



# Full wwPDB X-ray Structure Validation Report ⓘ

Mar 5, 2026 – 08:50 PM UTC

PDB ID : 9YFZ / pdb\_00009yfz  
Title : KrkA D193C ternary complex  
Authors : Govind, M.; Kimber, M.S.  
Deposited on : 2025-09-27  
Resolution : 2.21 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](mailto:validation@mail.wwpdb.org)

A user guide is available at

<https://www.wwpdb.org/validation/2017/XrayValidationReportHelp>

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

<http://www.wwpdb.org/validation/2017/FAQs#types>.

---

The following versions of software and data (see [references ⓘ](#)) were used in the production of this report:

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

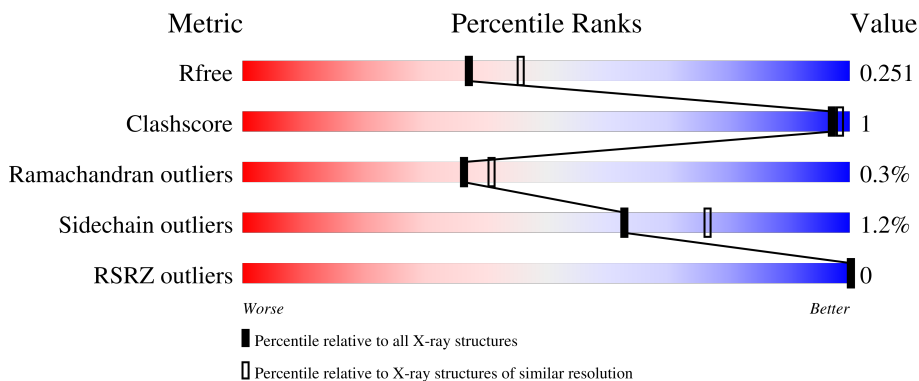
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 2.21 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	7682 (2.24-2.20)
Clashscore	190562	8402 (2.24-2.20)
Ramachandran outliers	187476	8303 (2.24-2.20)
Sidechain outliers	187428	8304 (2.24-2.20)
RSRZ outliers	180081	7683 (2.24-2.20)

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  $\geq 3$ , 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	364	 91% 5%
1	B	364	 92% 5%
2	C	2	 50% 50%
2	D	2	 50% 50%

## 2 Entry composition [i](#)

There are 6 unique types of molecules in this entry. The entry contains 12086 atoms, of which 5777 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 KrKA.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
			Total	C	H	N	O	S			
1	A	347	5782	1909	2852	476	538	7	0	1	0
1	B	344	5739	1891	2838	472	532	6	0	0	0

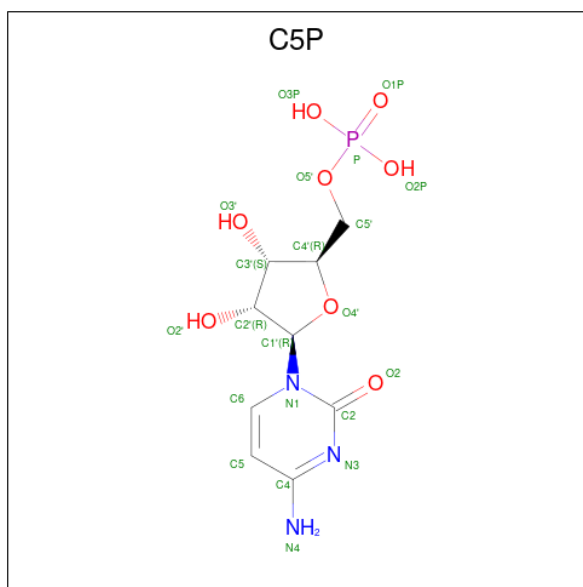
There are 22 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	1	MET	-	initiating methionine	UNP A0A854BIM6
A	2	ARG	-	expression tag	UNP A0A854BIM6
A	193	CYS	ASP	engineered mutation	UNP A0A854BIM6
A	357	LEU	-	expression tag	UNP A0A854BIM6
A	358	GLU	-	expression tag	UNP A0A854BIM6
A	359	HIS	-	expression tag	UNP A0A854BIM6
A	360	HIS	-	expression tag	UNP A0A854BIM6
A	361	HIS	-	expression tag	UNP A0A854BIM6
A	362	HIS	-	expression tag	UNP A0A854BIM6
A	363	HIS	-	expression tag	UNP A0A854BIM6
A	364	HIS	-	expression tag	UNP A0A854BIM6
B	1	MET	-	initiating methionine	UNP A0A854BIM6
B	2	ARG	-	expression tag	UNP A0A854BIM6
B	193	CYS	ASP	engineered mutation	UNP A0A854BIM6
B	357	LEU	-	expression tag	UNP A0A854BIM6
B	358	GLU	-	expression tag	UNP A0A854BIM6
B	359	HIS	-	expression tag	UNP A0A854BIM6
B	360	HIS	-	expression tag	UNP A0A854BIM6
B	361	HIS	-	expression tag	UNP A0A854BIM6
B	362	HIS	-	expression tag	UNP A0A854BIM6
B	363	HIS	-	expression tag	UNP A0A854BIM6
B	364	HIS	-	expression tag	UNP A0A854BIM6

- Molecule 2 is an oligosaccharide called beta-D-ribofuranose-(1-7)-methyl 3-deoxy-beta-D-manno-oct-2-ulopyranosidonic acid.

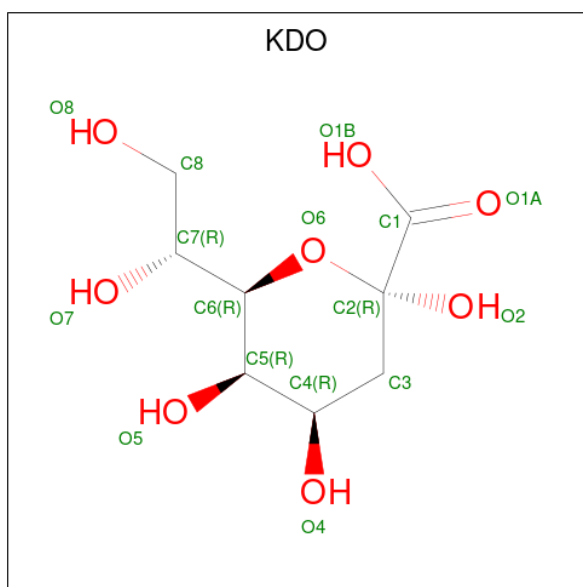
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
2	C	2	Total	C	H	O	0	0	0
			48	14	22	12			
2	D	2	Total	C	H	O	0	0	0
			48	14	22	12			

- Molecule 3 is CYTIDINE-5'-MONOPHOSPHATE (CCD ID: C5P) (formula: C<sub>9</sub>H<sub>14</sub>N<sub>3</sub>O<sub>8</sub>P) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	
3	A	1	Total	C	H	N	O	P	0	0
			32	9	11	3	8	1		
3	B	1	Total	C	H	N	O	P	0	0
			32	9	11	3	8	1		

- Molecule 4 is 3-deoxy- $\alpha$ -D-manno-oct-2-ulopyranosonic acid (CCD ID: KDO) (formula: C<sub>8</sub>H<sub>14</sub>O<sub>8</sub>) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf	
4	A	1	Total	C	H	O	0	0
			26	8	11	7		
4	B	1	Total	C	H	O	0	0
			25	8	10	7		

- Molecule 5 is CHLORIDE ION (CCD ID: CL) (formula: Cl).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	1	Total	Cl	0	0
			1	1		
5	B	1	Total	Cl	0	0
			1	1		

- Molecule 6 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	A	207	Total	O	0	0
			207	207		
6	B	145	Total	O	0	0
			145	145		

### 3 Residue-property plots [i](#)

These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron density. Residues are color-coded according to the number of geometric quality criteria for which they contain at least one outlier: green = 0, yellow = 1, orange = 2 and red = 3 or more. A red dot above a residue indicates a poor fit to the electron density ( $RSRZ > 2$ ). Stretches of 2 or more consecutive residues without any outlier are shown as a green connector. Residues present in the sample, but not in the model, are shown in grey.

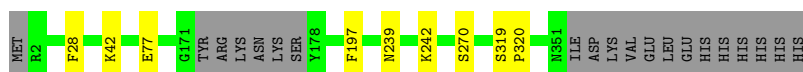
- Molecule 1: KrKA

Chain A:  91% 5%



- Molecule 1: KrKA

Chain B:  92% 5%



- Molecule 2: beta-D-ribofuranose-(1-7)-methyl 3-deoxy-beta-D-manno-oct-2-ulopyranosidonic acid

Chain C:  50% 50%



- Molecule 2: beta-D-ribofuranose-(1-7)-methyl 3-deoxy-beta-D-manno-oct-2-ulopyranosidonic acid

Chain D:  50% 50%



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 63	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	121.72Å 121.72Å 131.96Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	41.18 – 2.21 41.18 – 2.21	Depositor EDS
% Data completeness (in resolution range)	100.0 (41.18-2.21) 100.0 (41.18-2.21)	Depositor EDS
$R_{merge}$	(Not available)	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	1.86 (at 2.22Å)	Xtrriage
Refinement program	PHENIX 1.21.2_5419	Depositor
R, $R_{free}$	0.222 , 0.253 0.221 , 0.251	Depositor DCC
$R_{free}$ test set	2807 reflections (5.09%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	27.7	Xtrriage
Anisotropy	0.248	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.37 , 22.3	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.41$ , $\langle L^2 \rangle = 0.23$	Xtrriage
Estimated twinning fraction	0.258 for h,-h-k,-l	Xtrriage
$F_o, F_c$ correlation	0.97	EDS
Total number of atoms	12086	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	38.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.02% of the height of the origin peak. No significant pseudotranslation is detected.*

<sup>1</sup>Intensities estimated from amplitudes.

<sup>2</sup>Theoretical 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: KDO, CL, C5P, A1CWR, BDR

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	0.11	0/3011	0.26	0/4069
1	B	0.09	0/2979	0.25	0/4028
All	All	0.10	0/5990	0.26	0/8097

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 [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	2930	2852	2874	6	0
1	B	2901	2838	2838	2	0
2	C	26	22	6	1	0
2	D	26	22	6	1	0
3	A	21	11	12	0	0
3	B	21	11	12	0	0
4	A	15	11	12	0	0
4	B	15	10	12	0	0
5	A	1	0	0	0	0
5	B	1	0	0	0	0
6	A	207	0	0	0	0

*Continued on next page...*

Continued from previous page...

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
6	B	145	0	0	0	0
All	All	6309	5777	5772	10	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 1.

All (10) 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)
2:C:2:BDR:O4	2:C:2:BDR:C1	1.65	1.29
2:D:2:BDR:C1	2:D:2:BDR:O4	1.66	1.27
1:A:11:LEU:HD12	1:A:107:THR:HG23	1.90	0.52
1:A:227:HIS:HB3	1:A:230:VAL:HG23	1.94	0.50
1:A:222:VAL:HB	1:A:247:VAL:HG22	1.97	0.46
1:A:1:MET:HE3	1:A:39:TYR:HD1	1.82	0.45
1:B:319:SER:N	1:B:320:PRO:CD	2.84	0.41
1:A:66:GLU:HG3	1:A:66:GLU:O	2.21	0.41
1:B:239:ASN:HA	1:B:242:LYS:HD3	2.02	0.41
1:A:319:SER:N	1:A:320:PRO:CD	2.85	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	344/364 (94%)	331 (96%)	12 (4%)	1 (0%)	36	41
1	B	340/364 (93%)	324 (95%)	15 (4%)	1 (0%)	36	41
All	All	684/728 (94%)	655 (96%)	27 (4%)	2 (0%)	36	41

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	270	SER
1	B	270	SER

### 5.3.2 Protein sidechains [i](#)

In the following table, the Percentiles column shows the percent sidechain outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the sidechain conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles
1	A	326/342 (95%)	322 (99%)	4 (1%)	63 76
1	B	322/342 (94%)	318 (99%)	4 (1%)	63 76
All	All	648/684 (95%)	640 (99%)	8 (1%)	63 76

All (8) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	28	PHE
1	A	217	LYS
1	A	304	VAL
1	A	330	VAL
1	B	28	PHE
1	B	42	LYS
1	B	77	GLU
1	B	197	PHE

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (5) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	18	GLN
1	A	20	ASN
1	A	94	ASN
1	B	18	GLN
1	B	312	HIS

### 5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

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

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

## 5.5 Carbohydrates [i](#)

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	A1CWR	C	1	2	17,17,17	1.86	4 (23%)	19,25,25	0.89	0
2	BDR	C	2	2	9,9,10	5.81	5 (55%)	11,12,14	1.42	2 (18%)
2	A1CWR	D	1	2	17,17,17	1.87	4 (23%)	19,25,25	1.00	1 (5%)
2	BDR	D	2	2	9,9,10	5.82	6 (66%)	11,12,14	1.27	2 (18%)

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	A1CWR	C	1	2	-	3/15/33/33	0/1/1/1
2	BDR	C	2	2	-	0/2/15/18	0/1/1/1
2	A1CWR	D	1	2	-	8/15/33/33	0/1/1/1
2	BDR	D	2	2	-	0/2/15/18	0/1/1/1

All (19) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	C	2	BDR	C1-C2	-10.51	1.34	1.51
2	D	2	BDR	C1-C2	-10.35	1.34	1.51
2	D	2	BDR	O4-C1	10.31	1.66	1.43
2	C	2	BDR	O4-C1	10.16	1.65	1.43
2	D	2	BDR	O4-C4	-7.89	1.31	1.44
2	C	2	BDR	O4-C4	-7.80	1.31	1.44

*Continued on next page...*

Continued from previous page...

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	C	1	A1CWR	O6-C2	4.79	1.48	1.42
2	D	1	A1CWR	O6-C2	4.77	1.48	1.42
2	D	2	BDR	O3-C3	-3.99	1.33	1.43
2	C	2	BDR	O3-C3	-3.97	1.33	1.43
2	C	1	A1CWR	O6-C6	3.63	1.49	1.44
2	D	1	A1CWR	O6-C6	3.47	1.49	1.44
2	C	2	BDR	C3-C4	2.96	1.60	1.53
2	D	2	BDR	C3-C4	2.90	1.60	1.53
2	C	1	A1CWR	C3-C4	-2.61	1.49	1.53
2	D	1	A1CWR	C3-C4	-2.61	1.49	1.53
2	D	1	A1CWR	C4-C5	-2.31	1.48	1.52
2	C	1	A1CWR	C4-C5	-2.18	1.49	1.52
2	D	2	BDR	O2-C2	2.02	1.47	1.43

All (5) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	C	2	BDR	O4-C4-C3	2.68	107.11	104.63
2	C	2	BDR	C5-C4-C3	-2.65	108.85	115.10
2	D	2	BDR	O4-C4-C3	2.62	107.05	104.63
2	D	2	BDR	C5-C4-C3	-2.45	109.31	115.10
2	D	1	A1CWR	O6-C2-C3	2.07	114.12	111.35

There are no chirality outliers.

All (11) torsion outliers are listed below:

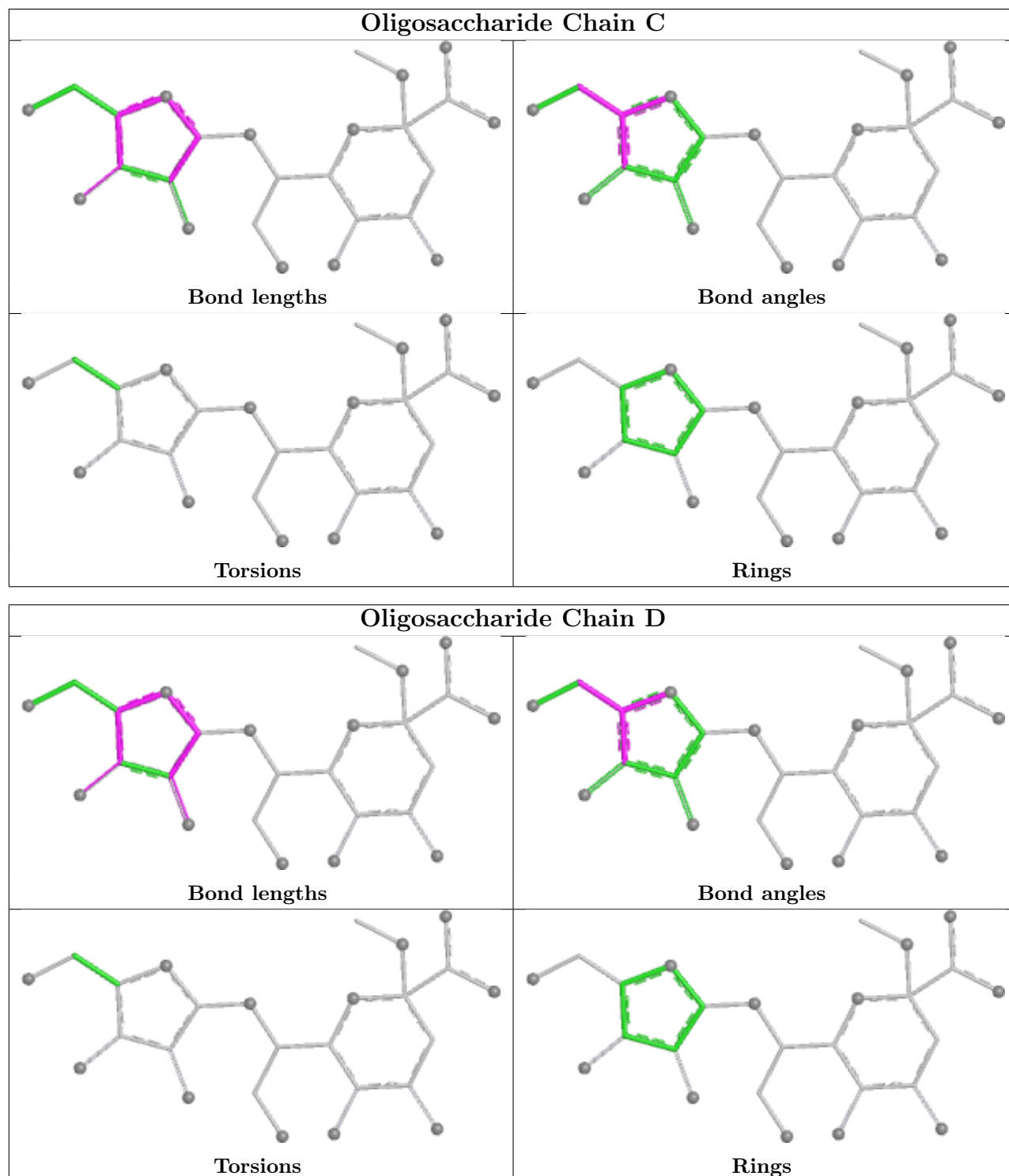
Mol	Chain	Res	Type	Atoms
2	C	1	A1CWR	O1B-C1-C2-O2
2	D	1	A1CWR	C5-C6-C7-C8
2	D	1	A1CWR	C5-C6-C7-O7
2	D	1	A1CWR	O6-C6-C7-C8
2	D	1	A1CWR	O6-C6-C7-O7
2	D	1	A1CWR	O1B-C1-C2-O2
2	D	1	A1CWR	C1-C2-O2-C02
2	D	1	A1CWR	C3-C2-O2-C02
2	D	1	A1CWR	O6-C2-O2-C02
2	C	1	A1CWR	O1A-C1-C2-O2
2	C	1	A1CWR	O1B-C1-C2-O6

There are no ring outliers.

2 monomers are involved in 2 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	D	2	BDR	1	0
2	C	2	BDR	1	0

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



## 5.6 Ligand geometry

Of 6 ligands modelled in this entry, 2 are monoatomic - leaving 4 for Mogul analysis.

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
4	KDO	A	402	1	15,15,16	1.56	2 (13%)	17,21,24	1.27	2 (11%)
4	KDO	B	402	1	15,15,16	1.64	2 (13%)	17,21,24	1.19	2 (11%)
3	C5P	B	401	-	22,22,22	0.46	0	32,33,33	0.73	1 (3%)
3	C5P	A	401	-	22,22,22	0.46	0	32,33,33	0.65	1 (3%)

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
4	KDO	A	402	1	-	4/10/26/30	0/1/1/1
4	KDO	B	402	1	-	0/10/26/30	0/1/1/1
3	C5P	B	401	-	-	1/10/26/26	0/2/2/2
3	C5P	A	401	-	-	0/10/26/26	0/2/2/2

All (4) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	B	402	KDO	O6-C6	3.94	1.50	1.44
4	A	402	KDO	O6-C6	3.52	1.49	1.44
4	A	402	KDO	C4-C5	-2.73	1.48	1.52
4	B	402	KDO	C4-C5	-2.64	1.48	1.52

All (6) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	B	401	C5P	O3P-P-O5'	-2.68	99.69	106.67
4	A	402	KDO	O1B-C1-C2	2.52	119.25	112.71
4	B	402	KDO	O1B-C1-C2	2.51	119.24	112.71

*Continued on next page...*

*Continued from previous page...*

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	A	402	KDO	O6-C6-C5	2.50	111.48	107.94
4	B	402	KDO	O6-C6-C5	2.43	111.37	107.94
3	A	401	C5P	O3P-P-O5'	-2.11	101.16	106.67

There are no chirality outliers.

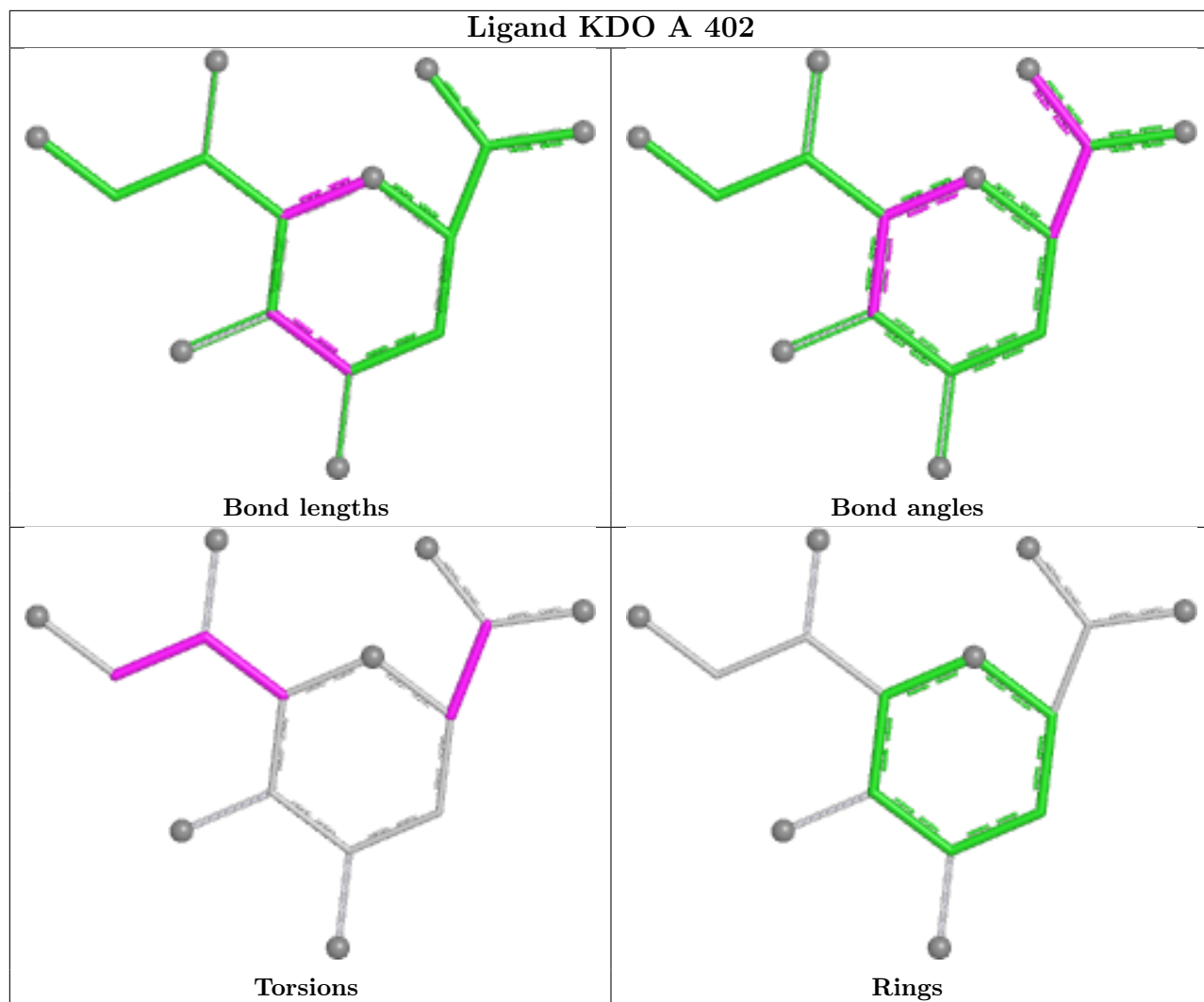
All (5) torsion outliers are listed below:

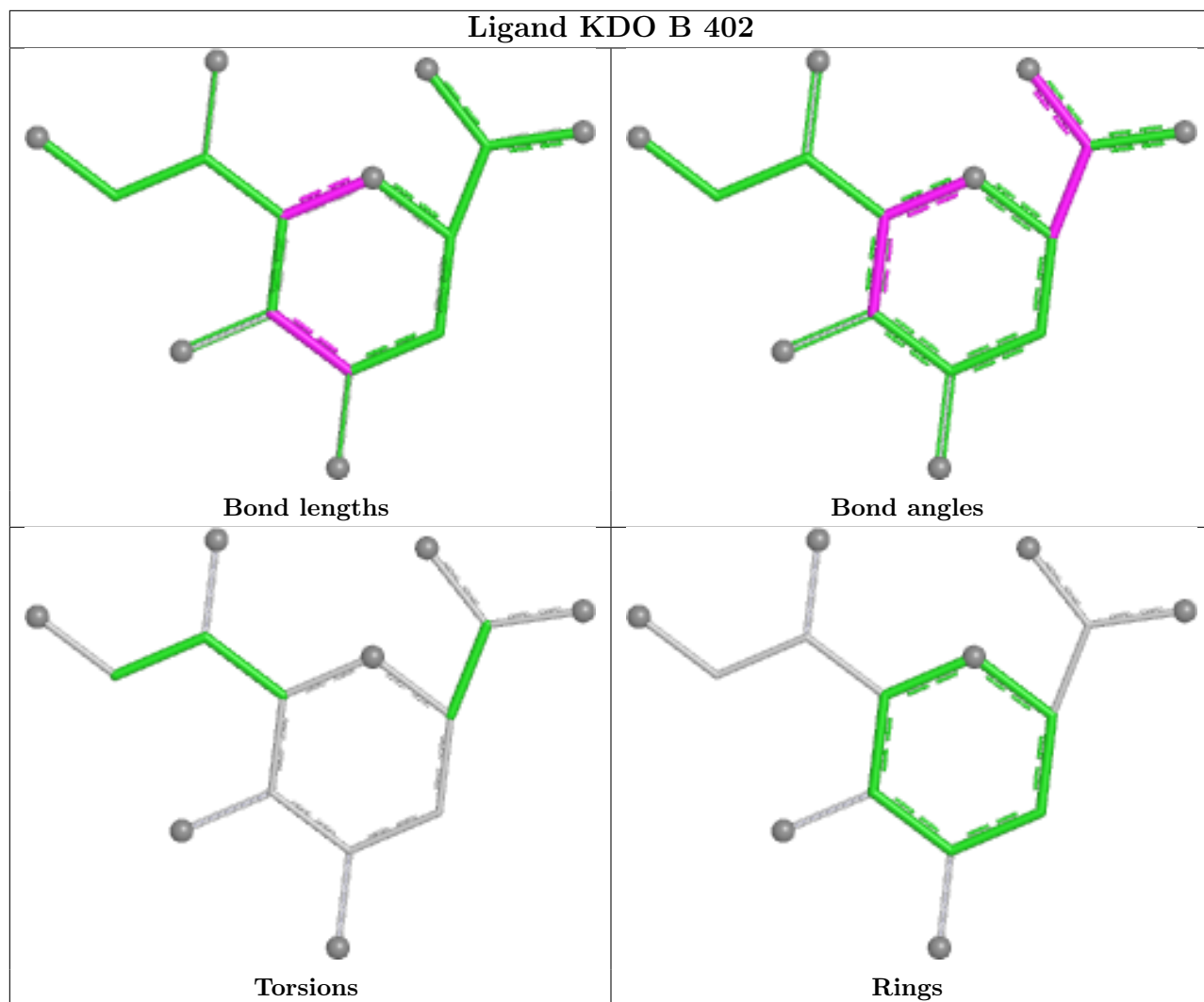
Mol	Chain	Res	Type	Atoms
4	A	402	KDO	O6-C6-C7-C8
3	B	401	C5P	C5'-O5'-P-O2P
4	A	402	KDO	O1A-C1-C2-O6
4	A	402	KDO	C5-C6-C7-C8
4	A	402	KDO	O7-C7-C8-O8

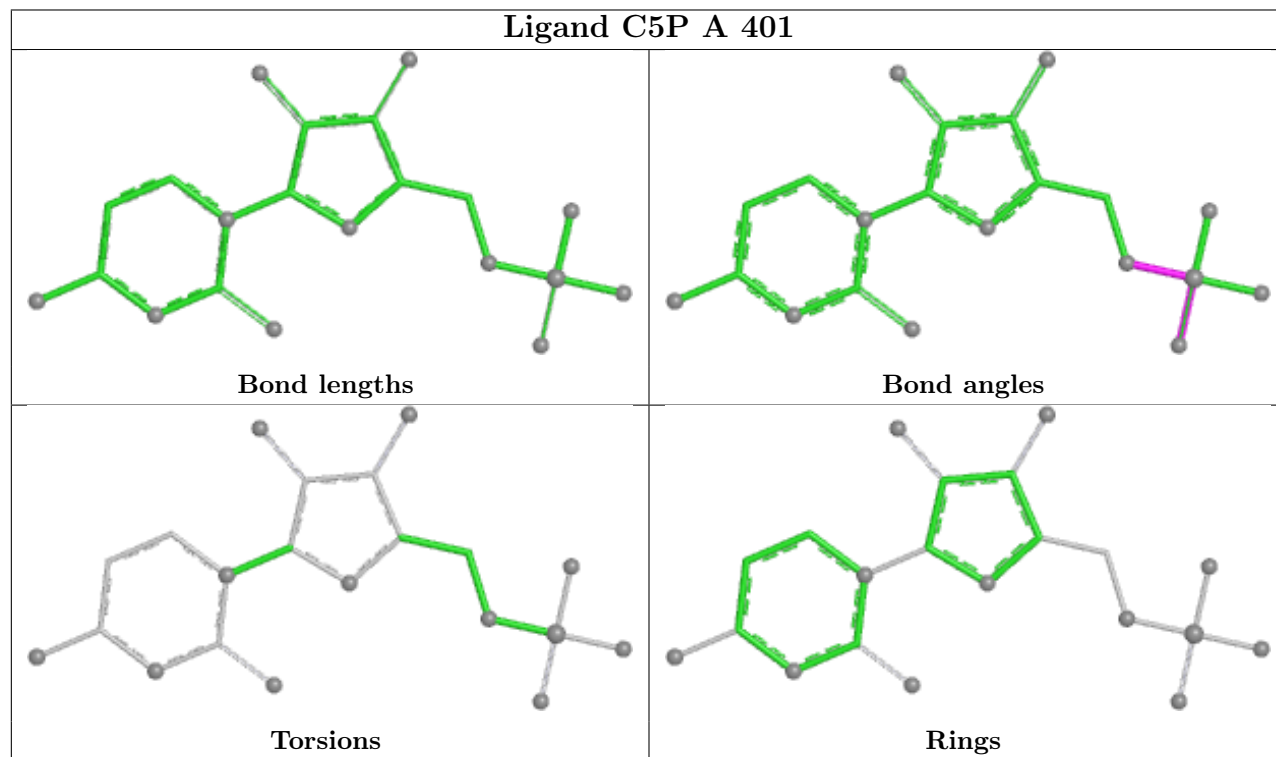
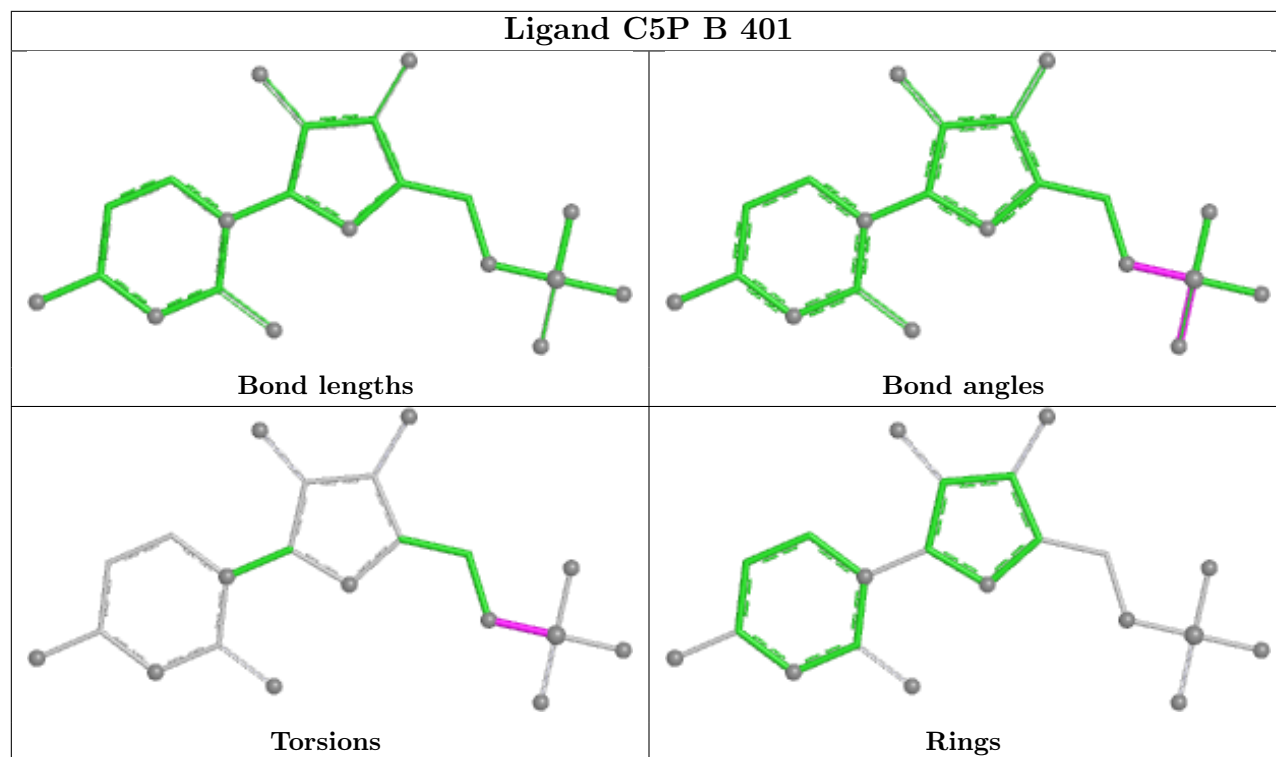
There are no ring outliers.

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 all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less than 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.







## 5.7 Other polymers [\(i\)](#)

There are no such residues in this entry.

## 5.8 Polymer linkage issues

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, 95<sup>th</sup> 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 <sup>2</sup> )	Q<0.9
1	A	347/364 (95%)	-1.56	0 100 100	19, 31, 59, 105	1 (0%)
1	B	344/364 (94%)	-1.48	0 100 100	21, 37, 73, 120	0
All	All	691/728 (94%)	-1.52	0 100 100	19, 35, 66, 120	1 (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](#)

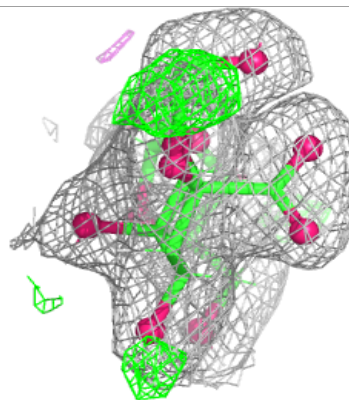
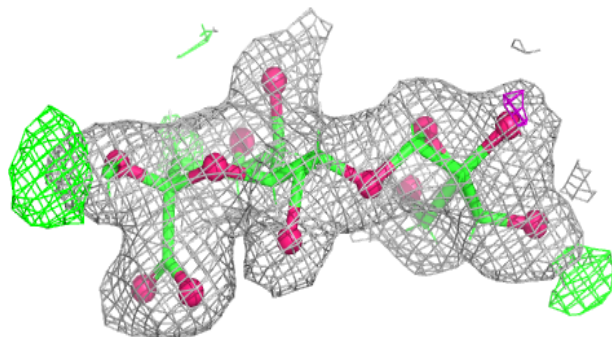
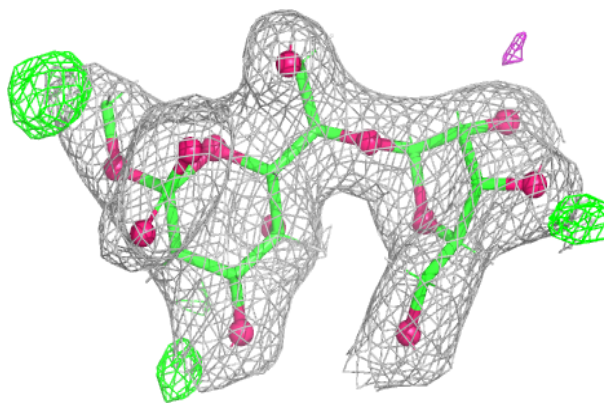
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95<sup>th</sup> percentile and maximum values of B factors of atoms in the group. The column labelled ‘Q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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å <sup>2</sup> )	Q<0.9
2	A1CWR	D	1	17/17	0.98	0.05	32,41,52,52	0
2	BDR	C	2	9/10	0.99	0.02	18,26,30,32	18
2	A1CWR	C	1	17/17	0.99	0.03	24,30,35,38	30
2	BDR	D	2	9/10	0.99	0.03	26,32,38,38	0

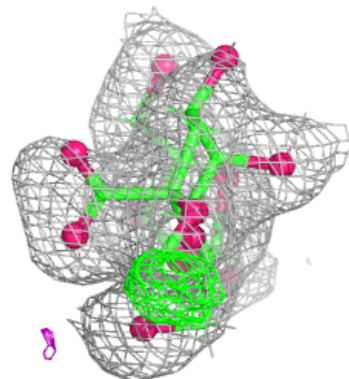
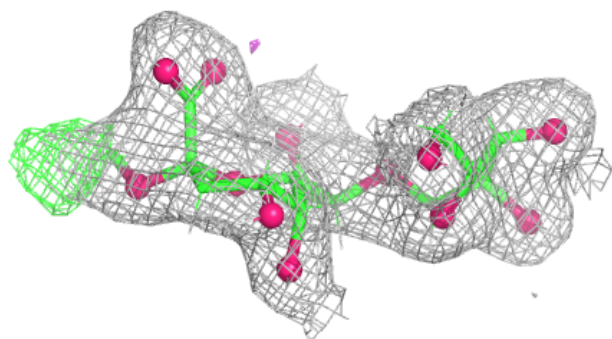
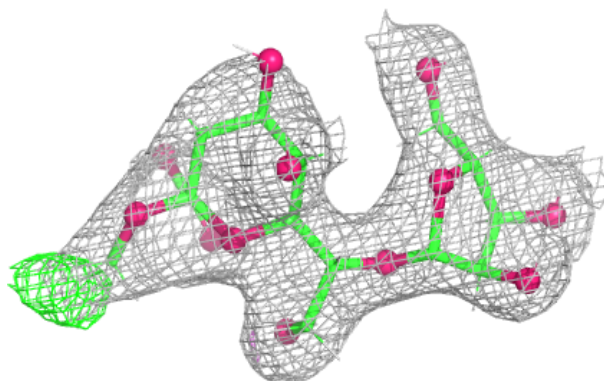
The following is a graphical depiction of the model fit to experimental electron density for oligosaccharide. Each fit is shown from different orientation to approximate a three-dimensional view.

**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)



## 6.4 Ligands

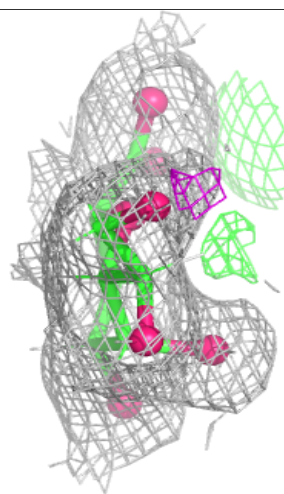
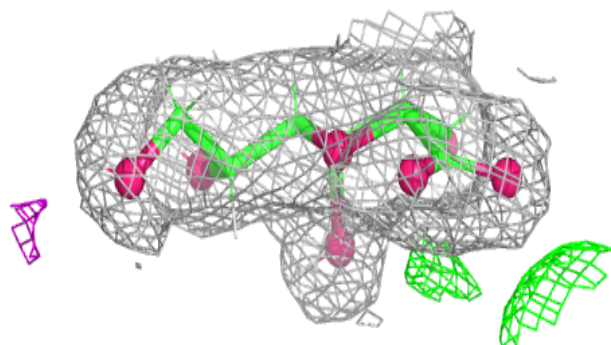
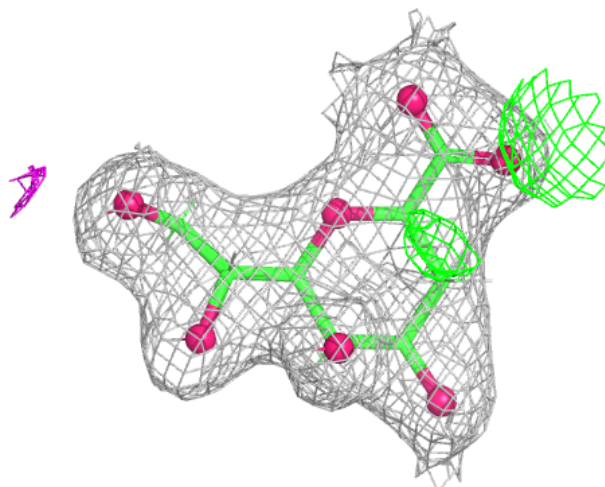
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95<sup>th</sup> percentile and maximum values of B factors of atoms in the group. The column labelled 'Q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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å <sup>2</sup> )	Q<0.9
4	KDO	A	402	15/16	0.99	0.02	19,25,30,30	0
4	KDO	B	402	15/16	0.99	0.02	21,26,31,32	0
5	CL	B	403	1/1	0.99	0.05	52,52,52,52	0
3	C5P	B	401	21/21	1.00	0.02	18,22,27,28	0
5	CL	A	403	1/1	1.00	0.04	39,39,39,39	0
3	C5P	A	401	21/21	1.00	0.02	17,21,26,27	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.

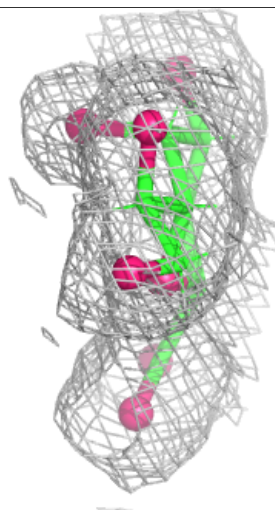
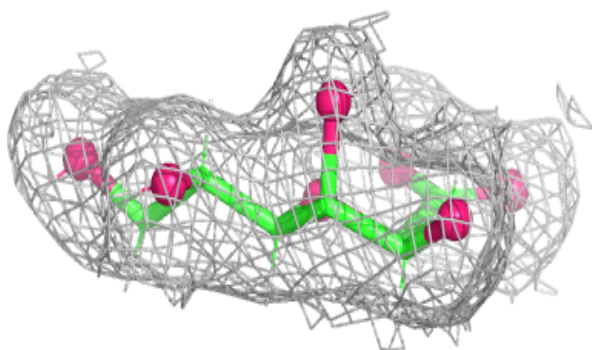
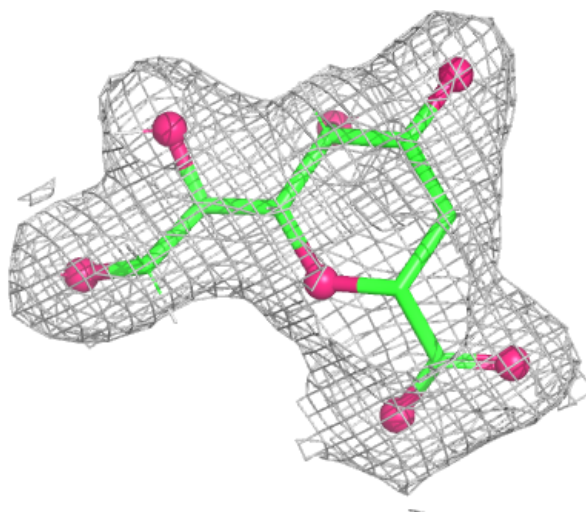
**Electron density around KDO A 402:**

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



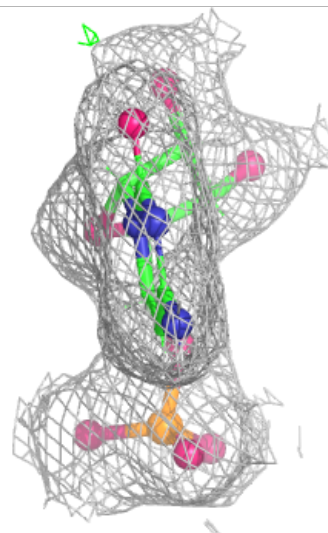
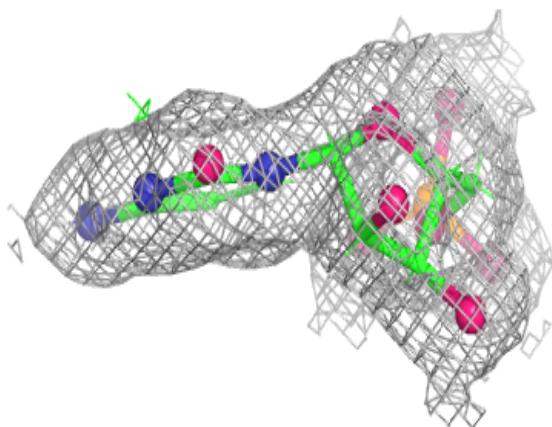
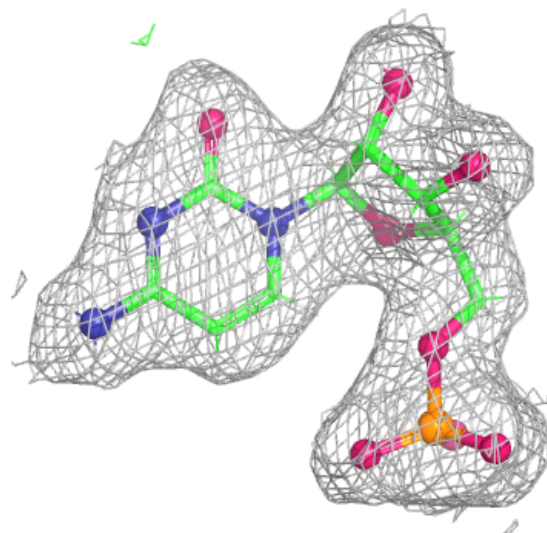
**Electron density around KDO B 402:**

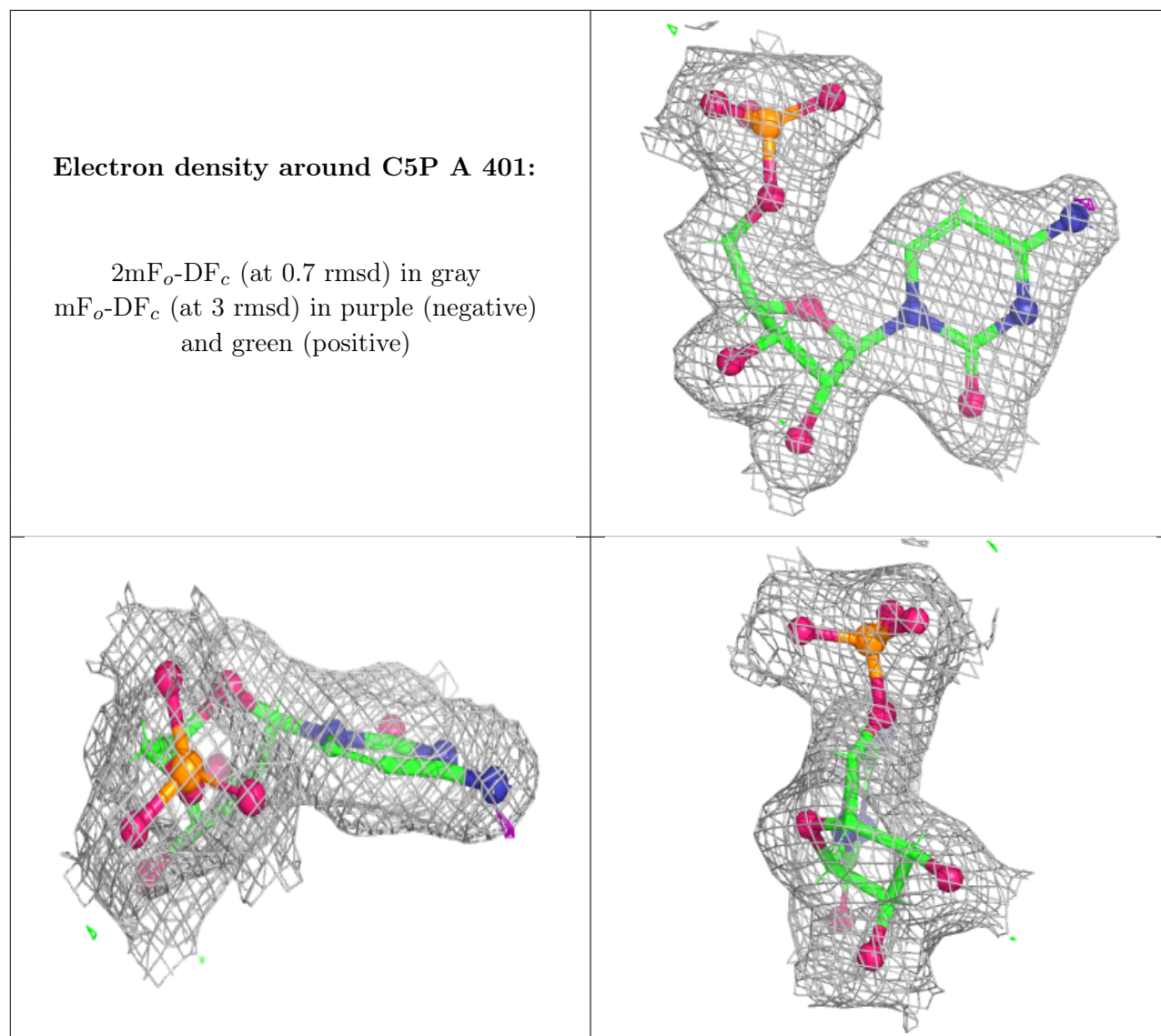
$2mF_o-DF_c$  (at 0.7 rmsd) in gray  
 $mF_o-DF_c$  (at 3 rmsd) in purple (negative)  
and green (positive)



**Electron density around C5P B 401:**

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





## 6.5 Other polymers [\(i\)](#)

There are no such residues in this entry.