



# wwPDB X-ray Structure Validation Summary Report ⓘ

May 25, 2020 – 05:09 am BST

PDB ID : 2BO8  
Title : DISSECTION OF MANNOSYLGLYCERATE SYNTHASE: AN ARCHETYPAL MANNOSYLTRANSFERASE  
Authors : Flint, J.; Taylor, E.; Yang, M.; Bolam, D.N.; Tailford, L.E.; Martinez-Fleites, C.; Dodson, E.J.; Davis, B.G.; Gilbert, H.J.; Davies, G.J.  
Deposited on : 2005-04-08  
Resolution : 2.80 Å(reported)

This is a wwPDB X-ray Structure Validation Summary 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 following versions of software and data (see [references ⓘ](#)) were used in the production of this report:

MolProbity	:	4.02b-467
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	2.11
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.11

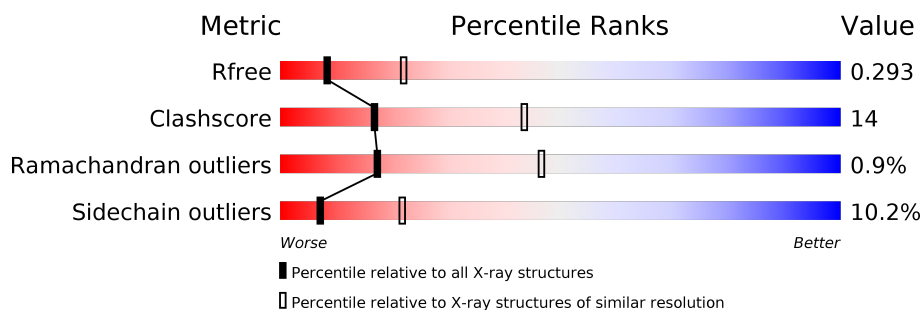
# 1 Overall quality at a glance ⓘ

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 2.80 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))
$R_{free}$	130704	3140 (2.80-2.80)
Clashscore	141614	3569 (2.80-2.80)
Ramachandran outliers	138981	3498 (2.80-2.80)
Sidechain outliers	138945	3500 (2.80-2.80)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments on 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  $\leq 5\%$ .

Mol	Chain	Length	Quality of chain
1	A	397	66% 21% 7% . .
1	B	397	64% 24% 6% . .
1	C	397	70% 19% 6% . .
1	D	397	72% 16% 6% . .
1	E	397	73% 18% 5% . .
1	F	397	72% 20% . . .
1	G	397	68% 21% 7% . .

*Continued on next page...*

Continued from previous page...

Mol	Chain	Length	Quality of chain
1	H	397	<div><div></div><div>73%19%<div><div></div><div></div><div></div></div></div></div>
1	I	397	<div><div></div><div>72%20%<div><div></div><div></div><div></div></div></div></div>
1	J	397	<div><div></div><div>68%21%5%<div><div></div><div></div><div></div></div></div></div>

## 2 Entry composition

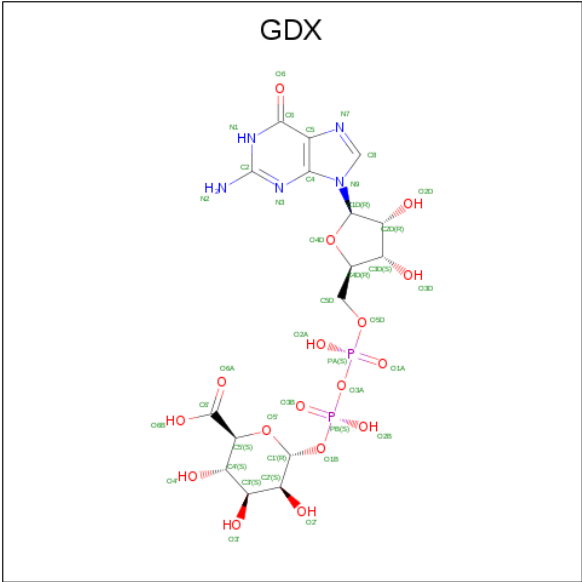
There are 5 unique types of molecules in this entry. The entry contains 32098 atoms, of which 0 are hydrogens and 0 are deuteriums.

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 MANNOSYLGLYCERATE SYNTHASE.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	381	Total	C	N	O	S	0	0	1
			3138	2006	558	559	15			
1	B	381	Total	C	N	O	S	0	0	1
			3138	2006	558	559	15			
1	C	381	Total	C	N	O	S	0	0	1
			3138	2006	558	559	15			
1	D	381	Total	C	N	O	S	0	0	1
			3138	2006	558	559	15			
1	E	381	Total	C	N	O	S	0	0	1
			3138	2006	558	559	15			
1	F	381	Total	C	N	O	S	0	0	1
			3138	2006	558	559	15			
1	G	381	Total	C	N	O	S	0	0	1
			3138	2006	558	559	15			
1	H	381	Total	C	N	O	S	0	0	1
			3138	2006	558	559	15			
1	I	381	Total	C	N	O	S	0	0	1
			3138	2006	558	559	15			
1	J	381	Total	C	N	O	S	0	0	1
			3138	2006	558	559	15			

- Molecule 2 is GUANOSINE 5'-(TRIHYDROGEN DIPHOSPHATE), P'-D-MANNOPYRANOSYL ESTER (three-letter code: GDX) (formula: C<sub>16</sub>H<sub>23</sub>N<sub>5</sub>O<sub>17</sub>P<sub>2</sub>).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
2	A	1	Total	C	N	O	P	0	0
			39	16	5	16	2		
2	B	1	Total	C	N	O	P	0	0
			39	16	5	16	2		
2	C	1	Total	C	N	O	P	0	0
			39	16	5	16	2		
2	D	1	Total	C	N	O	P	0	0
			39	16	5	16	2		
2	E	1	Total	C	N	O	P	0	0
			39	16	5	16	2		
2	F	1	Total	C	N	O	P	0	0
			39	16	5	16	2		
2	G	1	Total	C	N	O	P	0	0
			39	16	5	16	2		
2	H	1	Total	C	N	O	P	0	0
			39	16	5	16	2		
2	I	1	Total	C	N	O	P	0	0
			39	16	5	16	2		
2	J	1	Total	C	N	O	P	0	0
			39	16	5	16	2		

- Molecule 3 is MANGANESE (II) ION (three-letter code: MN) (formula: Mn).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	G	1	Total	Mn	0	0
			1	1		
3	J	1	Total	Mn	0	0
			1	1		

Continued on next page...

*Continued from previous page...*

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	D	1	Total 1	Mn 1	0	0
3	E	1	Total 1	Mn 1	0	0
3	H	1	Total 1	Mn 1	0	0
3	B	1	Total 1	Mn 1	0	0
3	I	1	Total 1	Mn 1	0	0
3	C	1	Total 1	Mn 1	0	0
3	A	1	Total 1	Mn 1	0	0
3	F	1	Total 1	Mn 1	0	0

- Molecule 4 is CHLORIDE ION (three-letter code: CL) (formula: Cl).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	G	1	Total 1	Cl 1	0	0
4	J	1	Total 1	Cl 1	0	0
4	D	1	Total 1	Cl 1	0	0
4	E	1	Total 1	Cl 1	0	0
4	H	1	Total 1	Cl 1	0	0
4	B	1	Total 1	Cl 1	0	0
4	I	1	Total 1	Cl 1	0	0
4	C	1	Total 1	Cl 1	0	0
4	A	1	Total 1	Cl 1	0	0
4	F	1	Total 1	Cl 1	0	0

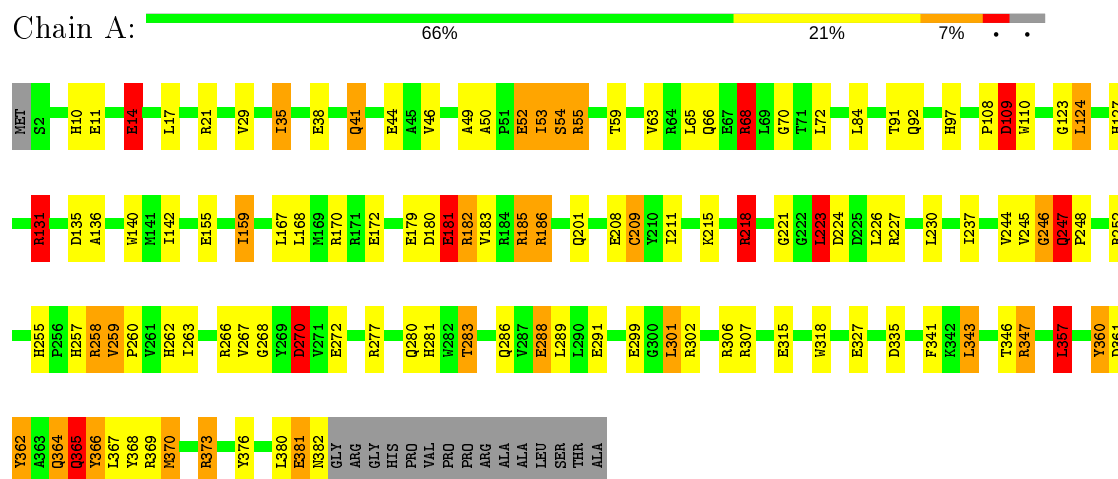
- Molecule 5 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	78	Total 78	O 78	0	0
5	B	80	Total 80	O 80	0	0
5	C	38	Total 38	O 38	0	0
5	D	27	Total 27	O 27	0	0
5	E	34	Total 34	O 34	0	0
5	F	3	Total 3	O 3	0	0
5	G	23	Total 23	O 23	0	0
5	H	6	Total 6	O 6	0	0
5	I	13	Total 13	O 13	0	0
5	J	6	Total 6	O 6	0	0

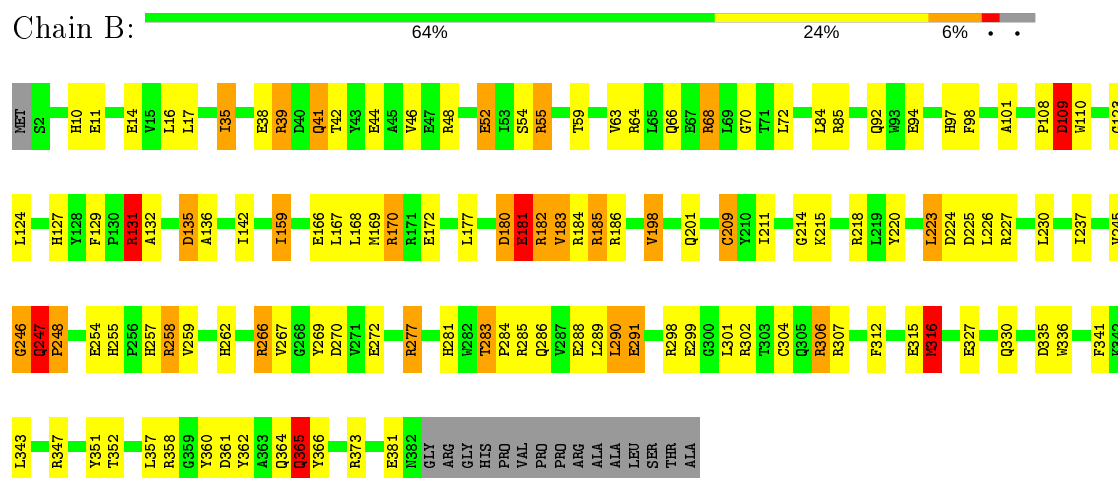
### 3 Residue-property plots

These plots are drawn for all protein, RNA and DNA 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. 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. 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.

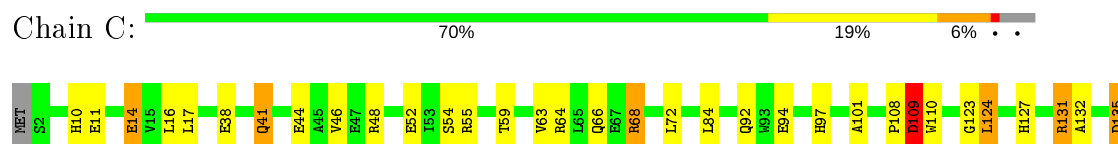
#### • Molecule 1: MANNOSYLGLYCERATE SYNTHASE



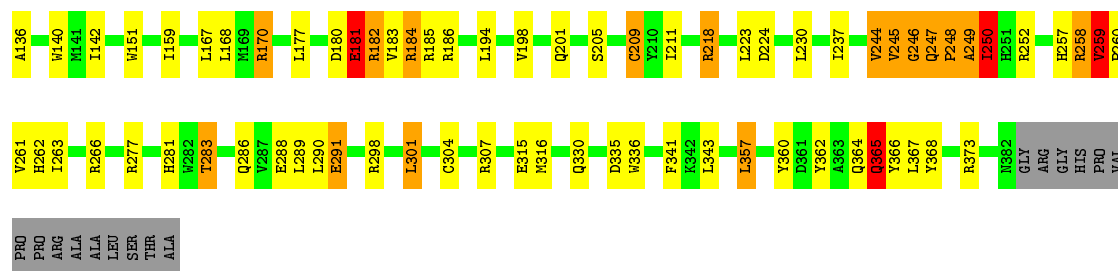
#### • Molecule 1: MANNOSYLGLYCERATE SYNTHASE



#### • Molecule 1: MANNOSYLGLYCERATE SYNTHASE

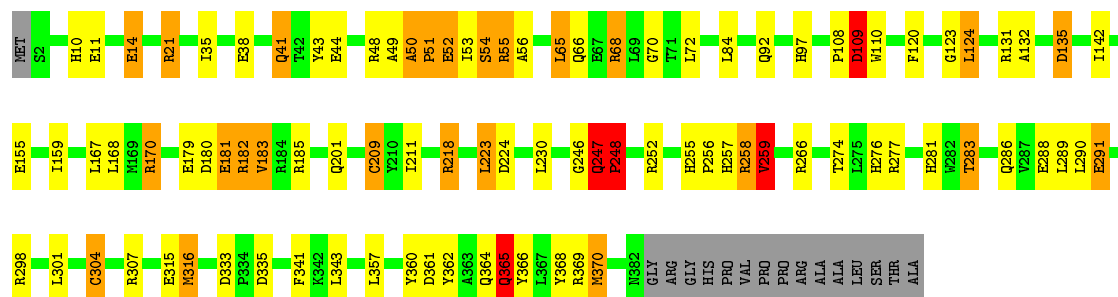






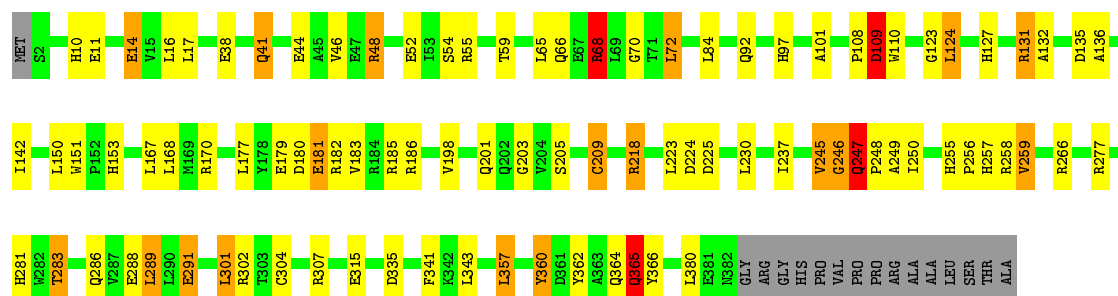
• Molecule 1: MANNOSYLGLYCERATE SYNTHASE

Chain D: 72% 16% 6% • •



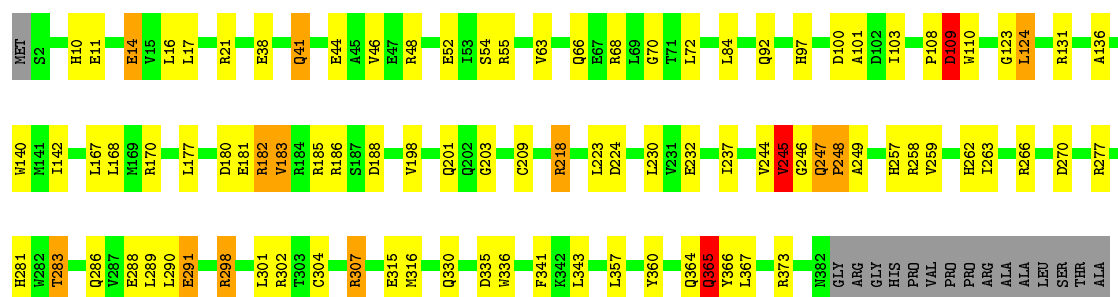
• Molecule 1: MANNOSYLGLYCERATE SYNTHASE

Chain E: 73% 18% 5% • •



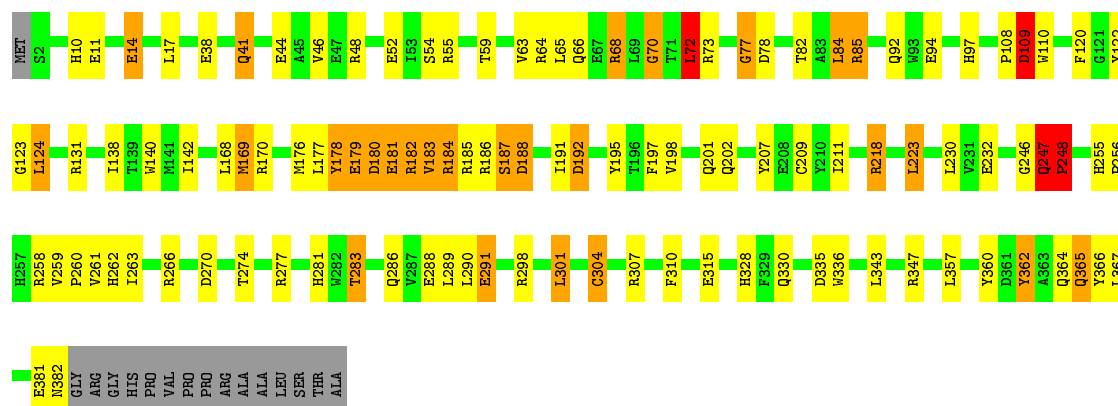
• Molecule 1: MANNOSYLGLYCERATE SYNTHASE

Chain F: 72% 20% • •



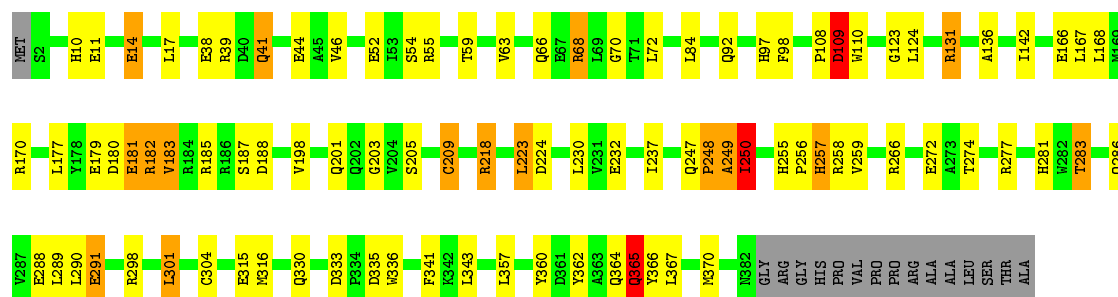
• Molecule 1: MANNOSYLGLYCERATE SYNTHASE

Chain G: 



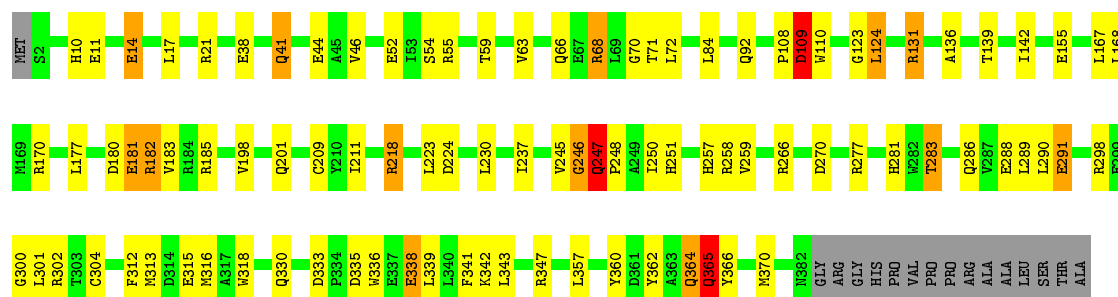
• Molecule 1: MANNOSYLGLYCERATE SYNTHASE

Chain H: 



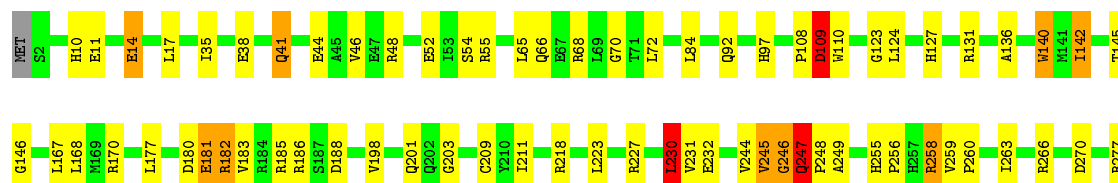
• Molecule 1: MANNOSYLGLYCERATE SYNTHASE

Chain I: 



• Molecule 1: MANNOSYLGLYCERATE SYNTHASE

Chain J: 





## 4 Data and refinement statistics

Property	Value	Source
Space group	P 2 <sub>1</sub> 2 <sub>1</sub> 2	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	405.09 Å   161.43 Å   108.71 Å 90.00°   90.00°   90.00°	Depositor
Resolution (Å)	74.12 – 2.80 74.10 – 2.80	Depositor EDS
% Data completeness (in resolution range)	97.4 (74.12-2.80) 97.4 (74.10-2.80)	Depositor EDS
$R_{merge}$	0.10	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	3.49 (at 2.82 Å)	Xtriage
Refinement program	REFMAC 5.2.0005	Depositor
R, $R_{free}$	0.195   ,   0.216 0.282   ,   0.293	Depositor DCC
$R_{free}$ test set	8687 reflections (5.07%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	58.1	Xtriage
Anisotropy	0.151	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.35 , 59.0	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.47$ , $\langle L^2 \rangle = 0.29$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
$F_o, F_c$ correlation	0.88	EDS
Total number of atoms	32098	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	58.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.57% 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 ⓘ

### 5.1 Standard geometry ⓘ

Bond lengths and bond angles in the following residue types are not validated in this section: GDX, MN, CL

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	1.51	24/3229 (0.7%)	1.24	28/4394 (0.6%)
1	B	1.50	28/3229 (0.9%)	1.22	29/4394 (0.7%)
1	C	1.09	7/3229 (0.2%)	0.97	13/4394 (0.3%)
1	D	1.16	9/3229 (0.3%)	0.95	10/4394 (0.2%)
1	E	1.00	4/3229 (0.1%)	0.92	7/4394 (0.2%)
1	F	0.75	3/3229 (0.1%)	0.77	4/4394 (0.1%)
1	G	1.17	15/3229 (0.5%)	0.97	8/4394 (0.2%)
1	H	0.80	2/3229 (0.1%)	0.82	4/4394 (0.1%)
1	I	0.90	5/3229 (0.2%)	0.88	9/4394 (0.2%)
1	J	1.14	24/3229 (0.7%)	0.98	7/4394 (0.2%)
All	All	1.13	121/32290 (0.4%)	0.98	119/43940 (0.3%)

Chiral center outliers are detected by calculating the chiral volume of a chiral center and verifying if the center is modelled as a planar moiety or with the opposite hand. A planarity outlier is detected by checking planarity of atoms in a peptide group, atoms in a mainchain group or atoms of a sidechain that are expected to be planar.

Mol	Chain	#Chirality outliers	#Planarity outliers
1	A	0	2
1	B	0	3
1	C	0	6
1	D	0	3
1	E	0	4
1	F	0	4
1	G	0	4
1	H	0	4
1	I	1	3
1	J	0	3
All	All	1	36

The worst 5 of 121 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	D	209	CYS	CB-SG	-17.09	1.53	1.82
1	A	209	CYS	CB-SG	-14.65	1.57	1.82
1	A	365	GLN	CB-CG	14.57	1.91	1.52
1	B	209	CYS	CB-SG	-14.55	1.57	1.82
1	I	209	CYS	CB-SG	-13.87	1.58	1.82

The worst 5 of 119 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	G	68	ARG	NE-CZ-NH2	12.44	126.52	120.30
1	J	347	ARG	NE-CZ-NH1	10.73	125.66	120.30
1	B	135	ASP	CB-CG-OD1	-10.67	108.69	118.30
1	J	347	ARG	NE-CZ-NH2	-10.20	115.20	120.30
1	A	347	ARG	NE-CZ-NH2	-9.76	115.42	120.30

All (1) chirality outliers are listed below:

Mol	Chain	Res	Type	Atom
1	I	245	VAL	CA

5 of 36 planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	108	PRO	Peptide
1	A	247	GLN	Peptide
1	B	108	PRO	Peptide
1	B	246	GLY	Peptide
1	B	247	GLN	Peptide

## 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	3138	0	3037	102	2
1	B	3138	0	3037	91	1
1	C	3138	0	3037	96	0
1	D	3138	0	3037	101	0
1	E	3138	0	3037	70	0

*Continued on next page...*

*Continued from previous page...*

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	F	3138	0	3037	81	0
1	G	3138	0	3037	106	1
1	H	3138	0	3037	79	0
1	I	3138	0	3037	78	0
1	J	3138	0	3036	100	0
2	A	39	0	20	4	0
2	B	39	0	20	4	0
2	C	39	0	20	3	0
2	D	39	0	20	4	0
2	E	39	0	20	3	0
2	F	39	0	20	3	0
2	G	39	0	20	3	0
2	H	39	0	20	3	0
2	I	39	0	20	3	0
2	J	39	0	20	3	0
3	A	1	0	0	0	0
3	B	1	0	0	0	0
3	C	1	0	0	0	0
3	D	1	0	0	0	0
3	E	1	0	0	0	0
3	F	1	0	0	0	0
3	G	1	0	0	0	0
3	H	1	0	0	0	0
3	I	1	0	0	0	0
3	J	1	0	0	0	0
4	A	1	0	0	0	0
4	B	1	0	0	1	0
4	C	1	0	0	1	0
4	D	1	0	0	0	0
4	E	1	0	0	1	0
4	F	1	0	0	1	0
4	G	1	0	0	1	0
4	H	1	0	0	1	0
4	I	1	0	0	1	0
4	J	1	0	0	1	0
5	A	78	0	0	17	0
5	B	80	0	0	12	0
5	C	38	0	0	12	0
5	D	27	0	0	3	0
5	E	34	0	0	6	0
5	F	3	0	0	1	0
5	G	23	0	0	9	0

*Continued on next page...*

*Continued from previous page...*

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
5	H	6	0	0	2	0
5	I	13	0	0	6	0
5	J	6	0	0	0	0
All	All	32098	0	30569	880	2

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 14.

The worst 5 of 880 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:365:GLN:CB	1:C:365:GLN:CG	1.76	1.61
1:B:365:GLN:CG	1:B:365:GLN:CB	1.75	1.55
1:B:316:MET:SD	1:B:316:MET:CG	2.03	1.46
1:J:247:GLN:CB	1:J:248:PRO:HD3	1.43	1.44
1:A:365:GLN:CB	1:A:365:GLN:CG	1.91	1.44

All (2) 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:380:LEU:O	1:G:179:GLU:OE2[1_554]	1.86	0.34
1:A:181:GLU:OE2	1:B:64:ARG:NH2[3_545]	2.17	0.03

## 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	379/397 (96%)	357 (94%)	16 (4%)	6 (2%)	9	31
1	B	379/397 (96%)	363 (96%)	13 (3%)	3 (1%)	19	49

*Continued on next page...*



*Continued from previous page...*

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	C	379/397 (96%)	363 (96%)	13 (3%)	3 (1%)	19	49
1	D	379/397 (96%)	360 (95%)	14 (4%)	5 (1%)	12	36
1	E	379/397 (96%)	363 (96%)	14 (4%)	2 (0%)	29	61
1	F	379/397 (96%)	364 (96%)	13 (3%)	2 (0%)	29	61
1	G	379/397 (96%)	359 (95%)	15 (4%)	5 (1%)	12	36
1	H	379/397 (96%)	365 (96%)	12 (3%)	2 (0%)	29	61
1	I	379/397 (96%)	366 (97%)	11 (3%)	2 (0%)	29	61
1	J	379/397 (96%)	353 (93%)	22 (6%)	4 (1%)	14	41
All	All	3790/3970 (96%)	3613 (95%)	143 (4%)	34 (1%)	17	46

5 of 34 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	109	ASP
1	B	109	ASP
1	B	247	GLN
1	B	248	PRO
1	C	109	ASP

### 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	326/338 (96%)	290 (89%)	36 (11%)	6	19
1	B	326/338 (96%)	290 (89%)	36 (11%)	6	19
1	C	326/338 (96%)	292 (90%)	34 (10%)	7	21
1	D	326/338 (96%)	289 (89%)	37 (11%)	6	18
1	E	326/338 (96%)	294 (90%)	32 (10%)	8	24
1	F	326/338 (96%)	294 (90%)	32 (10%)	8	24
1	G	326/338 (96%)	297 (91%)	29 (9%)	9	28
1	H	326/338 (96%)	293 (90%)	33 (10%)	7	22

*Continued on next page...*

*Continued from previous page...*

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	I	326/338 (96%)	295 (90%)	31 (10%)	8	25
1	J	326/338 (96%)	292 (90%)	34 (10%)	7	21
All	All	3260/3380 (96%)	2926 (90%)	334 (10%)	7	22

5 of 334 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	E	72	LEU
1	F	92	GLN
1	J	72	LEU
1	E	124	LEU
1	E	291	GLU

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 88 such sidechains are listed below:

Mol	Chain	Res	Type
1	E	153	HIS
1	F	257	HIS
1	J	66	GLN
1	E	255	HIS
1	F	10	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](#)

There are no carbohydrates in this entry.

## 5.6 Ligand geometry [i](#)

Of 30 ligands modelled in this entry, 20 are monoatomic - leaving 10 for Mogul analysis.

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
2	GDX	G	400	3	34,42,43	1.72	8 (23%)	43,65,67	1.88	10 (23%)
2	GDX	E	400	3	34,42,43	1.69	7 (20%)	43,65,67	2.11	13 (30%)
2	GDX	C	400	3	34,42,43	1.21	3 (8%)	43,65,67	2.05	11 (25%)
2	GDX	J	400	3	34,42,43	1.19	3 (8%)	43,65,67	1.79	8 (18%)
2	GDX	H	400	3	34,42,43	1.24	3 (8%)	43,65,67	1.95	10 (23%)
2	GDX	I	400	3	34,42,43	1.23	3 (8%)	43,65,67	1.73	9 (20%)
2	GDX	F	400	3	34,42,43	1.46	4 (11%)	43,65,67	1.84	7 (16%)
2	GDX	D	400	3	34,42,43	1.57	5 (14%)	43,65,67	1.99	10 (23%)
2	GDX	B	400	3	34,42,43	1.53	7 (20%)	43,65,67	2.26	14 (32%)
2	GDX	A	400	3	34,42,43	1.55	5 (14%)	43,65,67	2.05	13 (30%)

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	GDX	G	400	3	-	3/18/59/61	0/4/4/4
2	GDX	E	400	3	-	4/18/59/61	0/4/4/4
2	GDX	C	400	3	-	3/18/59/61	0/4/4/4
2	GDX	J	400	3	-	3/18/59/61	0/4/4/4
2	GDX	H	400	3	-	4/18/59/61	0/4/4/4
2	GDX	I	400	3	-	3/18/59/61	0/4/4/4
2	GDX	F	400	3	-	3/18/59/61	0/4/4/4
2	GDX	D	400	3	-	3/18/59/61	0/4/4/4
2	GDX	B	400	3	-	3/18/59/61	0/4/4/4
2	GDX	A	400	3	-	4/18/59/61	0/4/4/4

The worst 5 of 48 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	400	GDX	O5'-C5'	6.07	1.53	1.43
2	G	400	GDX	O5'-C5'	5.88	1.53	1.43
2	E	400	GDX	O5'-C5'	5.19	1.52	1.43
2	F	400	GDX	O5'-C5'	4.43	1.51	1.43
2	F	400	GDX	C6-N1	4.28	1.40	1.33

The worst 5 of 105 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	400	GDX	N3-C2-N1	-6.40	118.69	127.22
2	F	400	GDX	O5'-C1'-O1B	-5.94	103.61	111.36
2	B	400	GDX	C5-C6-N1	-5.85	115.42	123.43
2	H	400	GDX	C2-N3-C4	5.81	122.00	115.36
2	D	400	GDX	N3-C2-N1	-5.70	119.62	127.22

There are no chirality outliers.

5 of 33 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	D	400	GDX	O5'-C1'-O1B-PB
2	D	400	GDX	C2'-C1'-O1B-PB
2	G	400	GDX	O5'-C1'-O1B-PB
2	G	400	GDX	C2'-C1'-O1B-PB
2	H	400	GDX	O5'-C1'-O1B-PB

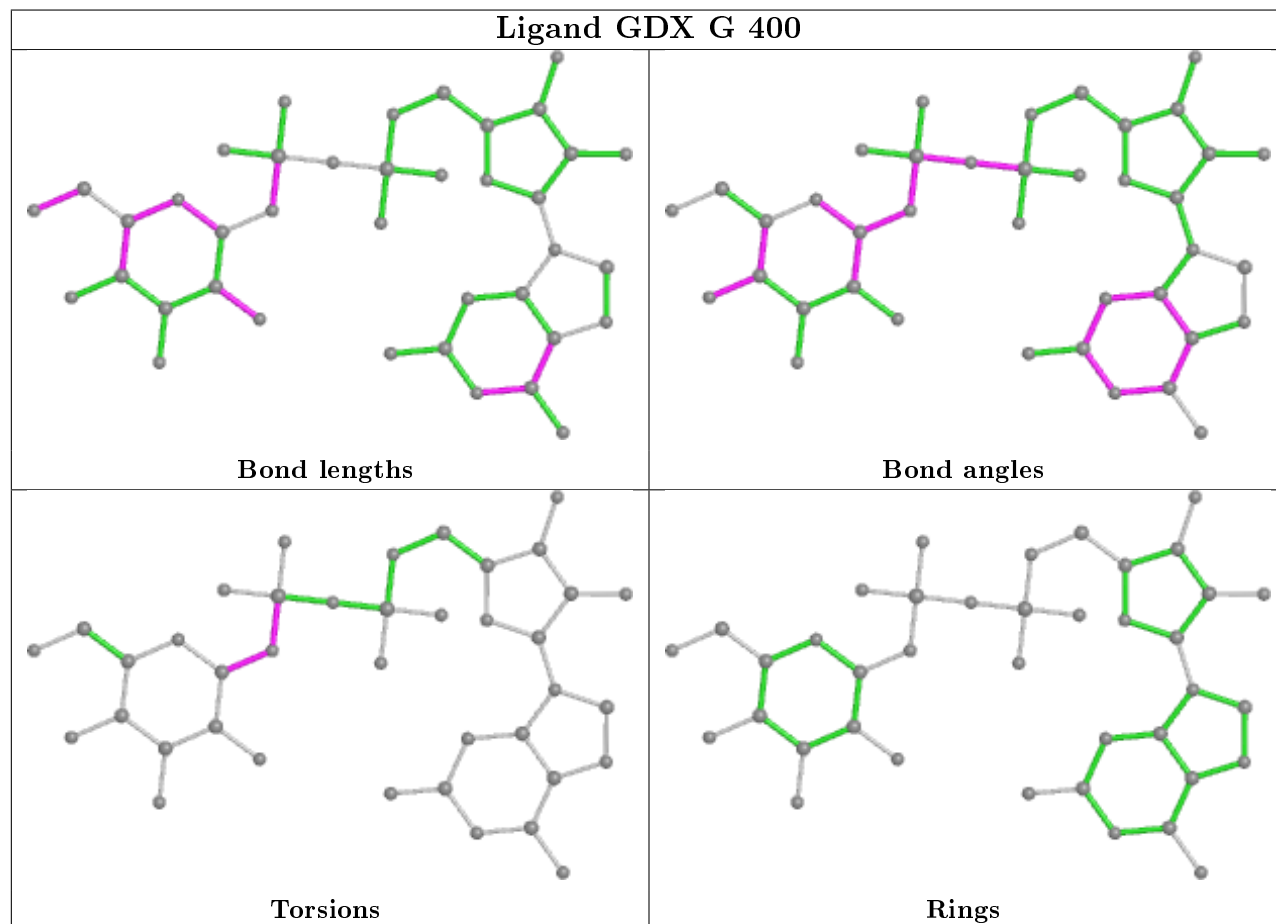
There are no ring outliers.

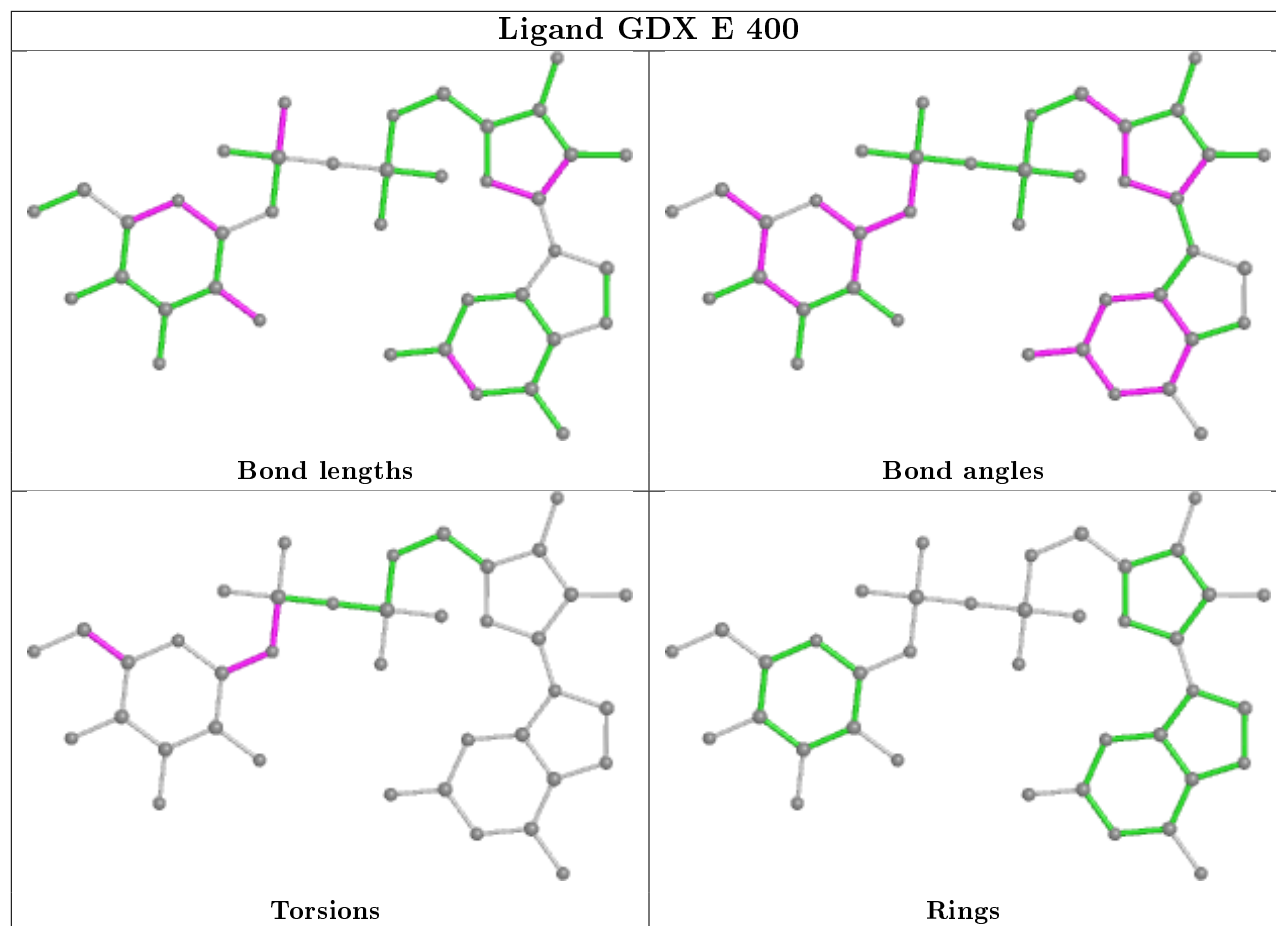
10 monomers are involved in 33 short contacts:

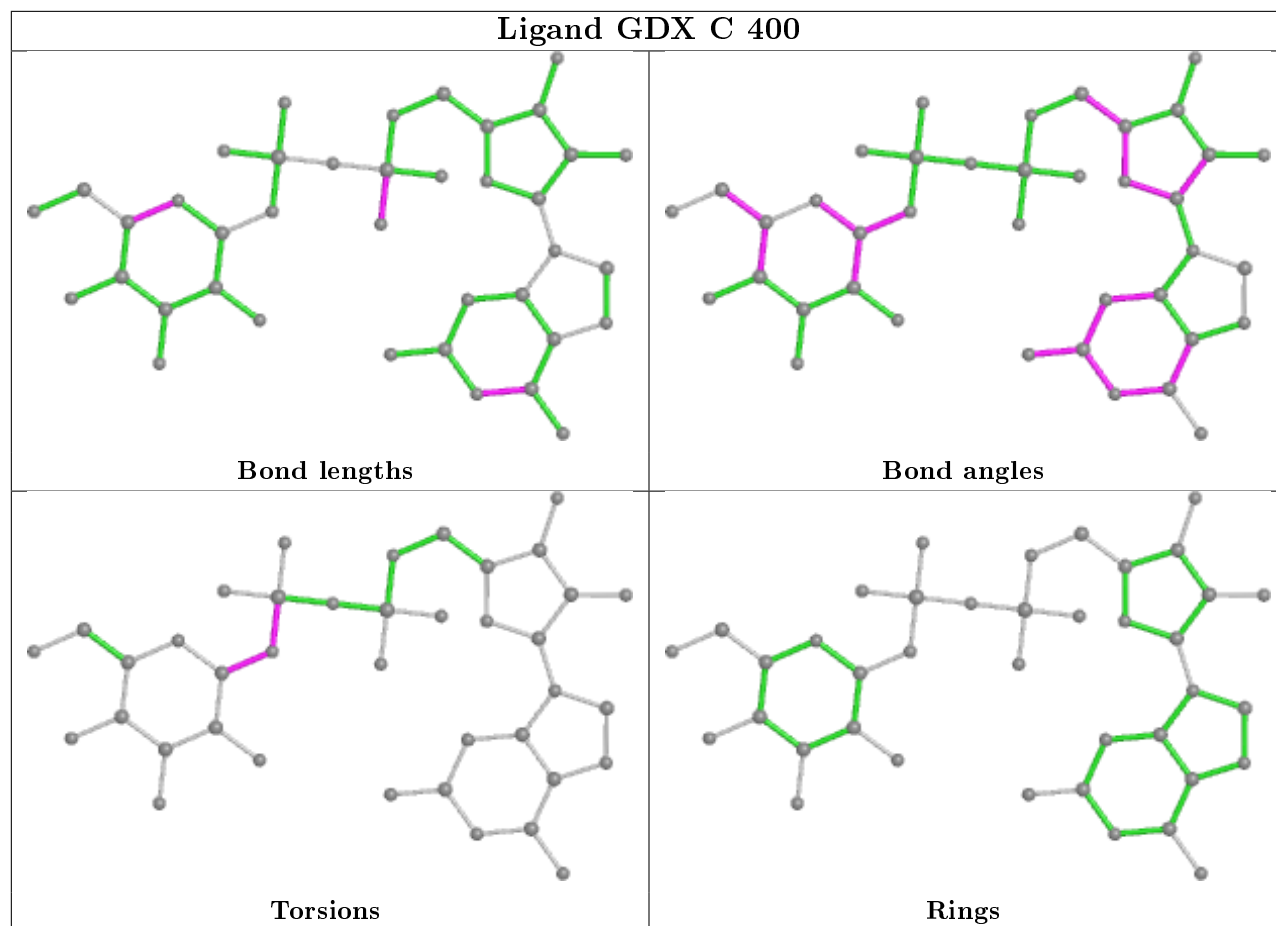
Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	G	400	GDX	3	0
2	E	400	GDX	3	0
2	C	400	GDX	3	0
2	J	400	GDX	3	0
2	H	400	GDX	3	0
2	I	400	GDX	3	0
2	F	400	GDX	3	0
2	D	400	GDX	4	0
2	B	400	GDX	4	0
2	A	400	GDX	4	0

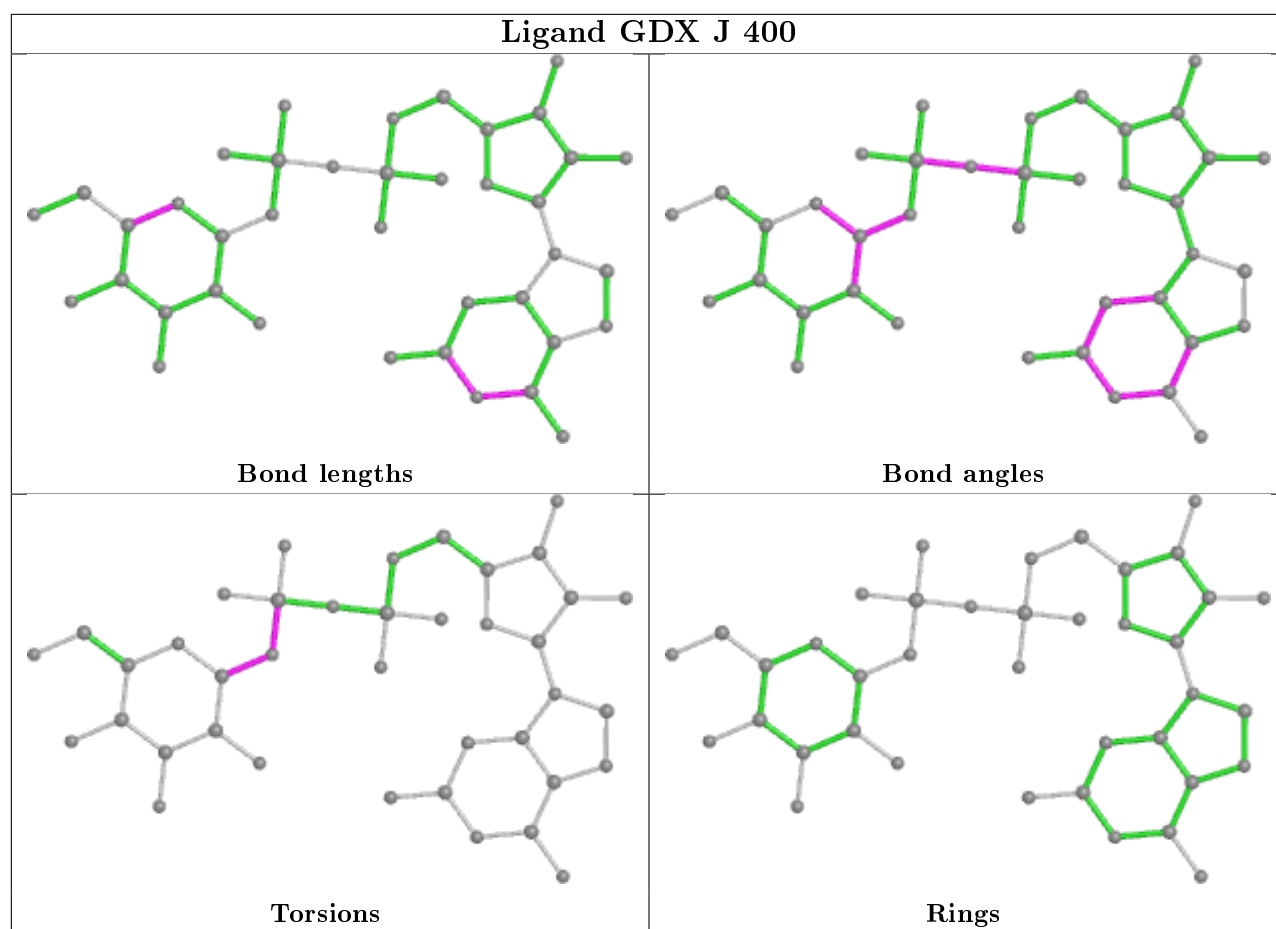
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In

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

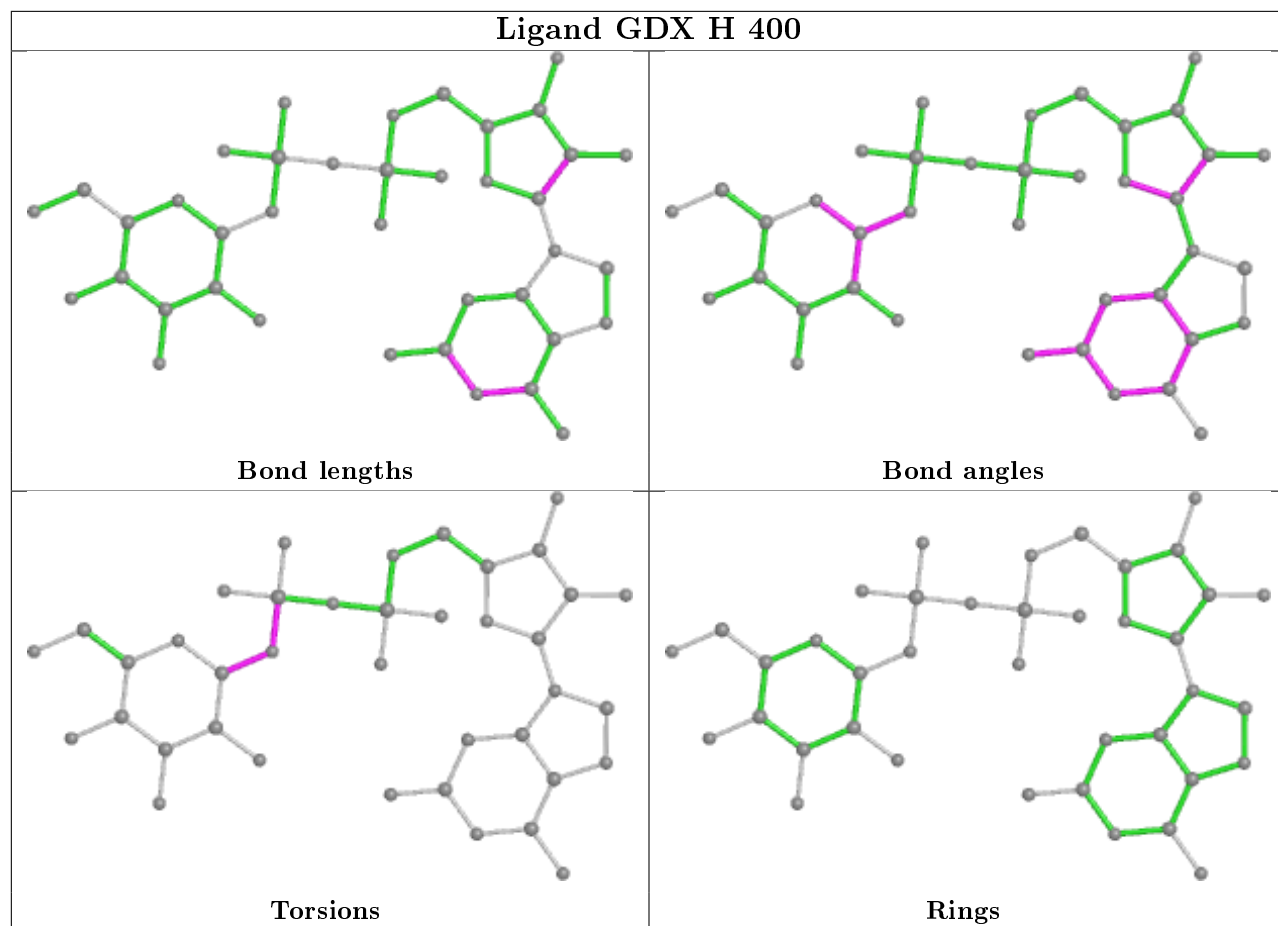


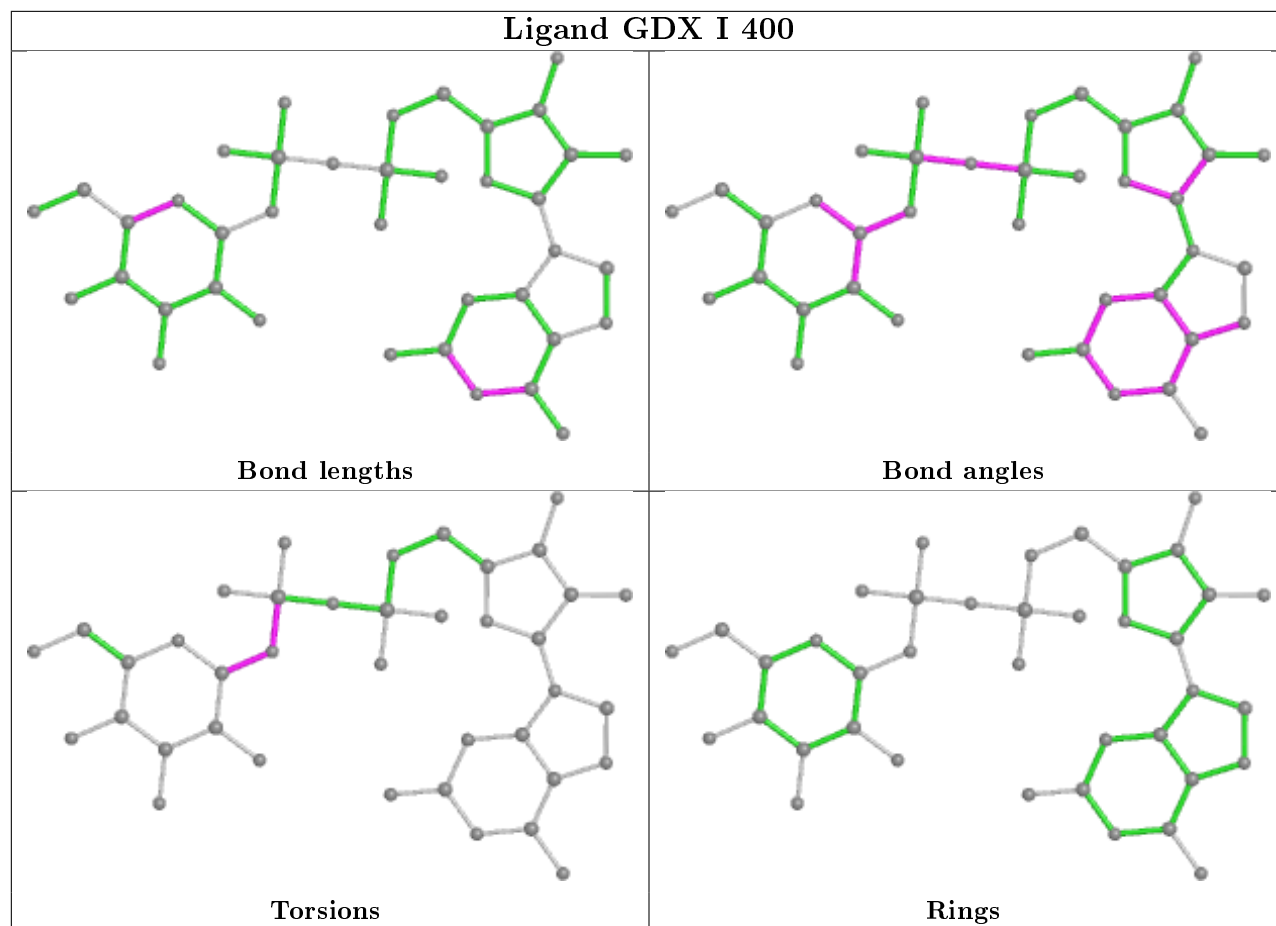


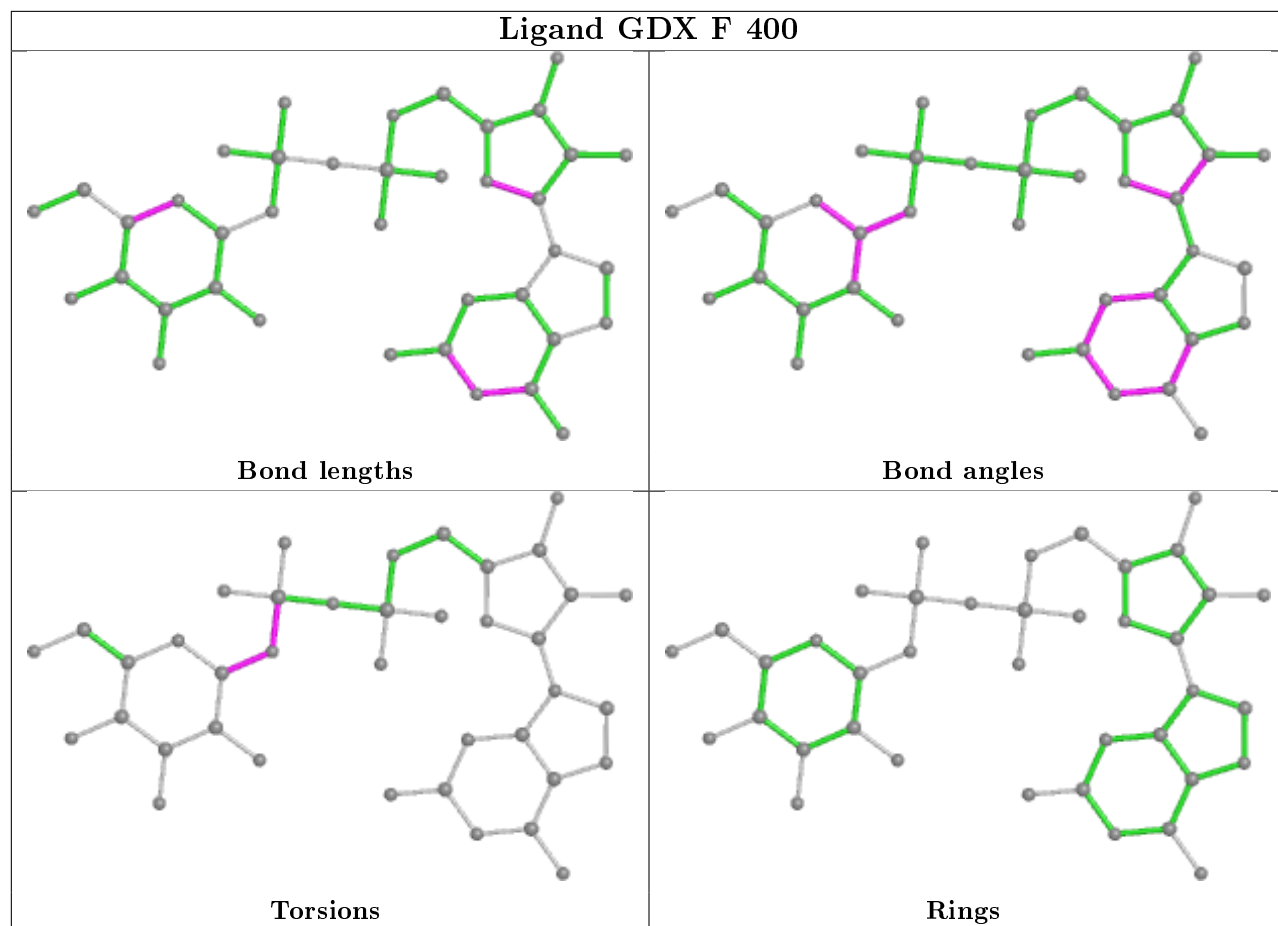


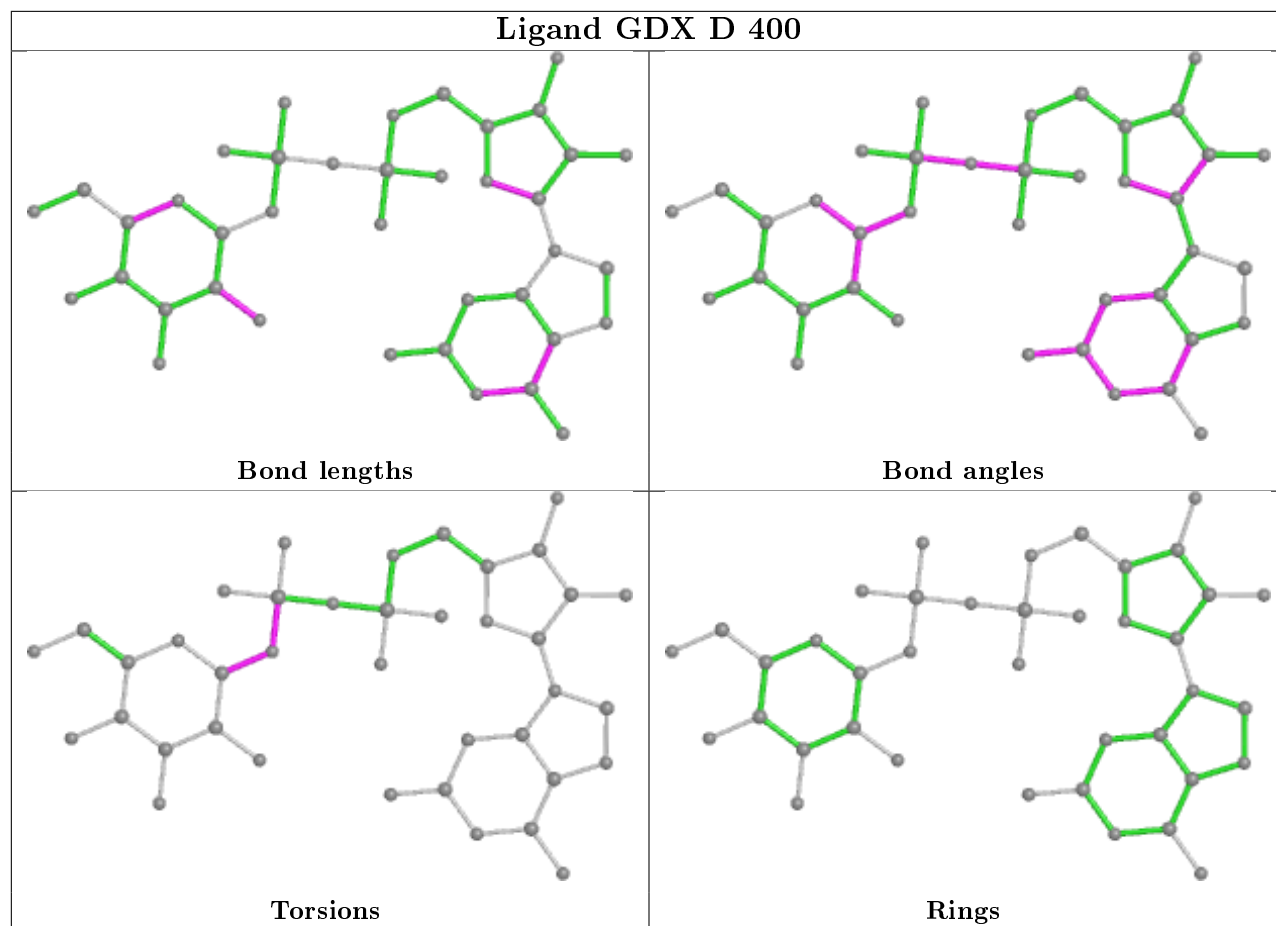


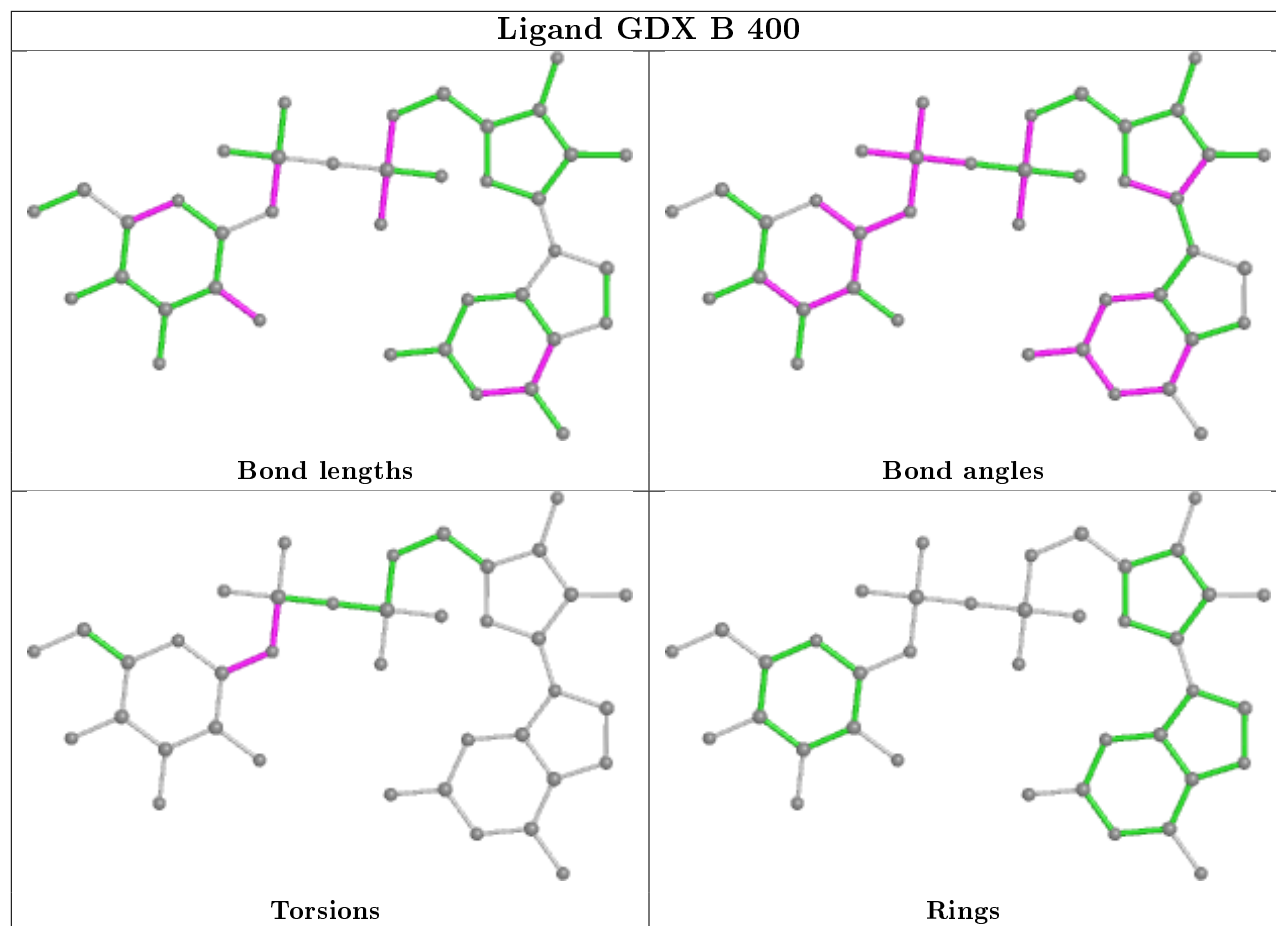


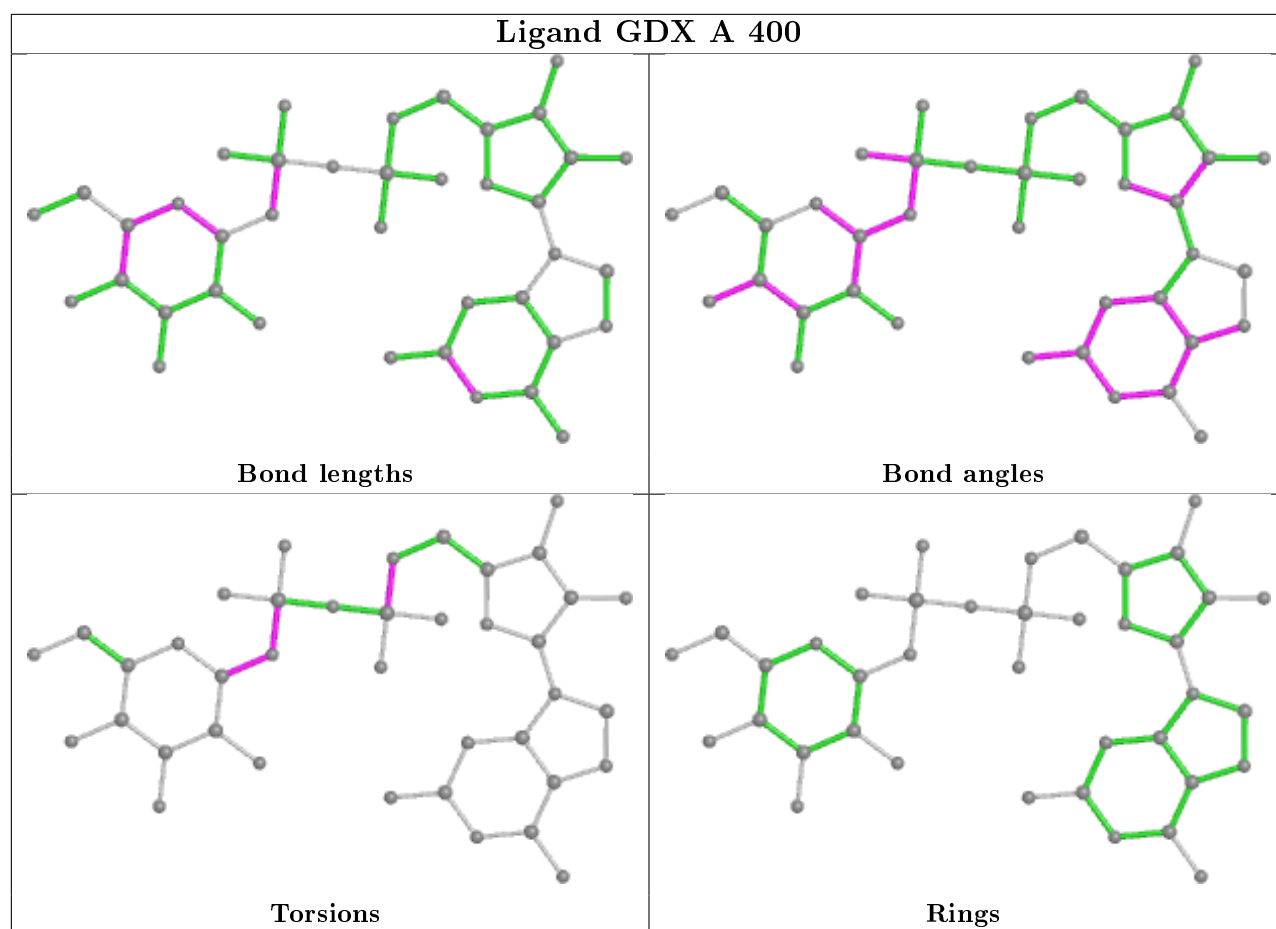












## 5.7 Other polymers [i](#)

There are no such residues in this entry.

## 5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

## 6 Fit of model and data ⓘ

### 6.1 Protein, DNA and RNA chains ⓘ

Unable to reproduce the depositors R factor - this section is therefore empty.

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

Unable to reproduce the depositors R factor - this section is therefore empty.

### 6.3 Carbohydrates ⓘ

Unable to reproduce the depositors R factor - this section is therefore empty.

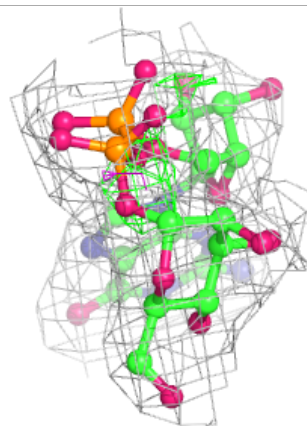
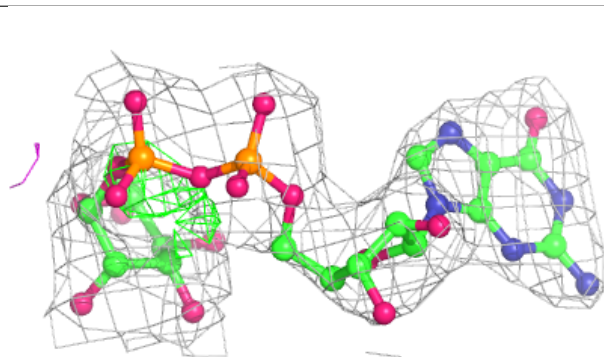
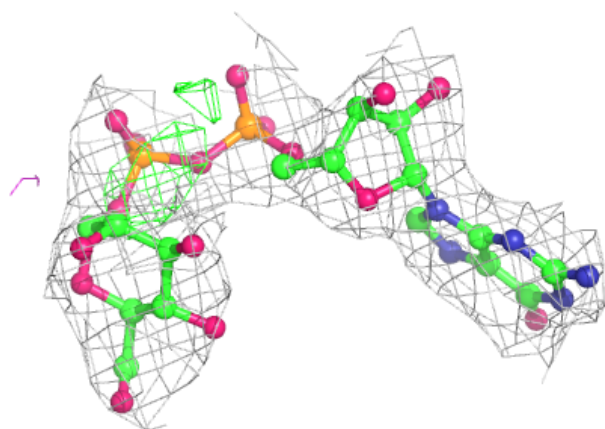
### 6.4 Ligands ⓘ

Unable to reproduce the depositors R factor - this section is therefore empty.

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 GDX D 400:**

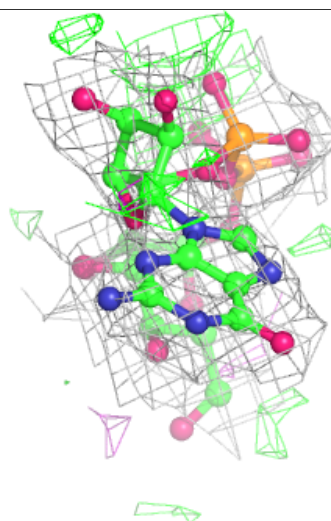
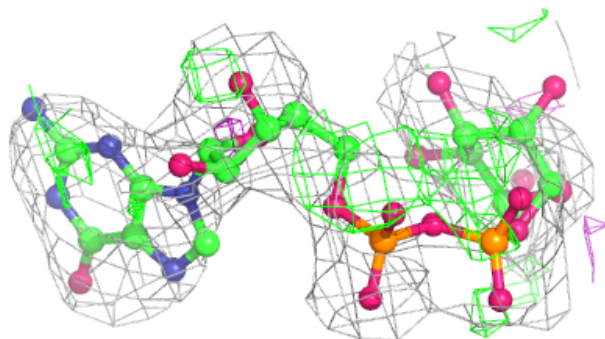
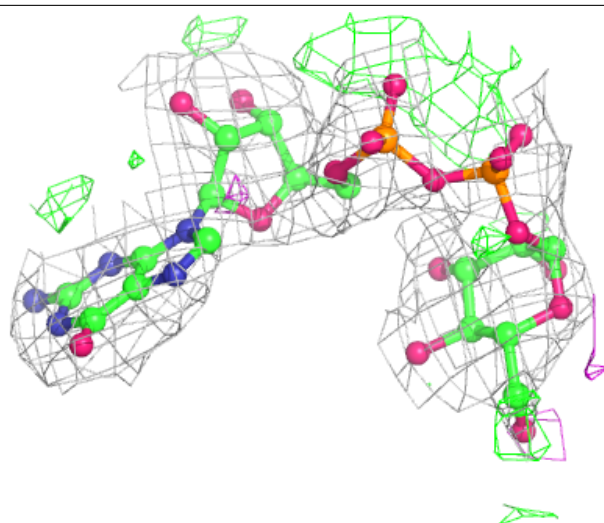
$2mF_o-DF_c$  (at 0.7 rmsd) in gray  
 $mF_o-DF_c$  (at 3 rmsd) in purple (negative)  
and green (positive)





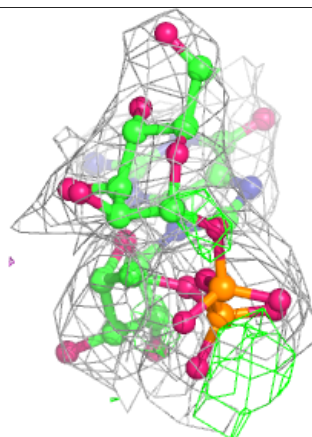
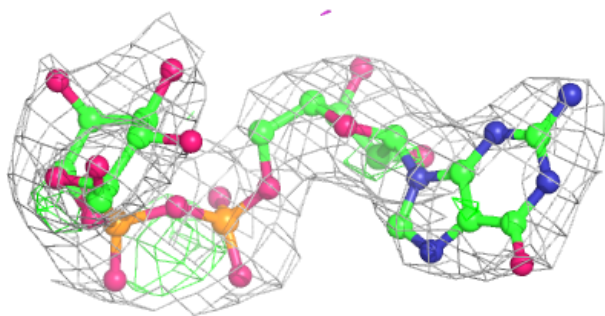
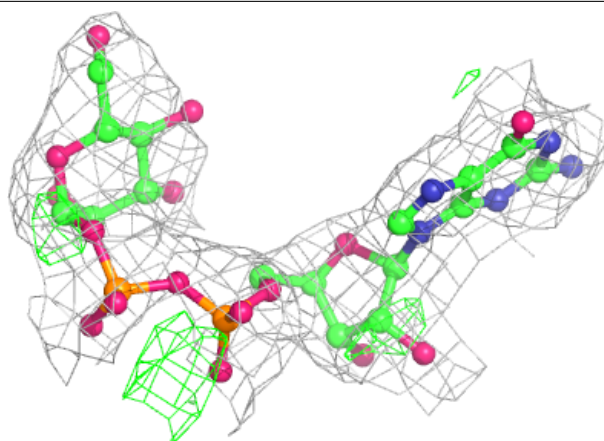
**Electron density around GDX G 400:**

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



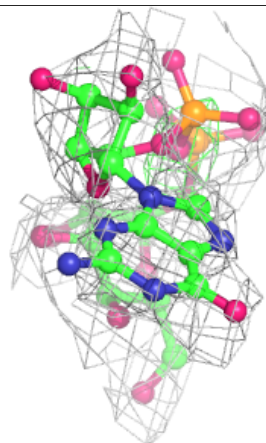
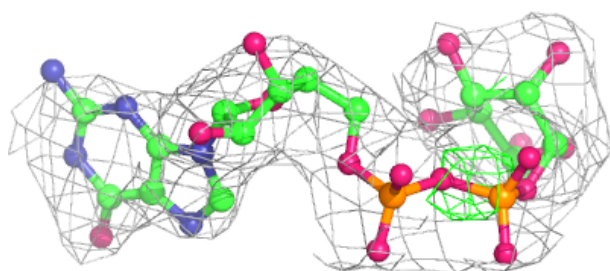
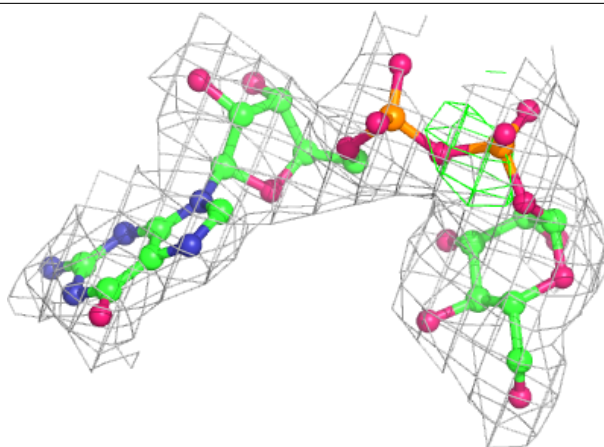
**Electron density around GDX H 400:**

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



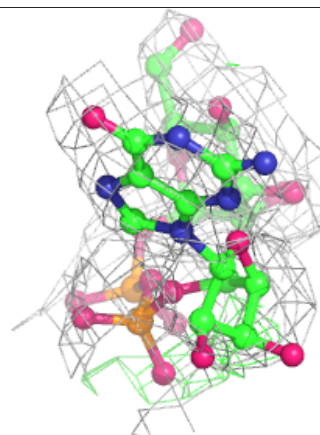
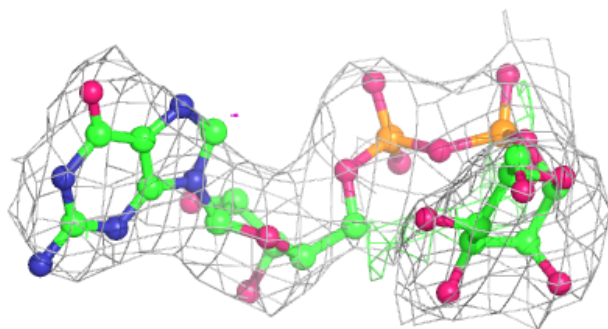
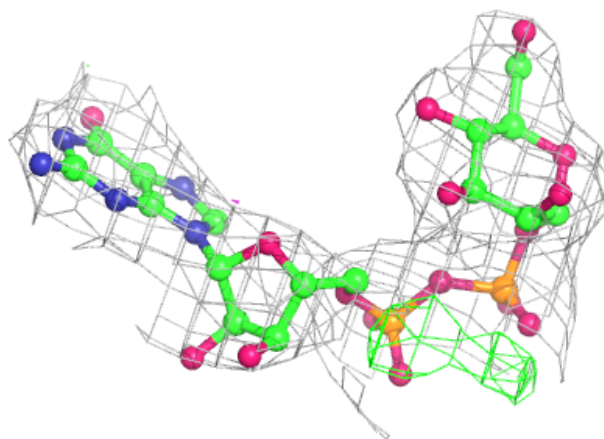
**Electron density around GDX I 400:**

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



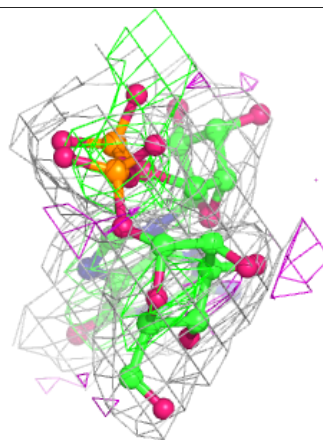
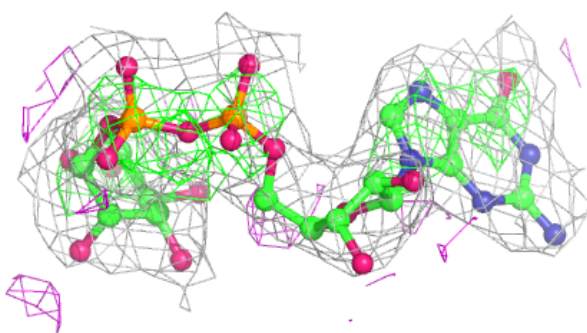
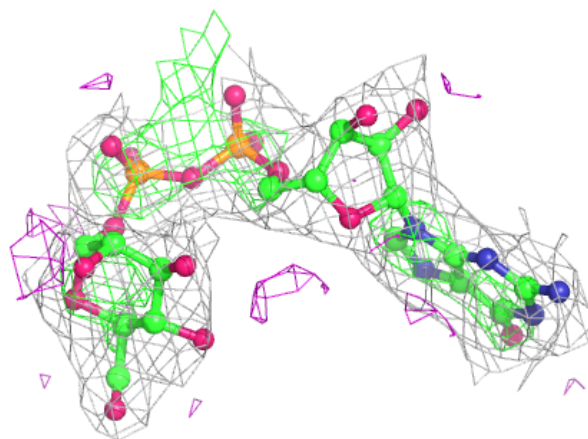
**Electron density around GDX F 400:**

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



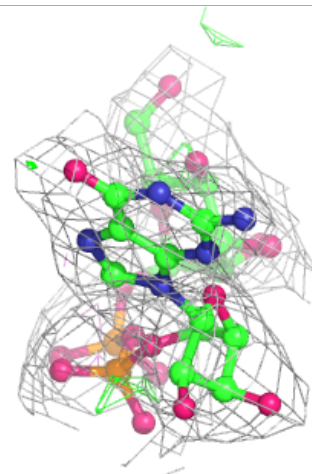
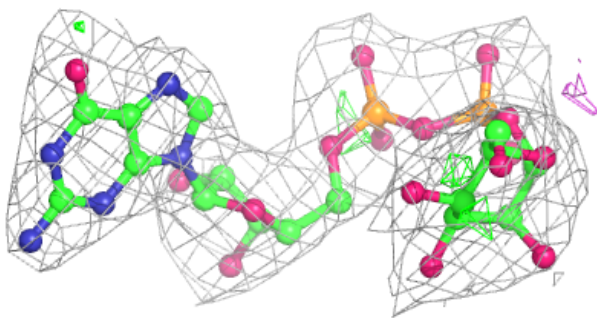
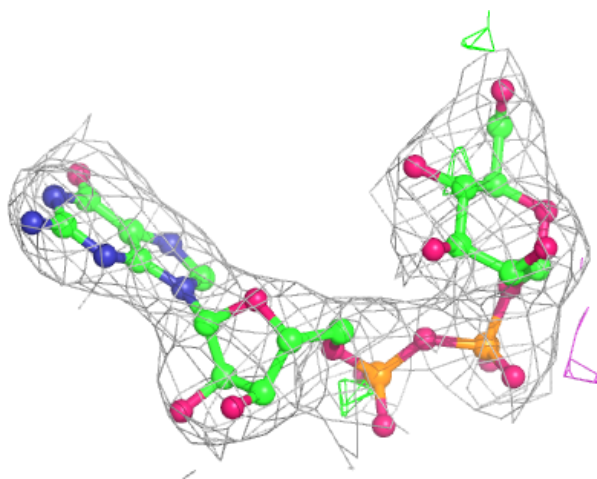
**Electron density around GDX A 400:**

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



**Electron density around GDX C 400:**

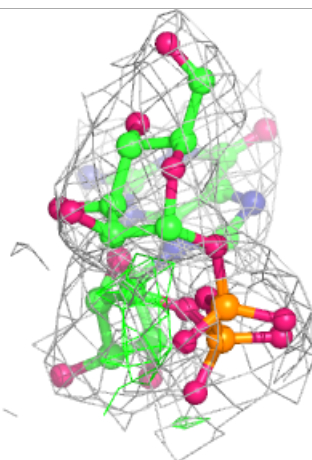
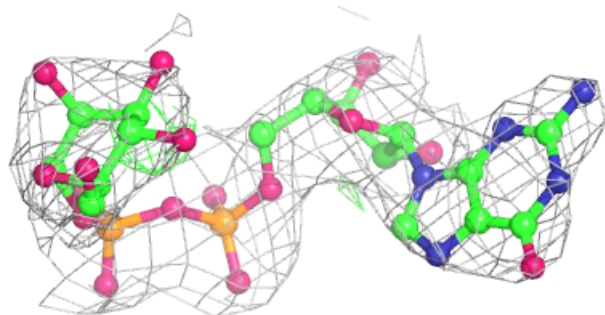
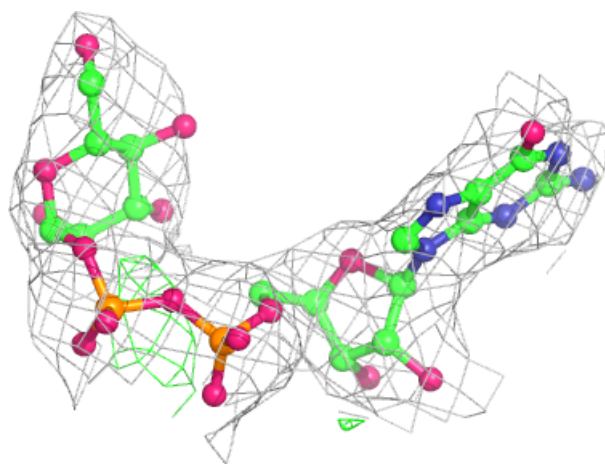
$2mF_o-DF_c$  (at 0.7 rmsd) in gray  
 $mF_o-DF_c$  (at 3 rmsd) in purple (negative)  
and green (positive)





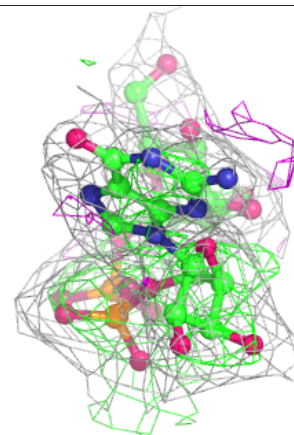
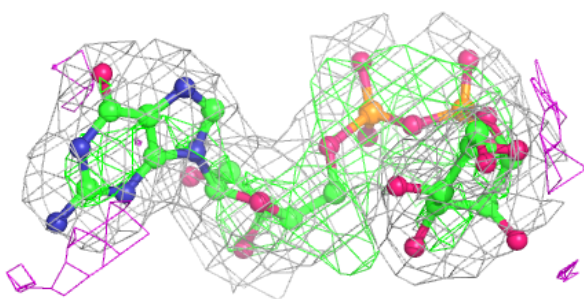
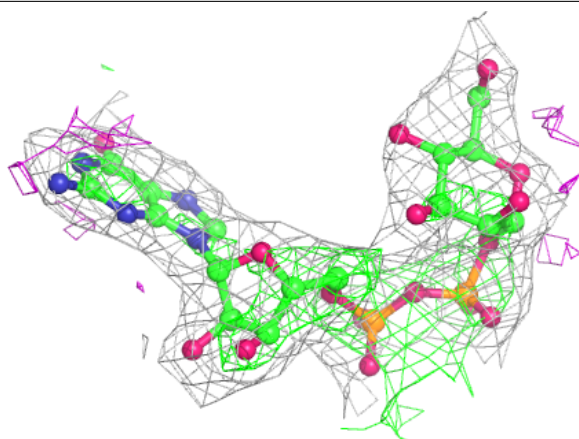
**Electron density around GDX J 400:**

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



**Electron density around GDX B 400:**

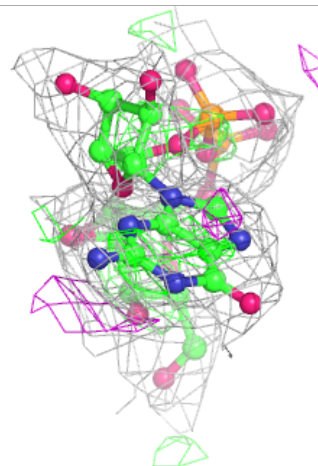
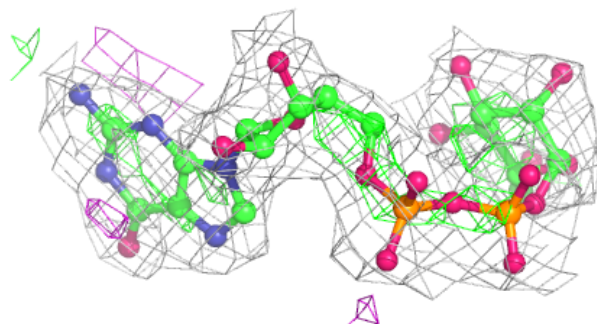
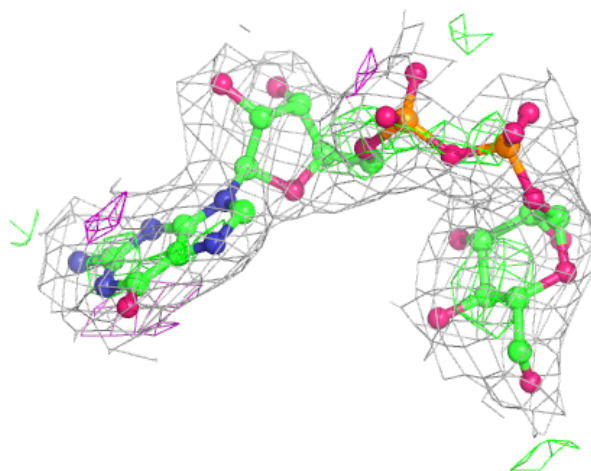
$2mF_o-DF_c$  (at 0.7 rmsd) in gray  
 $mF_o-DF_c$  (at 3 rmsd) in purple (negative)  
and green (positive)





**Electron density around GDX E 400:**

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



## 6.5 Other polymers [i](#)

Unable to reproduce the depositors R factor - this section is therefore empty.