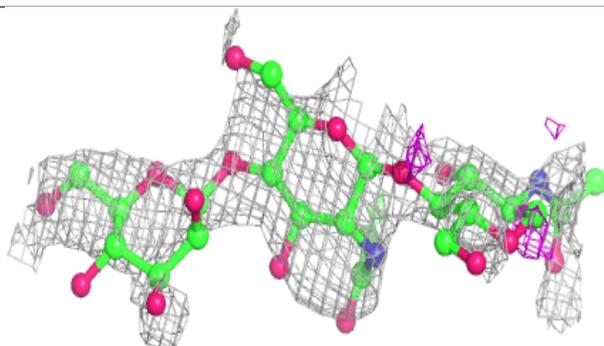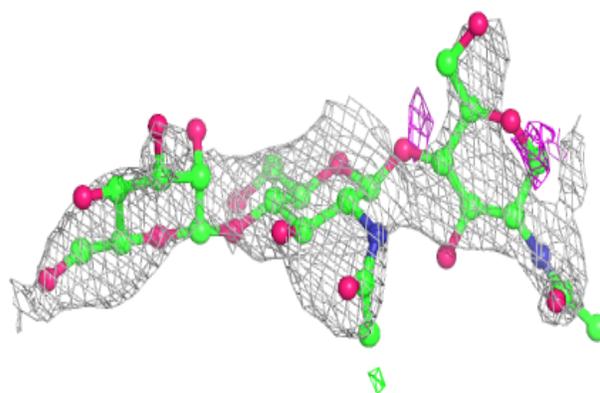and green (positive)

Electron density around Chain G:

$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)
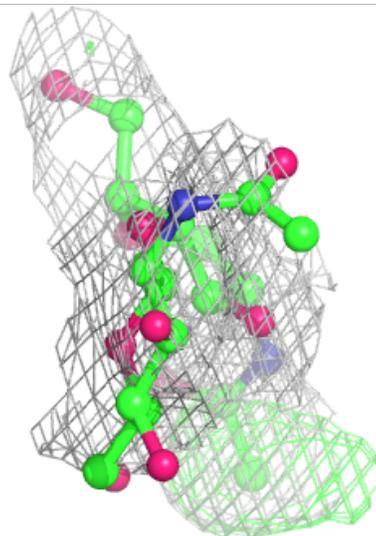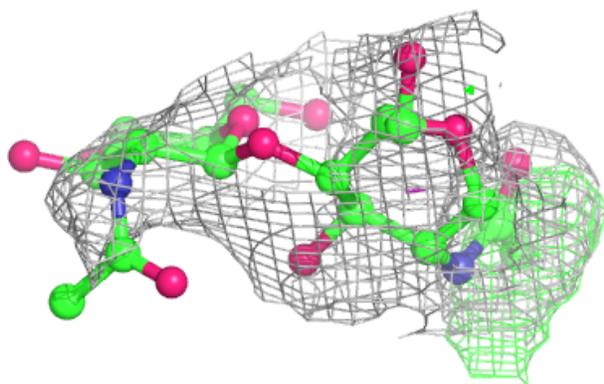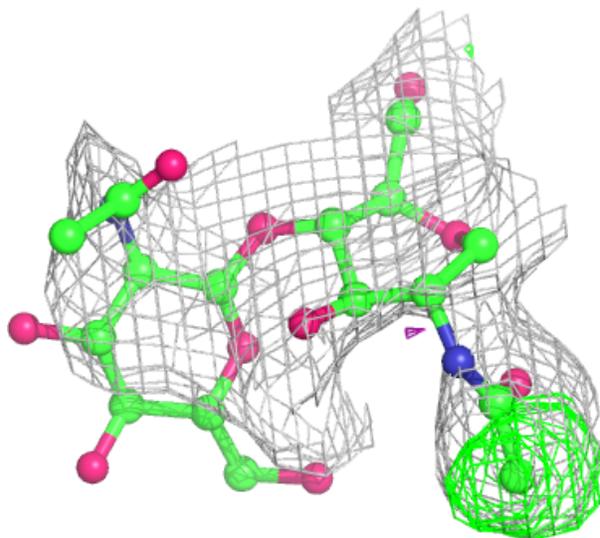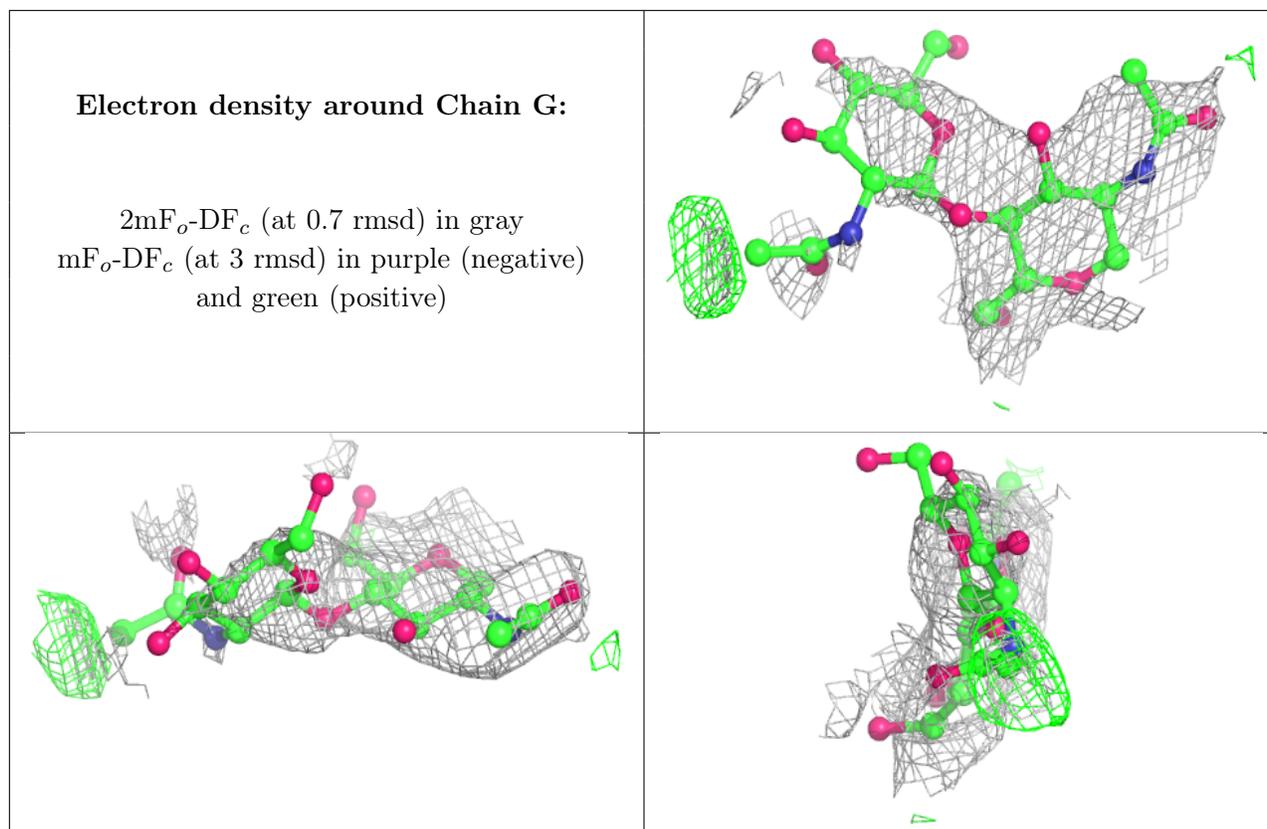
Electron density around Chain I:

$2mF_o\text{-}DF_c$ (at 0.7 rmsd) in gray
$mF_o\text{-}DF_c$ (at 3 rmsd) in purple (negative)
and green (positive)
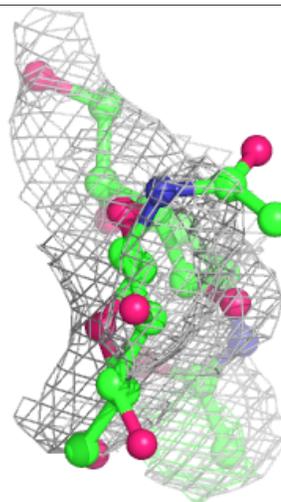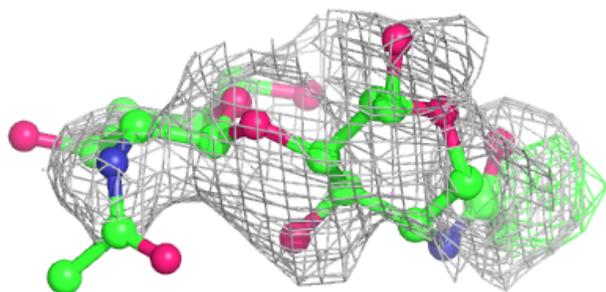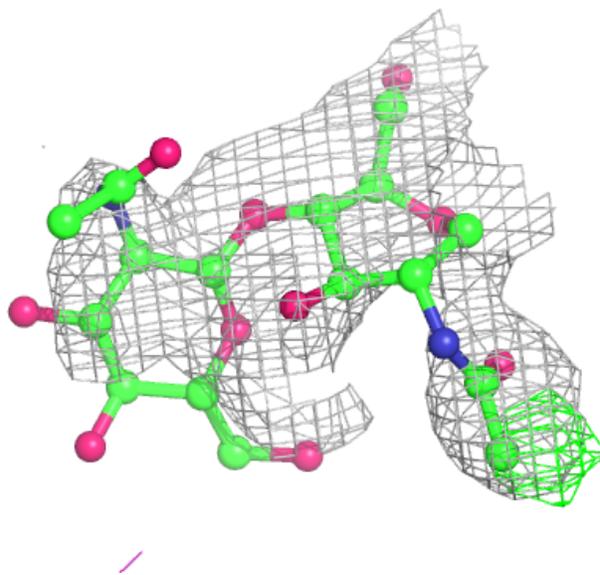
Electron density around Chain J:

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 L:

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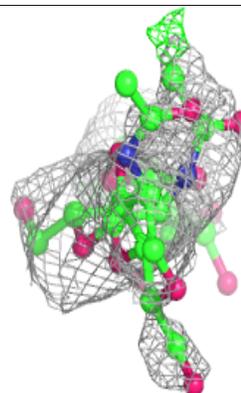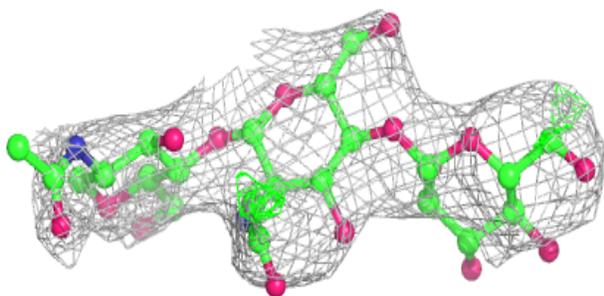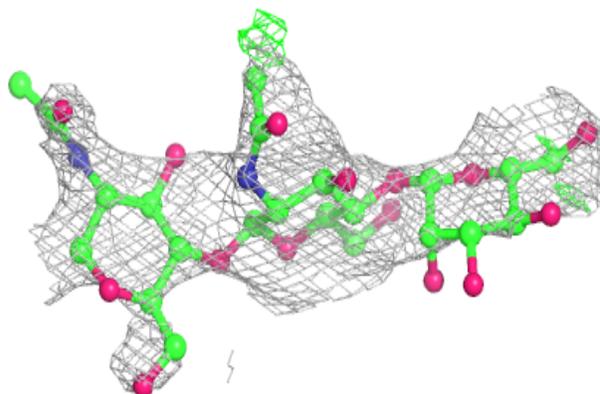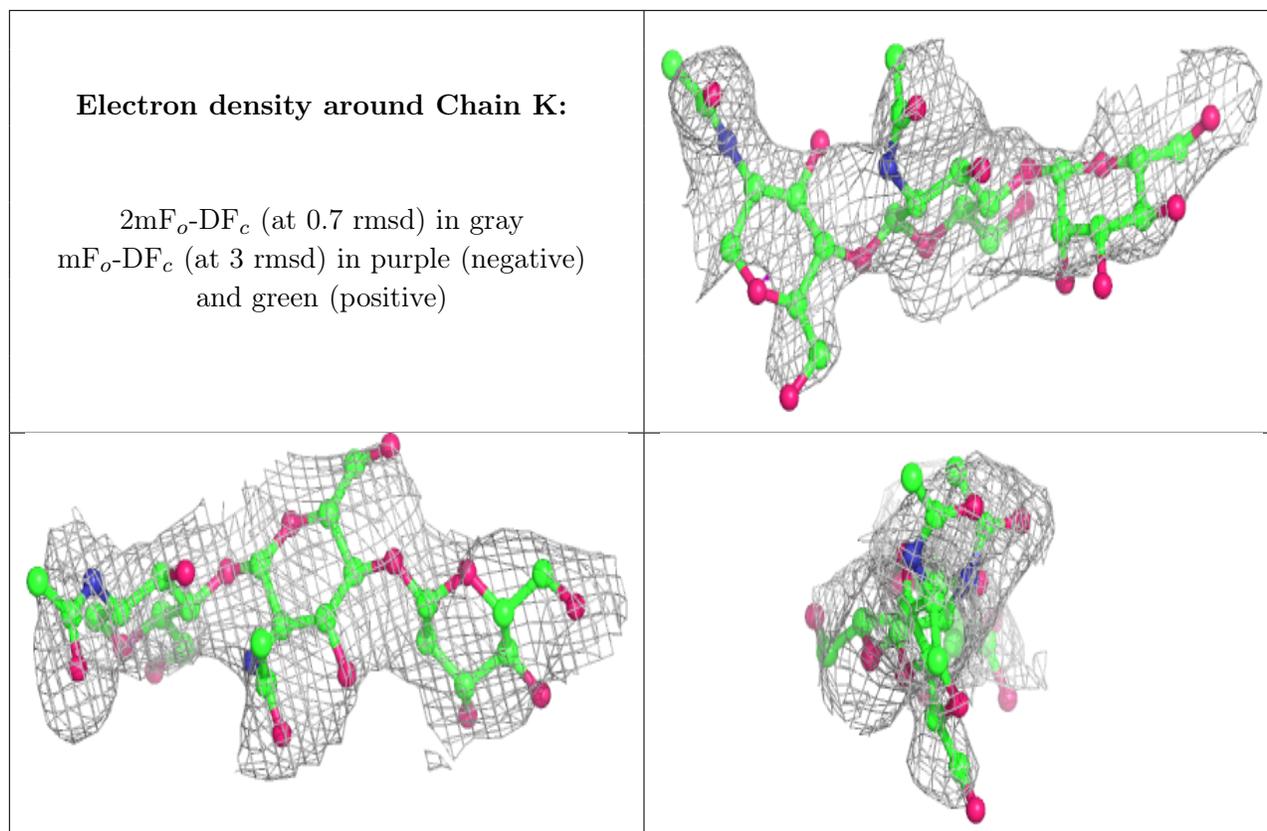and green (positive)

Electron density around 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)

Electron density around Chain H:

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

Electron density around Chain K:

$2mF_o$-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
5	GOL	C	1003	6/6	0.42	0.24	84,87,88,88	0
5	GOL	B	1002	6/6	0.51	0.29	84,87,88,88	0
5	GOL	A	1001	6/6	0.55	0.23	82,84,85,85	0
4	IOD	C	2018	1/1	0.91	0.10	148,148,148,148	0
4	IOD	C	2020	1/1	0.95	0.08	138,138,138,138	0
4	IOD	A	2004	1/1	0.95	0.08	150,150,150,150	0
4	IOD	B	2011	1/1	0.96	0.09	148,148,148,148	0
4	IOD	A	2007	1/1	0.97	0.11	108,108,108,108	0
4	IOD	C	2021	1/1	0.97	0.10	110,110,110,110	0
4	IOD	B	2013	1/1	0.97	0.10	138,138,138,138	0
4	IOD	C	2017	1/1	0.97	0.09	135,135,135,135	0
4	IOD	B	2010	1/1	0.97	0.05	135,135,135,135	0
4	IOD	B	2014	1/1	0.98	0.07	110,110,110,110	0
4	IOD	A	2006	1/1	0.98	0.08	137,137,137,137	0

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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($Å^2$)	Q<0.9
4	IOD	A	2003	1/1	0.98	0.08	134,134,134,134	0
4	IOD	B	2008	1/1	0.98	0.16	84,84,84,84	0
4	IOD	A	2002	1/1	0.99	0.17	56,56,56,56	0
4	IOD	C	2015	1/1	0.99	0.17	84,84,84,84	0
4	IOD	C	2016	1/1	0.99	0.14	56,56,56,56	0
4	IOD	A	2001	1/1	0.99	0.15	83,83,83,83	0
4	IOD	B	2009	1/1	0.99	0.15	56,56,56,56	0
4	IOD	C	2019	1/1	1.00	0.12	69,69,69,69	0
4	IOD	A	2005	1/1	1.00	0.13	69,69,69,69	0
4	IOD	B	2012	1/1	1.00	0.12	69,69,69,69	0

6.5 Other polymers ⓘ

There are no such residues in this entry.