



# wwPDB X-ray Structure Validation Summary Report

Sep 15, 2022 – 07:14 pm BST

PDB ID : 7ZZS  
Title : HDAC2 complexed with an inhibitory ligand  
Authors : Cleasby, A.; Tisi, D.  
Deposited on : 2022-05-26  
Resolution : 1.88 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 types of validation reports are described at <http://www.wwpdb.org/validation/2017/FAQs#types>.

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

MolProbity : 4.02b-467  
Mogul : 1.8.4, CSD as541be (2020)  
Xtriage (Phenix) : 1.13  
EDS : 2.30  
buster-report : 1.1.7 (2018)  
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)  
Refmac : 5.8.0267  
CCP4 : 7.1.010 (Gargrove)  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.30

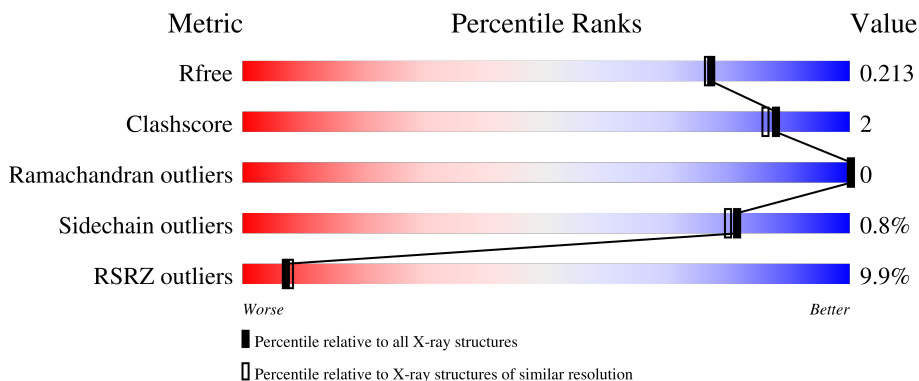
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 1.88 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	9470 (1.90-1.86)
Clashscore	141614	10282 (1.90-1.86)
Ramachandran outliers	138981	10152 (1.90-1.86)
Sidechain outliers	138945	10152 (1.90-1.86)
RSRZ outliers	127900	9303 (1.90-1.86)

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	498	 20% 70% 26%
1	B	498	 70% 26%
1	C	498	 20% 70% 27%

## 2 Entry composition i

There are 11 unique types of molecules in this entry. The entry contains 9893 atoms, of which 223 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 Histone deacetylase 2.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	369	2968	1895	502	547	24	0	0	0
1	B	367	2978	1906	500	545	27	0	4	0
1	C	366	2956	1889	498	544	25	0	1	0

There are 30 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	493	GLY	-	expression tag	UNP Q92769
A	494	SER	-	expression tag	UNP Q92769
A	495	SER	-	expression tag	UNP Q92769
A	496	GLY	-	expression tag	UNP Q92769
A	497	HIS	-	expression tag	UNP Q92769
A	498	HIS	-	expression tag	UNP Q92769
A	499	HIS	-	expression tag	UNP Q92769
A	500	HIS	-	expression tag	UNP Q92769
A	501	HIS	-	expression tag	UNP Q92769
A	502	HIS	-	expression tag	UNP Q92769
B	493	GLY	-	expression tag	UNP Q92769
B	494	SER	-	expression tag	UNP Q92769
B	495	SER	-	expression tag	UNP Q92769
B	496	GLY	-	expression tag	UNP Q92769
B	497	HIS	-	expression tag	UNP Q92769
B	498	HIS	-	expression tag	UNP Q92769
B	499	HIS	-	expression tag	UNP Q92769
B	500	HIS	-	expression tag	UNP Q92769
B	501	HIS	-	expression tag	UNP Q92769
B	502	HIS	-	expression tag	UNP Q92769
C	493	GLY	-	expression tag	UNP Q92769
C	494	SER	-	expression tag	UNP Q92769
C	495	SER	-	expression tag	UNP Q92769

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Chain	Residue	Modelled	Actual	Comment	Reference
C	496	GLY	-	expression tag	UNP Q92769
C	497	HIS	-	expression tag	UNP Q92769
C	498	HIS	-	expression tag	UNP Q92769
C	499	HIS	-	expression tag	UNP Q92769
C	500	HIS	-	expression tag	UNP Q92769
C	501	HIS	-	expression tag	UNP Q92769
C	502	HIS	-	expression tag	UNP Q92769

- Molecule 2 is ZINC ION (three-letter code: ZN) (formula: Zn).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
2	A	1	Total Zn 1 1	0	0
2	B	1	Total Zn 1 1	0	0
2	C	1	Total Zn 1 1	0	0

- Molecule 3 is CALCIUM ION (three-letter code: CA) (formula: Ca).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	A	1	Total Ca 1 1	0	0
3	B	1	Total Ca 1 1	0	0
3	C	1	Total Ca 1 1	0	0

- Molecule 4 is SODIUM ION (three-letter code: NA) (formula: Na).

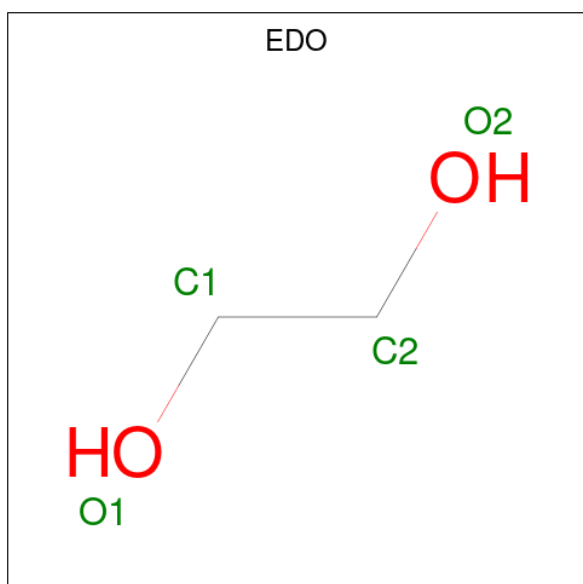
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	A	1	Total Na 1 1	0	0
4	B	1	Total Na 1 1	0	0
4	C	1	Total Na 1 1	0	0

- Molecule 5 is DI(HYDROXYETHYL)ETHER (three-letter code: PEG) (formula: C<sub>4</sub>H<sub>10</sub>O<sub>3</sub>).



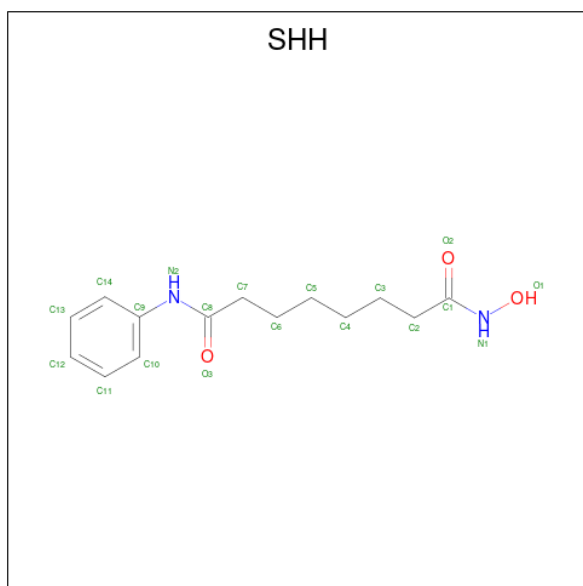
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
			Total	C	H	O		
5	A	1	Total	C	H	O	1	0
			17	4	10	3		
5	A	1	Total	C	H	O	1	0
			17	4	10	3		
5	A	1	Total	C	H	O	1	0
			17	4	10	3		
5	B	1	Total	C	H	O	1	0
			17	4	10	3		
5	C	1	Total	C	H	O	1	0
			17	4	10	3		

- Molecule 6 is 1,2-ETHANEDIOL (three-letter code: EDO) (formula: C<sub>2</sub>H<sub>6</sub>O<sub>2</sub>).



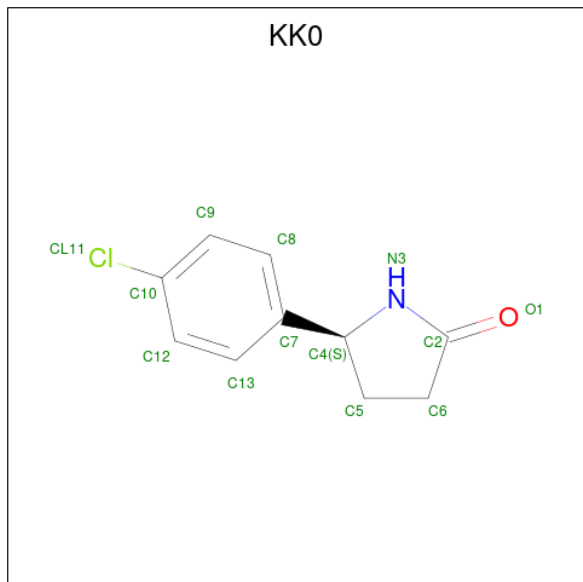
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
6	A	1	Total	C	H	O	1	0
			10	2	6	2		
6	B	1	Total	C	H	O	1	0
			10	2	6	2		
6	B	1	Total	C	H	O	1	0
			10	2	6	2		
6	B	1	Total	C	H	O	1	0
			10	2	6	2		
6	B	1	Total	C	H	O	1	0
			10	2	6	2		
6	C	1	Total	C	H	O	1	0
			10	2	6	2		
6	C	1	Total	C	H	O	1	0
			10	2	6	2		

- Molecule 7 is OCTANEDIOIC ACID HYDROXYAMIDE PHENYLAMIDE (three-letter code: SHH) (formula: C<sub>14</sub>H<sub>20</sub>N<sub>2</sub>O<sub>3</sub>).



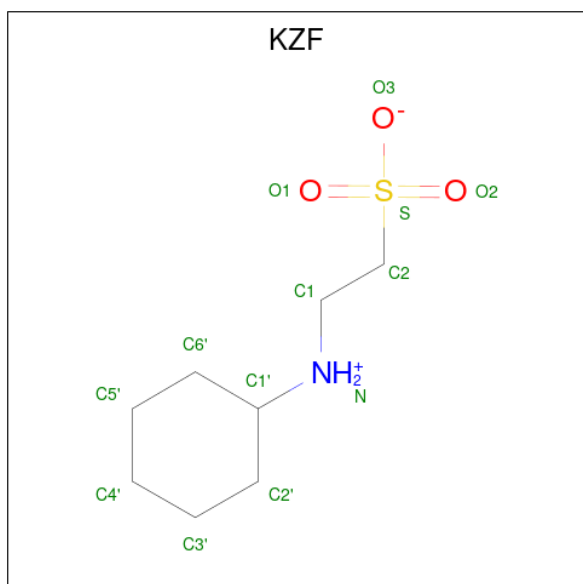
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
7	A	1	Total	C	H	N	O	1	0
			39	14	20	2	3		
7	B	1	Total	C	H	N	O	1	0
			39	14	20	2	3		
7	C	1	Total	C	H	N	O	1	0
			39	14	20	2	3		

- Molecule 8 is (5 {S})-5-(4-chlorophenyl)pyrrolidin-2-one (three-letter code: KK0) (formula:  $C_{10}H_{10}ClNO$ ) (labeled as "Ligand of Interest" by depositor).



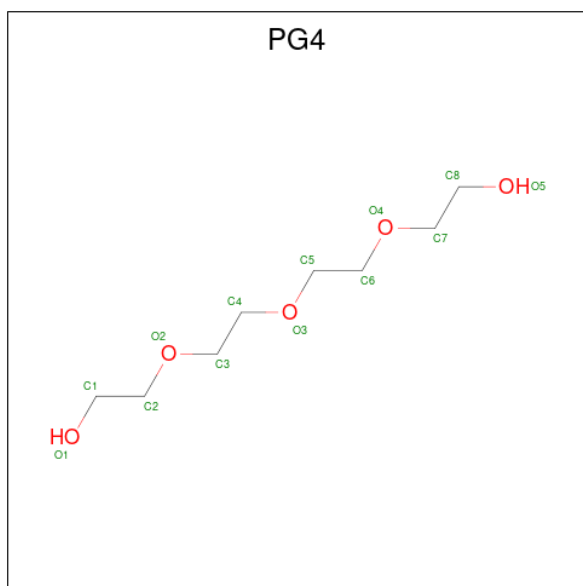
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	
			Total	C	Cl	H	N			O
8	A	1	Total 23	10	1	10	1	1	0	0
8	B	1	Total 23	10	1	10	1	1	0	0
8	C	1	Total 23	10	1	10	1	1	0	0

- Molecule 9 is 2-(cyclohexylazanumyl)ethanesulfonate (three-letter code: KZF) (formula:  $C_8H_{17}NO_3S$ ).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	
			Total	C	H	N	O			S
9	B	1	30	8	17	1	3	1	0	0

- Molecule 10 is TETRAETHYLENE GLYCOL (three-letter code: PG4) (formula: C<sub>8</sub>H<sub>18</sub>O<sub>5</sub>).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
			Total	C	H	O		
10	B	1	31	8	18	5	1	0

- Molecule 11 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
11	A	239	Total	O	0	0
			239	239		
11	B	225	Total	O	0	0
			225	225		
11	C	106	Total	O	0	0
			106	106		





C316	W317	Y319	E320	T321	A322	L325	D326	C327	E328	I329	F330	Y335	N336	D337	Y338	F339	E340	Y341	F342	G343	P344	D345	F346	I350	S351	P352	S353	N354	M355	T356	M364	E365	K366	I367	K368	Q369	R370	L371	F372	E373	R376	M377	L378	F379	HIS	ALA	PRO	GLY	VAL	GLN	MET	GLN	ALA				
TLE	PRO	GLU	ASP	ALA	VAL	HIS	GLU	ASP	THR	SER	GLY	ASP	GLY	THR	GLY	GLU	ASP	PRO	PRO	ASP	LYS	ARG	ARG	ARG	LYS	ASP	THR	PHE	SER	SER	ASP	GLU	LEU	GLU	ASP	GLY	GLY	GLY	GLY	GLY	ARG	ARG	ASN	VAL	ALA	ALA	ASP	HIS	PRO	HIS	LYS	LYS	VAL	GLN	ALA	LYS	LYS
ALA	ARG	ILE	GLU	GLU	ASP	LYS	LYS	GLU	THR	GLU	LYS	THR	ASP	VAL	LYS	GLU	GLU	GLU	LYS	LYS	LYS	LYS	ASN	SER	GLY	GLU	LYS	SER	GLU	GLN	LEU	SER	ASN	ASN	PRO	GLY	SER	SER	GLY	GLY	HIS	HIS	HIS	HIS	HIS	HIS	HIS	HIS	HIS	HIS	HIS						

## 4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	92.50Å 98.66Å 139.19Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	48.49 – 1.88 48.45 – 1.88	Depositor EDS
% Data completeness (in resolution range)	99.3 (48.49-1.88) 99.3 (48.45-1.88)	Depositor EDS
$R_{merge}$	(Not available)	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	1.60 (at 1.88Å)	Xtriage
Refinement program	REFMAC 5.8.0232	Depositor
R, $R_{free}$	0.166 , 0.207 0.177 , 0.213	Depositor DCC
$R_{free}$ test set	5136 reflections (4.97%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	31.4	Xtriage
Anisotropy	0.533	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	(Not available) , (Not available)	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.48$ , $\langle L^2 \rangle = 0.31$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
$F_o, F_c$ correlation	0.97	EDS
Total number of atoms	9893	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	44.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.71% 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: NA, SHH, ZN, PG4, KZF, KK0, PEG, CA, EDO

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	0.52	0/3045	0.70	1/4110 (0.0%)
1	B	0.53	0/3067	0.74	2/4139 (0.0%)
1	C	0.50	0/3036	0.60	0/4099
All	All	0.52	0/9148	0.68	3/12348 (0.0%)

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	4
1	B	0	3
1	C	0	1
All	All	0	8

There are no bond length outliers.

All (3) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	47	LEU	N-CA-CB	-7.03	96.34	110.40
1	B	196	ASP	CB-CG-OD1	5.21	122.99	118.30
1	A	238	ASP	CB-CG-OD1	5.05	122.85	118.30

There are no chirality outliers.

5 of 8 planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	131	ARG	Sidechain

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Mol	Chain	Res	Type	Group
1	A	39	ARG	Sidechain
1	A	41	ARG	Sidechain
1	A	54	ARG	Sidechain
1	B	39	ARG	Sidechain

## 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	2968	0	2874	10	0
1	B	2978	0	2902	14	0
1	C	2956	0	2864	9	0
2	A	1	0	0	0	0
2	B	1	0	0	0	0
2	C	1	0	0	0	0
3	A	1	0	0	0	0
3	B	1	0	0	0	0
3	C	1	0	0	0	0
4	A	1	0	0	0	0
4	B	1	0	0	0	0
4	C	1	0	0	0	0
5	A	21	30	30	0	0
5	B	7	10	10	0	0
5	C	7	10	10	0	0
6	A	4	6	6	0	0
6	B	20	30	30	0	0
6	C	8	12	12	0	0
7	A	19	20	19	1	0
7	B	19	20	19	1	0
7	C	19	20	19	1	0
8	A	13	10	0	0	0
8	B	13	10	0	0	0
8	C	13	10	0	0	0
9	B	13	17	0	0	0
10	B	13	18	18	0	0
11	A	239	0	0	3	0
11	B	225	0	0	1	0
11	C	106	0	0	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
All	All	9670	223	8813	35	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 2.

The worst 5 of 35 close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:245[A]:ILE:HG21	1:B:364[A]:MET:HE3	1.33	1.08
1:B:245[A]:ILE:HG21	1:B:364[A]:MET:CE	1.93	0.98
1:B:241:SER:HB3	1:B:364[B]:MET:SD	2.42	0.59
7:A:607:SHH:H101	7:A:607:SHH:O3	2.02	0.58
1:C:245:ILE:HG22	1:C:368:LYS:HE3	1.84	0.58

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	367/498 (74%)	363 (99%)	4 (1%)	0	100	100
1	B	369/498 (74%)	363 (98%)	6 (2%)	0	100	100
1	C	365/498 (73%)	358 (98%)	7 (2%)	0	100	100
All	All	1101/1494 (74%)	1084 (98%)	17 (2%)	0	100	100

There are no Ramachandran outliers to report.

### 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	317/425 (75%)	316 (100%)	1 (0%)	92	92
1	B	321/425 (76%)	317 (99%)	4 (1%)	71	67
1	C	317/425 (75%)	314 (99%)	3 (1%)	78	76
All	All	955/1275 (75%)	947 (99%)	8 (1%)	81	80

5 of 8 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	C	326	ASP
1	C	145	HIS
1	B	278	CYS
1	B	145	HIS
1	C	90	SER

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (3) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	358	GLN
1	C	62	HIS
1	C	95	GLN

### 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 monosaccharides in this entry.

## 5.6 Ligand geometry

Of 30 ligands modelled in this entry, 9 are monoatomic - leaving 21 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	PEG	A	608	-	6,6,6	0.39	0	5,5,5	0.30	0
5	PEG	A	606	-	6,6,6	0.48	0	5,5,5	0.47	0
6	EDO	B	612	-	3,3,3	0.47	0	2,2,2	0.38	0
6	EDO	C	604	-	3,3,3	0.43	0	2,2,2	0.38	0
7	SHH	B	610	2	19,19,19	0.74	0	21,22,22	0.82	0
5	PEG	C	606	-	6,6,6	0.50	0	5,5,5	0.24	0
9	KZF	B	604	-	13,13,13	0.59	0	16,17,17	0.56	0
8	KK0	C	608	-	14,14,14	0.29	0	18,19,19	0.49	0
8	KK0	B	613	-	14,14,14	0.30	0	18,19,19	0.88	1 (5%)
6	EDO	B	608	-	3,3,3	0.42	0	2,2,2	0.33	0
5	PEG	A	604	-	6,6,6	0.40	0	5,5,5	0.30	0
6	EDO	B	605	-	3,3,3	0.42	0	2,2,2	0.35	0
6	EDO	B	611	-	3,3,3	0.49	0	2,2,2	0.29	0
5	PEG	B	609	-	6,6,6	0.45	0	5,5,5	0.28	0
8	KK0	A	609	-	14,14,14	0.32	0	18,19,19	0.68	1 (5%)
6	EDO	B	606	-	3,3,3	0.44	0	2,2,2	0.36	0
6	EDO	A	605	-	3,3,3	0.50	0	2,2,2	0.26	0
10	PG4	B	607	-	12,12,12	0.54	0	11,11,11	0.24	0
7	SHH	C	607	2	19,19,19	0.64	0	21,22,22	0.95	1 (4%)
6	EDO	C	605	-	3,3,3	0.47	0	2,2,2	0.20	0
7	SHH	A	607	2	19,19,19	0.80	0	21,22,22	1.00	1 (4%)

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	PEG	A	608	-	-	1/4/4/4	-
5	PEG	A	606	-	-	3/4/4/4	-

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
6	EDO	B	612	-	-	1/1/1/1	-
6	EDO	C	604	-	-	0/1/1/1	-
7	SHH	B	610	2	-	2/15/15/15	0/1/1/1
5	PEG	C	606	-	-	0/4/4/4	-
9	KZF	B	604	-	-	3/7/15/15	0/1/1/1
8	KK0	C	608	-	-	0/4/13/13	0/2/2/2
8	KK0	B	613	-	-	0/4/13/13	0/2/2/2
6	EDO	B	608	-	-	0/1/1/1	-
5	PEG	A	604	-	-	1/4/4/4	-
6	EDO	B	605	-	-	1/1/1/1	-
6	EDO	B	611	-	-	0/1/1/1	-
5	PEG	B	609	-	-	1/4/4/4	-
8	KK0	A	609	-	-	0/4/13/13	0/2/2/2
6	EDO	B	606	-	-	1/1/1/1	-
6	EDO	A	605	-	-	0/1/1/1	-
10	PG4	B	607	-	-	1/10/10/10	-
7	SHH	C	607	2	-	3/15/15/15	0/1/1/1
6	EDO	C	605	-	-	0/1/1/1	-
7	SHH	A	607	2	-	2/15/15/15	0/1/1/1

There are no bond length outliers.

All (4) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
8	B	613	KK0	C7-C4-N3	-3.28	109.09	112.84
8	A	609	KK0	C7-C4-N3	-2.47	110.02	112.84
7	C	607	SHH	O1-N1-C1	2.13	122.93	119.79
7	A	607	SHH	C7-C8-N2	2.12	118.33	114.59

There are no chirality outliers.

5 of 20 torsion outliers are listed below:

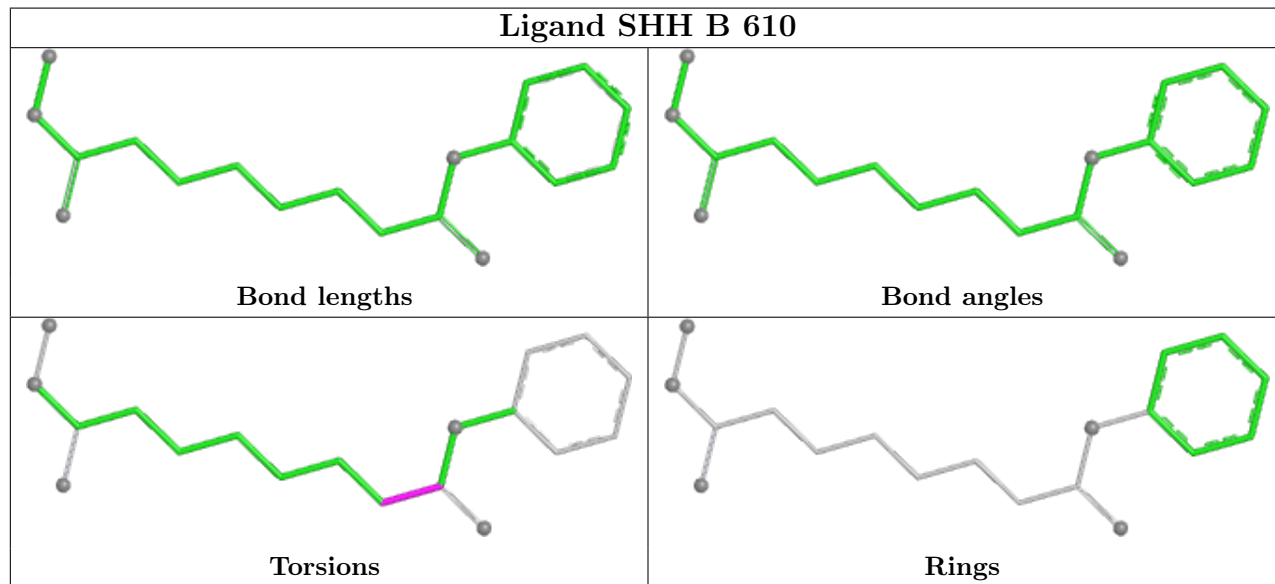
Mol	Chain	Res	Type	Atoms
6	B	605	EDO	O1-C1-C2-O2
6	B	606	EDO	O1-C1-C2-O2
5	A	606	PEG	O1-C1-C2-O2
5	A	604	PEG	O1-C1-C2-O2
5	A	606	PEG	C4-C3-O2-C2

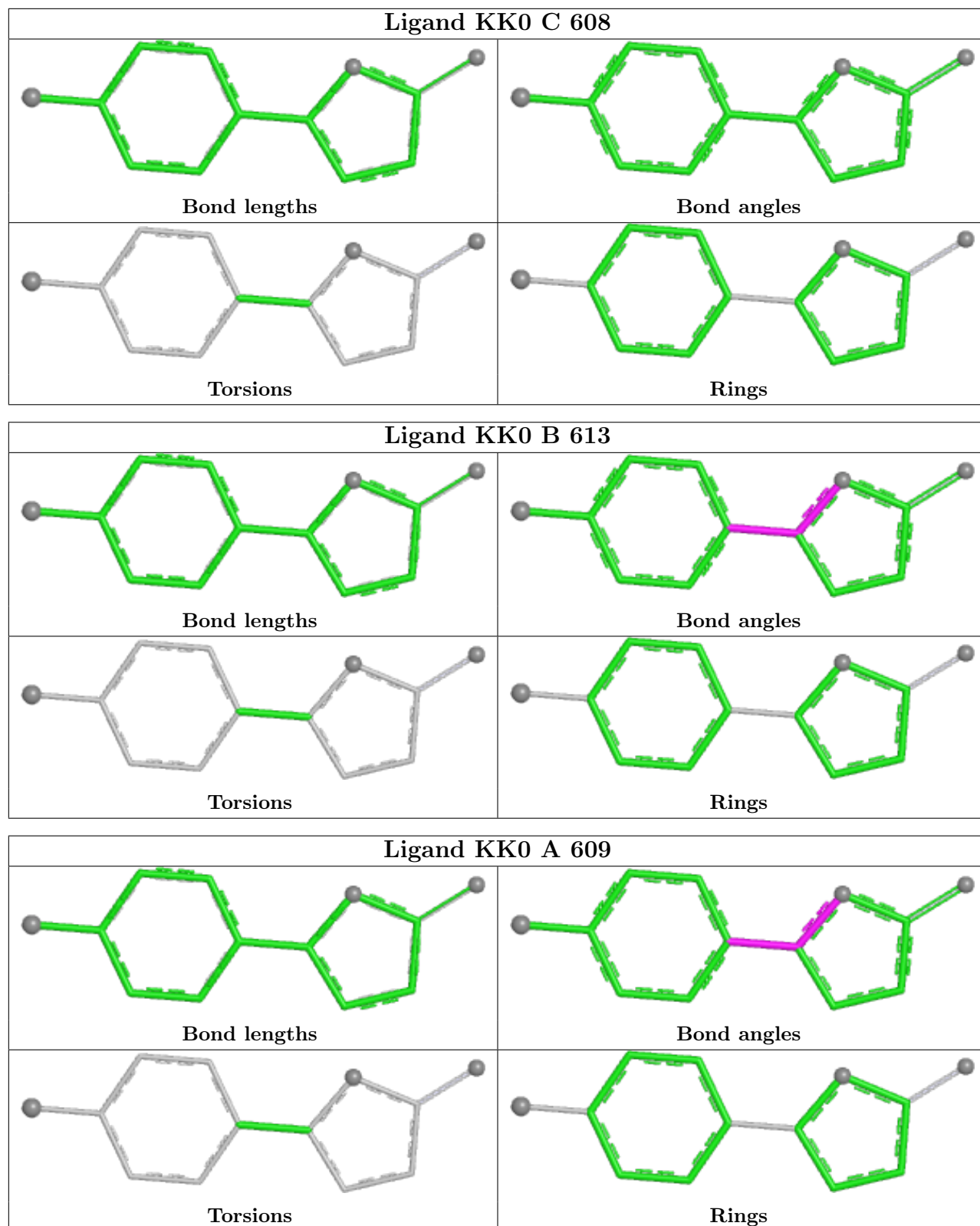
There are no ring outliers.

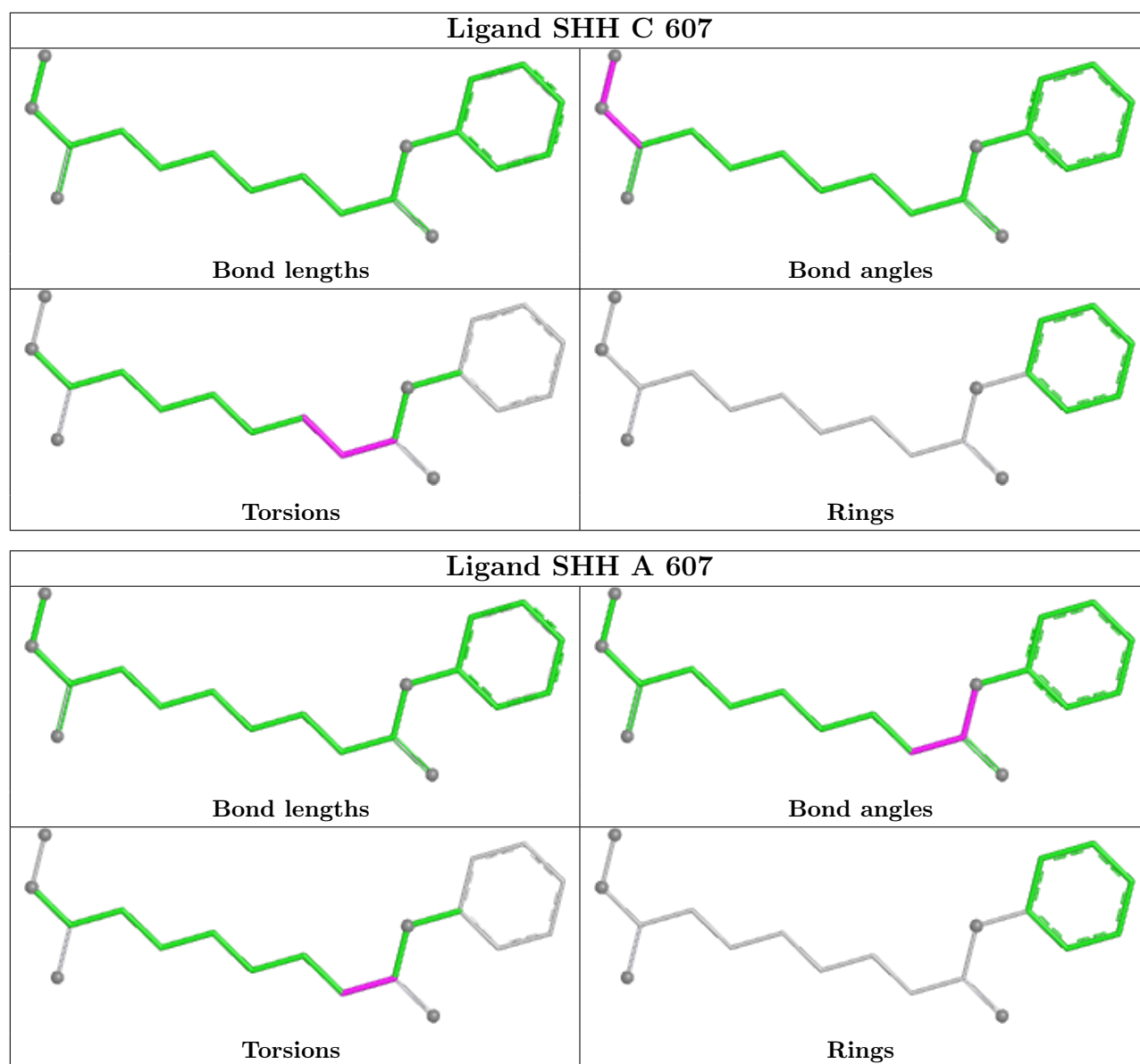
3 monomers are involved in 3 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
7	B	610	SHH	1	0
7	C	607	SHH	1	0
7	A	607	SHH	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 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 [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	369/498 (74%)	0.19	6 (1%) 72 74	24, 34, 55, 72	0
1	B	367/498 (73%)	0.11	2 (0%) 91 91	23, 34, 58, 75	0
1	C	366/498 (73%)	1.32	101 (27%) 0 0	36, 54, 78, 93	0
All	All	1102/1494 (73%)	0.54	109 (9%) 7 8	23, 40, 71, 93	0

The worst 5 of 109 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	C	341	TYR	6.6
1	C	52	LEU	6.5
1	C	352	PRO	5.1
1	C	345	ASP	5.0
1	C	378	LEU	4.9

### 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](#)

There are no monosaccharides in this entry.

### 6.4 Ligands [i](#)

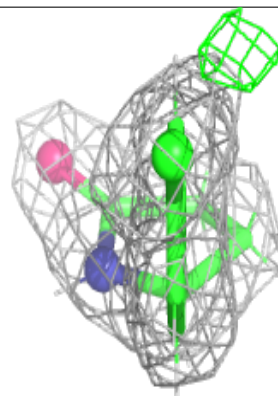
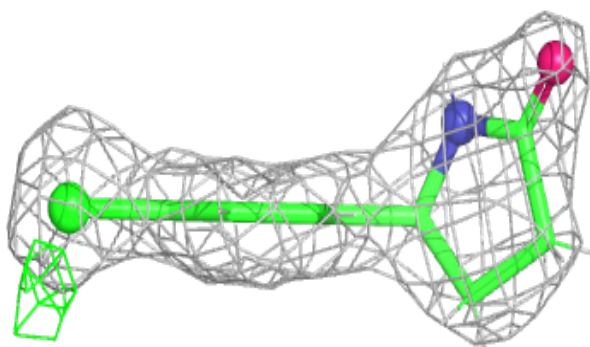
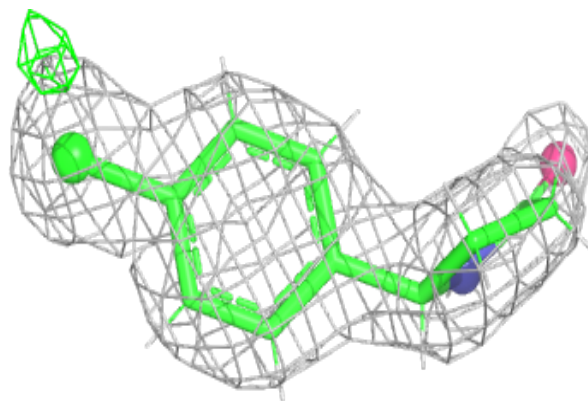
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95<sup>th</sup> percentile and maximum values of B factors of atoms in the group. The column labelled ‘Q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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors( $\text{\AA}^2$ )	Q<0.9
6	EDO	A	605	4/4	0.56	0.19	53,68,71,74	1
6	EDO	B	606	4/4	0.68	0.16	53,69,75,78	1
6	EDO	B	611	4/4	0.69	0.27	53,61,63,66	1
6	EDO	B	612	4/4	0.76	0.15	53,69,70,72	1
5	PEG	A	604	7/7	0.78	0.28	53,82,89,92	1
6	EDO	C	605	4/4	0.78	0.21	53,64,71,84	1
5	PEG	A	606	7/7	0.79	0.15	47,54,58,60	1
5	PEG	B	609	7/7	0.82	0.12	53,67,76,78	1
6	EDO	C	604	4/4	0.85	0.21	53,69,72,74	1
6	EDO	B	608	4/4	0.86	0.10	53,58,62,64	1
9	KZF	B	604	13/13	0.86	0.22	47,52,61,73	0
10	PG4	B	607	13/13	0.86	0.16	40,55,66,69	1
5	PEG	C	606	7/7	0.87	0.17	53,59,61,61	1
5	PEG	A	608	7/7	0.91	0.15	46,52,60,64	1
8	KK0	C	608	13/13	0.93	0.14	29,37,43,48	23
6	EDO	B	605	4/4	0.93	0.09	52,55,60,63	1
7	SHH	B	610	19/19	0.93	0.14	28,41,58,61	1
8	KK0	B	613	13/13	0.95	0.12	20,24,26,37	23
7	SHH	A	607	19/19	0.95	0.15	24,42,54,57	1
7	SHH	C	607	19/19	0.95	0.24	40,61,79,82	1
8	KK0	A	609	13/13	0.95	0.11	23,28,33,42	0
4	NA	C	603	1/1	0.97	0.11	40,40,40,40	0
4	NA	A	603	1/1	0.97	0.07	34,34,34,34	0
3	CA	A	602	1/1	0.99	0.07	37,37,37,37	0
4	NA	B	603	1/1	0.99	0.08	37,37,37,37	0
3	CA	B	602	1/1	0.99	0.06	40,40,40,40	0
3	CA	C	602	1/1	0.99	0.15	55,55,55,55	0
2	ZN	A	601	1/1	1.00	0.14	25,25,25,25	0
2	ZN	B	601	1/1	1.00	0.11	24,24,24,24	0
2	ZN	C	601	1/1	1.00	0.04	41,41,41,41	0

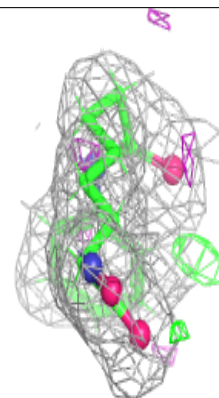
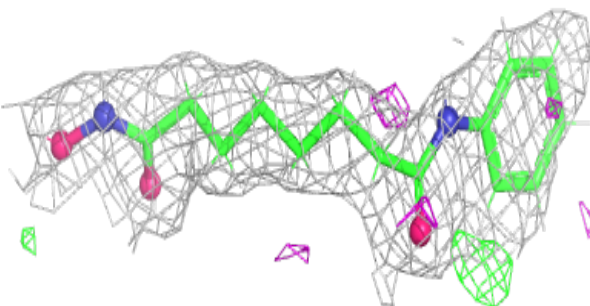
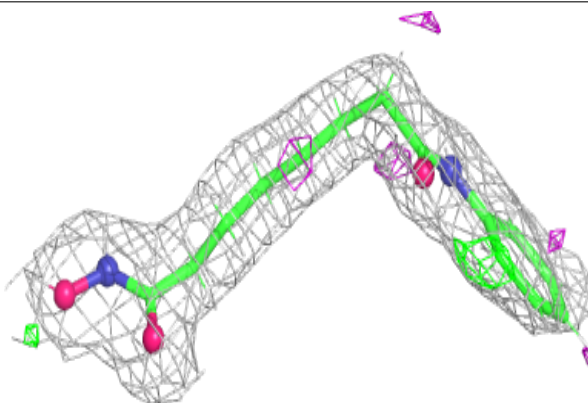
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation to approximate a three-dimensional view.

**Electron density around KK0 C 608:**

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

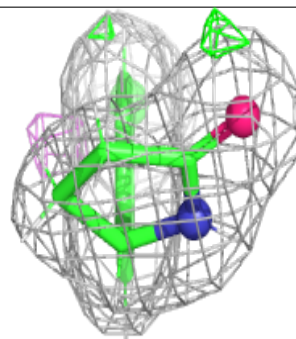
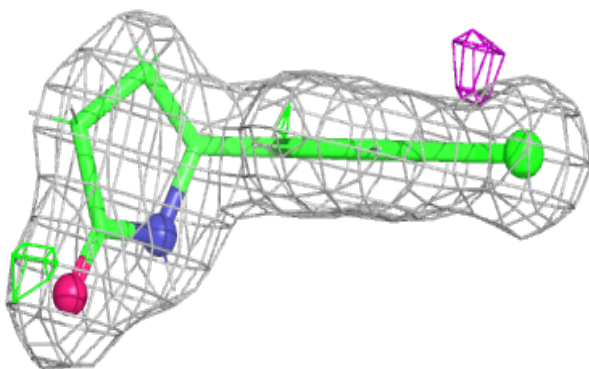
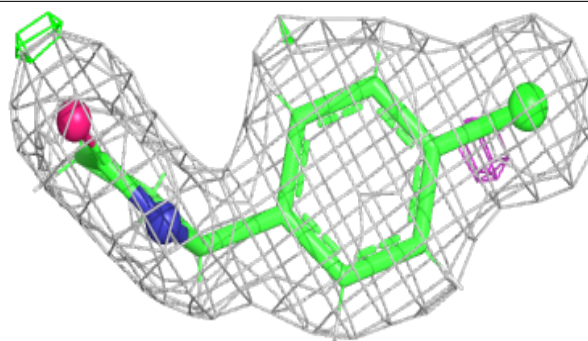
**Electron density around SHH B 610:**

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

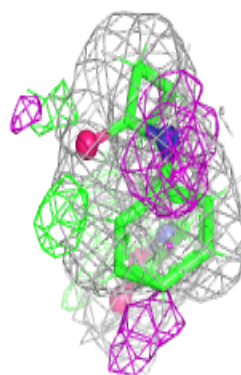
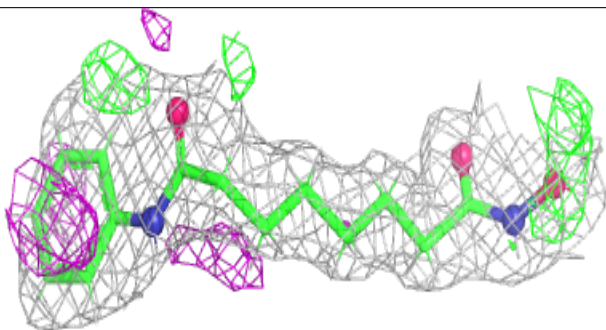
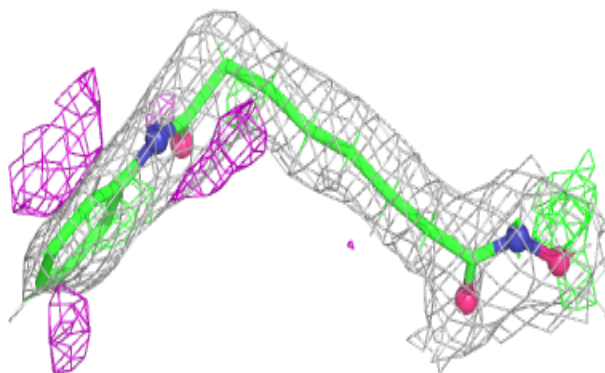


**Electron density around KK0 B 613:**

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

**Electron density around SHH A 607:**

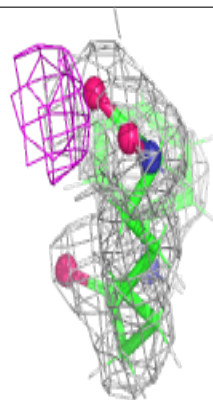
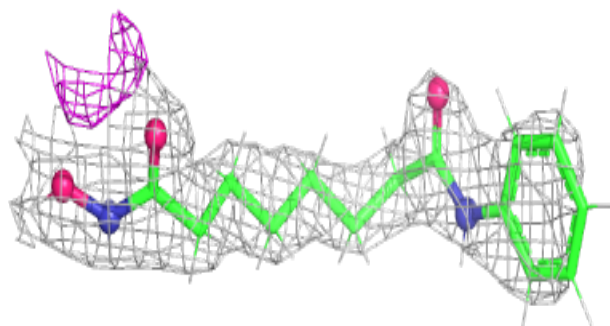
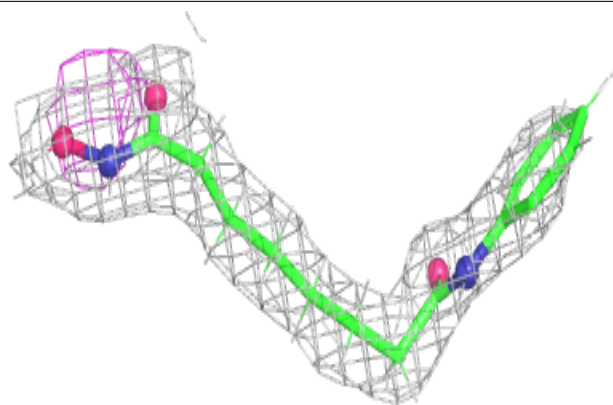
$2mF_o-DF_c$  (at 0.7 rmsd) in gray  
 $mF_o-DF_c$  (at 3 rmsd) in purple (negative)  
and green (positive)



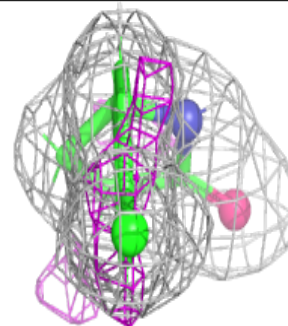
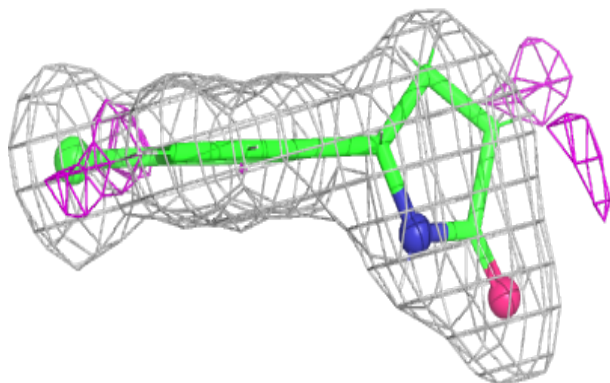
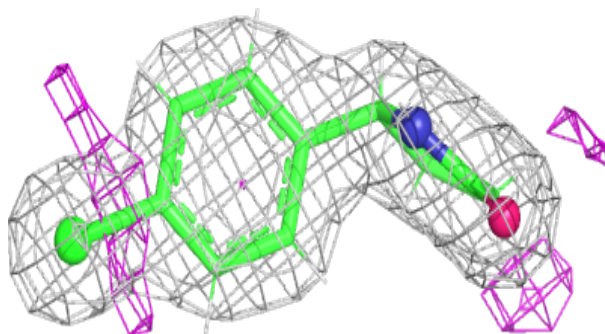


**Electron density around SHH C 607:**

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

**Electron density around KK0 A 609:**

$2mF_o-DF_c$  (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.