Full wwPDB X-ray Structure Validation Report (i)

Jun 22, 2024 – 05:56 PM EDT

PDB ID	:	5FHO
Title	:	Crystal structure of the GluA2 ligand-binding domain (S1S2J) in complex with (S)-2-Amino-3-(5-(2-(3-chlorobenzyl)-2H-tetrazol-5-yl)-3-hydroxyisoxazol-4-yl)propanoic acid at 2.3 A resolution
Authors	:	Frydenvang, K.; Kastrup, J.S.
Deposited on	:	2015-12-22
Resolution	:	2.30 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*
A user guide is available at
https://www.wwpdb.org/validation/2017/XrayValidationReportHelp
with specific help available everywhere you see the (i) 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 (i)) were used in the production of this report:

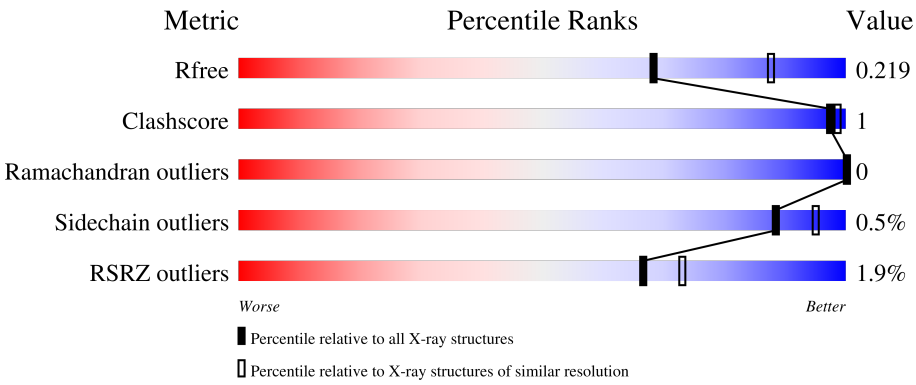
MolProbity	:	4.02b-467
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	2.37.1
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.37.1

1 Overall quality at a glance (i)

The following experimental techniques were used to determine the structure:
X-RAY DIFFRACTION

The reported resolution of this entry is 2.30 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	5042 (2.30-2.30)
Clashscore	141614	5643 (2.30-2.30)
Ramachandran outliers	138981	5575 (2.30-2.30)
Sidechain outliers	138945	5575 (2.30-2.30)
RSRZ outliers	127900	4938 (2.30-2.30)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments of the lower bar indicate the fraction of residues that contain outliers for >=3, 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions <=5% The upper red bar (where present) indicates the fraction of residues that have poor fit to the electron density. The numeric value is given above the bar.

Mol	Chain	Length	Quality of chain
1	A	264	2% 94%
1	B	264	94%
1	C	264	2% 96%
1	D	264	2% 95%

2 Entry composition (i)

There are 8 unique types of molecules in this entry. The entry contains 17025 atoms, of which 8330 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.

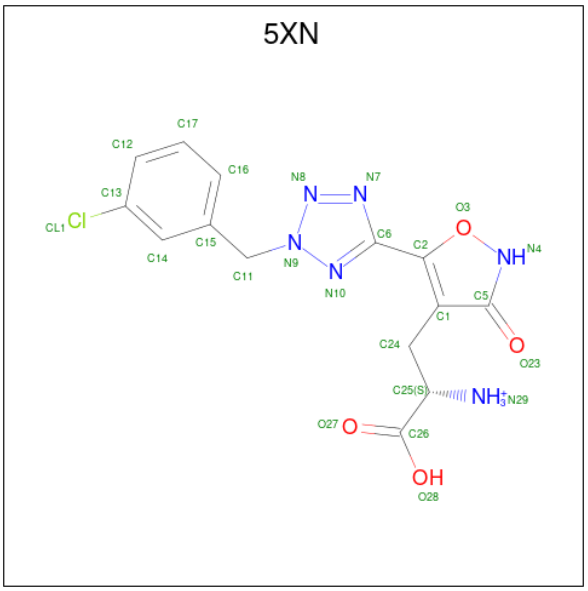
- Molecule 1 is a protein called Glutamate receptor 2,Glutamate receptor 2.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
			Total	C	H	N	O	S			
1	A	254	4005	1265	2020	331	375	14	0	0	0
1	B	255	4001	1264	2015	331	377	14	0	0	0
1	C	259	4103	1300	2066	339	384	14	0	1	0
1	D	256	4029	1272	2031	334	378	14	0	0	0

There are 16 discrepancies between the modelled and reference sequences:

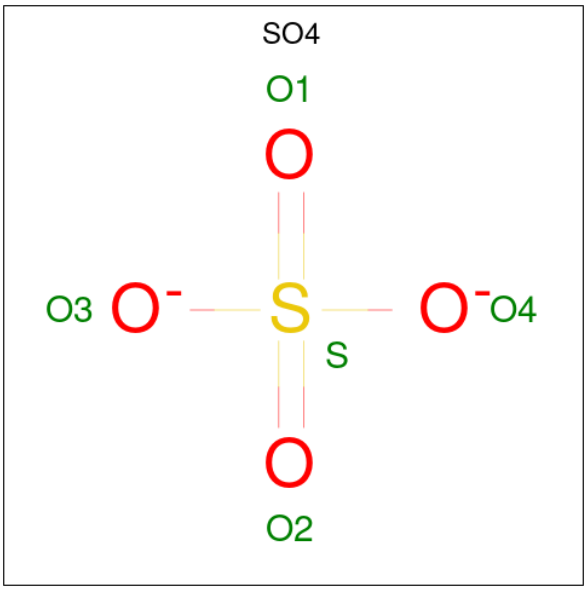
Chain	Residue	Modelled	Actual	Comment	Reference
A	1	GLY	-	expression tag	UNP P19491
A	2	ALA	-	expression tag	UNP P19491
A	118	GLY	-	linker	UNP P19491
A	119	THR	-	linker	UNP P19491
B	1	GLY	-	expression tag	UNP P19491
B	2	ALA	-	expression tag	UNP P19491
B	118	GLY	-	linker	UNP P19491
B	119	THR	-	linker	UNP P19491
C	1	GLY	-	expression tag	UNP P19491
C	2	ALA	-	expression tag	UNP P19491
C	118	GLY	-	linker	UNP P19491
C	119	THR	-	linker	UNP P19491
D	1	GLY	-	expression tag	UNP P19491
D	2	ALA	-	expression tag	UNP P19491
D	118	GLY	-	linker	UNP P19491
D	119	THR	-	linker	UNP P19491

- Molecule 2 is (1S)-1-carboxy-2-(5-{2-[(3-chlorophenyl)methyl]-2H-tetrazol-5-yl}-3-oxo-2,3-dihydro-1,2-oxazol-4-yl)ethan-1-aminium (three-letter code: 5XN) (formula: $C_{14}H_{14}ClN_6O_4$).



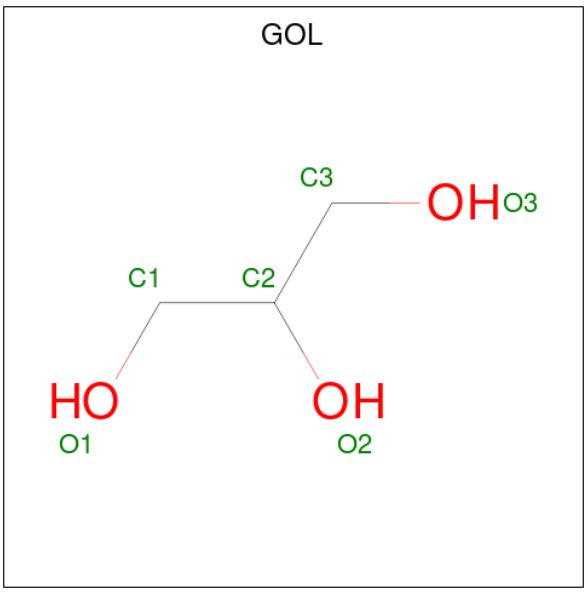
Mol	Chain	Residues	Atoms						ZeroOcc	AltConf
			Total	C	Cl	H	N	O		
2	A	1	37	14	1	12	6	4	0	0
			Total	C	Cl	H	N	O		
2	B	1	37	14	1	12	6	4	0	0
			Total	C	Cl	H	N	O		
2	C	1	37	14	1	12	6	4	0	0
			Total	C	Cl	H	N	O		
2	D	1	37	14	1	12	6	4	0	0

- Molecule 3 is SULFATE ION (three-letter code: SO4) (formula: O_4S).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
			Total	O	S		
3	A	1	5	4	1	0	0
			Total	O	S		
3	A	1	5	4	1	0	0
			Total	O	S		
3	A	1	5	4	1	0	0
			Total	O	S		
3	A	1	5	4	1	0	0
			Total	O	S		
3	B	1	5	4	1	0	0
			Total	O	S		
3	B	1	5	4	1	0	0
			Total	O	S		
3	B	1	5	4	1	0	0
			Total	O	S		
3	B	1	5	4	1	0	0
			Total	O	S		
3	C	1	5	4	1	0	0
			Total	O	S		
3	C	1	5	4	1	0	0
			Total	O	S		
3	D	1	5	4	1	0	0
			Total	O	S		
3	D	1	5	4	1	0	0

- Molecule 4 is GLYCEROL (three-letter code: GOL) (formula: $C_3H_8O_3$).

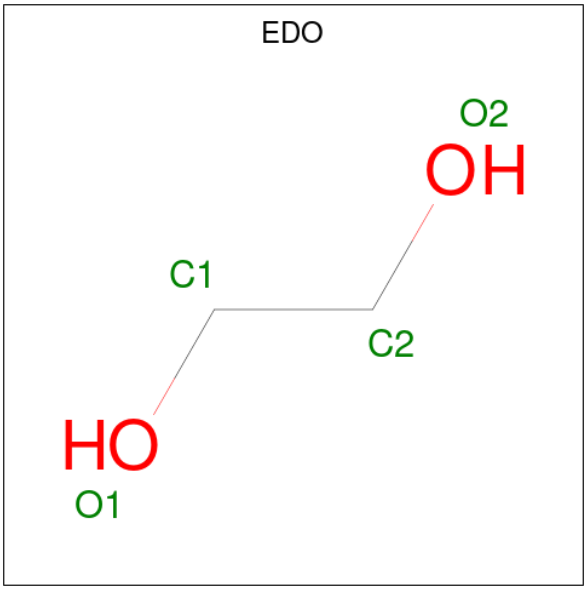


Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
			Total	C	H	O		
4	A	1	14	3	8	3	0	0
4	B	1	14	3	8	3	0	0
4	B	1	14	3	8	3	0	0
4	C	1	14	3	8	3	0	0
4	C	1	14	3	8	3	0	0
4	D	1	14	3	8	3	0	0

- Molecule 5 is CHLORIDE ION (three-letter code: CL) (formula: Cl).

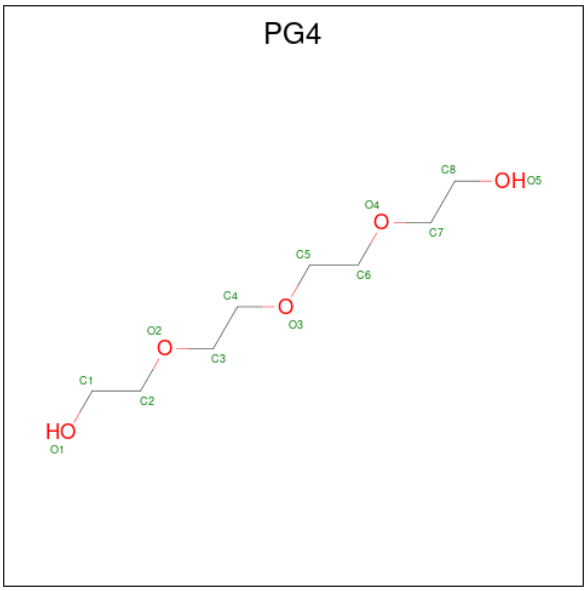
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
			Total	Cl		
5	A	2	2	2	0	0
5	B	3	3	3	0	0
5	C	1	1	1	0	0
5	D	3	3	3	0	0

- Molecule 6 is 1,2-ETHANEDIOL (three-letter code: EDO) (formula: $C_2H_6O_2$).



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

- Molecule 7 is TETRAETHYLENE GLYCOL (three-letter code: PG4) (formula: $C_8H_{18}O_5$).



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

- Molecule 8 is water.

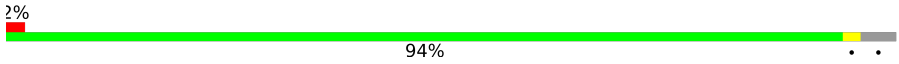
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
			Total	O		
8	A	80	80	80	0	0
			Total	O		
8	B	116	118	118	0	2
			Total	O		
8	C	112	112	112	0	0
			Total	O		
8	D	105	105	105	0	0

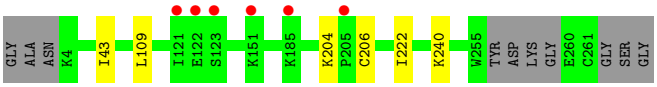
3 Residue-property plots (i)

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: Glutamate receptor 2,Glutamate receptor 2

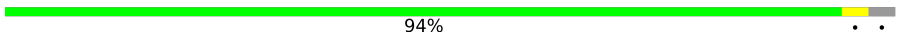
Chain A:





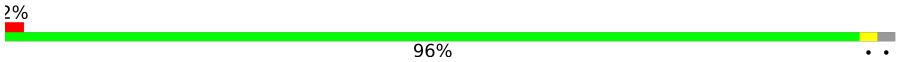
• Molecule 1: Glutamate receptor 2,Glutamate receptor 2

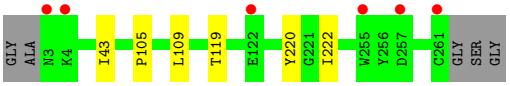
Chain B:



• Molecule 1: Glutamate receptor 2,Glutamate receptor 2

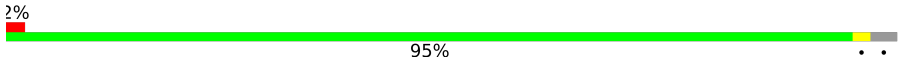
Chain C:

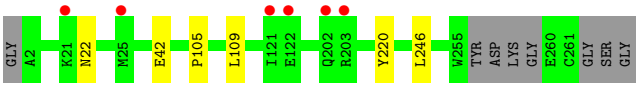




• Molecule 1: Glutamate receptor 2,Glutamate receptor 2

Chain D:





4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α, β, γ	70.98Å 109.98Å 144.21Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	44.05 – 2.30 45.96 – 2.30	Depositor EDS
% Data completeness (in resolution range)	99.9 (44.05-2.30) 100.0 (45.96-2.30)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	0.07	Depositor
$< I/\sigma(I) >$ [1]	4.32 (at 2.29Å)	Xtriage
Refinement program	PHENIX	Depositor
R, R_{free}	0.173 , 0.216 0.177 , 0.219	Depositor DCC
R_{free} test set	2583 reflections (5.07%)	wwPDB-VP
Wilson B-factor (Å^2)	28.5	Xtriage
Anisotropy	0.450	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.46 , 50.2	EDS
L-test for twinning[2]	$< \|L\| > = 0.48$, $< L^2 > = 0.31$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.95	EDS
Total number of atoms	17025	wwPDB-VP
Average B, all atoms (Å^2)	36.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The analyses of the Patterson function reveals a significant off-origin peak that is 38.31 % of the origin peak, indicating pseudo-translational symmetry. The chance of finding a peak of this or larger height randomly in a structure without pseudo-translational symmetry is equal to 3.7573e-04. The detected translational NCS is most likely also responsible for the elevated intensity ratio.*

[1]Intensities estimated from amplitudes.

[2]Theoretical values of $< |L| >$, $< L^2 >$ for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

5 Model quality (i)

5.1 Standard geometry (i)

Bond lengths and bond angles in the following residue types are not validated in this section: 5XN, PG4, CL, EDO, SO4, GOL

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	0.26	0/2019	0.43	0/2714
1	B	0.24	0/2020	0.43	0/2716
1	C	0.27	1/2078 (0.0%)	0.43	0/2796
1	D	0.26	0/2032	0.42	0/2732
All	All	0.26	1/8149 (0.0%)	0.43	0/10958

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	C	119	THR	C-N	5.62	1.45	1.34

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	1985	2020	2020	3	0
1	B	1986	2015	2015	4	0
1	C	2037	2066	2066	2	0
1	D	1998	2031	2031	4	0
2	A	25	12	0	0	0
2	B	25	12	0	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	C	25	12	0	0	0
2	D	25	12	0	0	0
3	A	20	0	0	0	0
3	B	20	0	0	0	0
3	C	10	0	0	0	0
3	D	10	0	0	1	0
4	A	6	8	8	0	0
4	B	12	16	16	0	0
4	C	12	16	16	0	0
4	D	6	8	8	0	0
5	A	2	0	0	0	0
5	B	3	0	0	0	0
5	C	1	0	0	0	0
5	D	3	0	0	0	0
6	A	20	30	30	0	0
6	B	8	12	12	0	0
6	C	16	24	24	0	0
6	D	12	18	18	0	0
7	B	13	18	18	0	0
8	A	80	0	0	0	0
8	B	118	0	0	0	0
8	C	112	0	0	0	0
8	D	105	0	0	1	0
All	All	8695	8330	8282	13	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 (13) close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:240:LYS:NZ	3:D:302:SO4:O4	2.43	0.52
1:B:42:GLU:HG3	1:B:246:LEU:HD21	1.97	0.46
1:B:125:GLU:OE2	1:B:129:LYS:NZ	2.49	0.46
1:D:22:ASN:OD1	1:D:22:ASN:N	2.48	0.46
1:A:43:ILE:HD13	1:A:222:ILE:HD13	1.99	0.45
1:C:43:ILE:HD13	1:C:222:ILE:HD13	1.98	0.45
1:A:204:LYS:HA	1:A:206:CYS:N	2.33	0.43
1:C:105:PRO:HA	1:C:220:TYR:O	2.18	0.43
1:B:241:LEU:HD22	1:B:246:LEU:HD22	2.01	0.43
1:D:105:PRO:HA	1:D:220:TYR:O	2.20	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:42:GLU:HG3	1:D:246:LEU:HD21	2.02	0.41
1:D:22:ASN:ND2	8:D:410:HOH:O	2.53	0.41
1:B:237:ALA:O	1:B:241:LEU:HG	2.21	0.41

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	250/264 (95%)	247 (99%)	3 (1%)	0	100	100
1	B	251/264 (95%)	247 (98%)	4 (2%)	0	100	100
1	C	258/264 (98%)	254 (98%)	4 (2%)	0	100	100
1	D	252/264 (96%)	248 (98%)	4 (2%)	0	100	100
All	All	1011/1056 (96%)	996 (98%)	15 (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	214/219 (98%)	213 (100%)	1 (0%)	88	95
1	B	214/219 (98%)	213 (100%)	1 (0%)	88	95

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles
1	C	219/219 (100%)	218 (100%)	1 (0%)	88 95
1	D	215/219 (98%)	214 (100%)	1 (0%)	88 95
All	All	862/876 (98%)	858 (100%)	4 (0%)	88 95

All (4) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	109	LEU
1	B	109	LEU
1	C	109	LEU
1	D	109	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. There are no such sidechains identified.

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 (i)

Of 46 ligands modelled in this entry, 9 are monoatomic - leaving 37 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	$\#\|Z\| > 2$
3	SO4	D	303	-	4,4,4	0.14	0	6,6,6	0.06	0
3	SO4	B	304	-	4,4,4	0.13	0	6,6,6	0.05	0
4	GOL	C	304	-	5,5,5	0.35	0	5,5,5	0.21	0
3	SO4	B	302	-	4,4,4	0.15	0	6,6,6	0.06	0
3	SO4	A	302	-	4,4,4	0.15	0	6,6,6	0.05	0
3	SO4	A	304	-	4,4,4	0.14	0	6,6,6	0.05	0
3	SO4	A	303	-	4,4,4	0.15	0	6,6,6	0.05	0
6	EDO	D	309	-	3,3,3	0.48	0	2,2,2	0.21	0
6	EDO	C	309	-	3,3,3	0.48	0	2,2,2	0.29	0
3	SO4	A	305	-	4,4,4	0.14	0	6,6,6	0.04	0
6	EDO	A	309	-	3,3,3	0.46	0	2,2,2	0.32	0
3	SO4	D	302	-	4,4,4	0.14	0	6,6,6	0.05	0
6	EDO	D	310	-	3,3,3	0.48	0	2,2,2	0.31	0
4	GOL	C	305	-	5,5,5	0.37	0	5,5,5	0.25	0
6	EDO	B	313	-	3,3,3	0.47	0	2,2,2	0.28	0
6	EDO	A	313	-	3,3,3	0.48	0	2,2,2	0.31	0
4	GOL	D	304	-	5,5,5	0.41	0	5,5,5	0.09	0
4	GOL	B	306	-	5,5,5	0.37	0	5,5,5	0.25	0
4	GOL	A	306	-	5,5,5	0.34	0	5,5,5	0.21	0
6	EDO	A	310	-	3,3,3	0.47	0	2,2,2	0.29	0
2	5XN	B	301	-	21,27,27	1.44	3 (14%)	23,38,38	1.48	2 (8%)
6	EDO	C	310	-	3,3,3	0.48	0	2,2,2	0.28	0
6	EDO	B	312	-	3,3,3	0.48	0	2,2,2	0.28	0
6	EDO	D	308	-	3,3,3	0.48	0	2,2,2	0.30	0
6	EDO	C	307	-	3,3,3	0.47	0	2,2,2	0.28	0
3	SO4	C	302	-	4,4,4	0.14	0	6,6,6	0.05	0
7	PG4	B	308	-	12,12,12	0.47	0	11,11,11	0.25	0
6	EDO	A	312	-	3,3,3	0.47	0	2,2,2	0.31	0
3	SO4	B	305	-	4,4,4	0.14	0	6,6,6	0.06	0
6	EDO	C	308	-	3,3,3	0.47	0	2,2,2	0.30	0
3	SO4	C	303	-	4,4,4	0.14	0	6,6,6	0.05	0
2	5XN	C	301	-	21,27,27	1.40	3 (14%)	23,38,38	1.49	3 (13%)
3	SO4	B	303	-	4,4,4	0.14	0	6,6,6	0.04	0
6	EDO	A	311	-	3,3,3	0.44	0	2,2,2	0.37	0
4	GOL	B	307	-	5,5,5	0.37	0	5,5,5	0.28	0
2	5XN	A	301	-	21,27,27	1.43	3 (14%)	23,38,38	1.44	1 (4%)
2	5XN	D	301	-	21,27,27	1.43	3 (14%)	23,38,38	1.42	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
4	GOL	C	304	-	-	4/4/4/4	-
6	EDO	D	309	-	-	1/1/1/1	-
6	EDO	C	309	-	-	0/1/1/1	-
6	EDO	A	309	-	-	1/1/1/1	-
6	EDO	D	310	-	-	0/1/1/1	-
4	GOL	C	305	-	-	2/4/4/4	-
6	EDO	B	313	-	-	0/1/1/1	-
6	EDO	A	313	-	-	0/1/1/1	-
4	GOL	D	304	-	-	2/4/4/4	-
4	GOL	B	306	-	-	2/4/4/4	-
4	GOL	A	306	-	-	2/4/4/4	-
6	EDO	A	310	-	-	0/1/1/1	-
2	5XN	B	301	-	-	3/12/16/16	0/3/3/3
6	EDO	C	310	-	-	1/1/1/1	-
6	EDO	B	312	-	-	0/1/1/1	-
6	EDO	D	308	-	-	0/1/1/1	-
6	EDO	C	307	-	-	0/1/1/1	-
7	PG4	B	308	-	-	5/10/10/10	-
6	EDO	A	312	-	-	0/1/1/1	-
6	EDO	C	308	-	-	0/1/1/1	-
2	5XN	C	301	-	-	3/12/16/16	0/3/3/3
6	EDO	A	311	-	-	0/1/1/1	-
4	GOL	B	307	-	-	0/4/4/4	-
2	5XN	A	301	-	-	3/12/16/16	0/3/3/3
2	5XN	D	301	-	-	3/12/16/16	0/3/3/3

All (12) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	D	301	5XN	C6-N7	2.80	1.36	1.33
2	B	301	5XN	C6-N7	2.75	1.36	1.33
2	A	301	5XN	C6-N7	2.74	1.36	1.33
2	C	301	5XN	C6-N7	2.68	1.36	1.33
2	A	301	5XN	N7-N8	-2.63	1.29	1.34
2	B	301	5XN	N7-N8	-2.60	1.29	1.34
2	D	301	5XN	N7-N8	-2.50	1.29	1.34
2	C	301	5XN	N7-N8	-2.40	1.30	1.34
2	B	301	5XN	C5-C1	-2.33	1.43	1.48
2	A	301	5XN	C5-C1	-2.30	1.43	1.48
2	D	301	5XN	C5-C1	-2.29	1.43	1.48
2	C	301	5XN	C5-C1	-2.29	1.43	1.48

All (7) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	B	301	5XN	N10-C6-N7	5.36	116.16	111.91
2	C	301	5XN	N10-C6-N7	5.34	116.14	111.91
2	D	301	5XN	N10-C6-N7	5.27	116.09	111.91
2	A	301	5XN	N10-C6-N7	5.27	116.09	111.91
2	B	301	5XN	O23-C5-C1	-2.21	125.65	128.04
2	C	301	5XN	C15-C11-N9	-2.18	109.29	112.48
2	C	301	5XN	O23-C5-C1	-2.00	125.87	128.04

There are no chirality outliers.

All (32) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
4	A	306	GOL	C1-C2-C3-O3
4	C	304	GOL	C1-C2-C3-O3
7	B	308	PG4	O3-C5-C6-O4
4	B	306	GOL	O1-C1-C2-C3
4	C	304	GOL	O1-C1-C2-C3
4	C	305	GOL	O1-C1-C2-C3
4	D	304	GOL	C1-C2-C3-O3
4	C	304	GOL	O1-C1-C2-O2
4	C	304	GOL	O2-C2-C3-O3
4	D	304	GOL	O2-C2-C3-O3
6	A	309	EDO	O1-C1-C2-O2
6	C	310	EDO	O1-C1-C2-O2
4	B	306	GOL	O1-C1-C2-O2
7	B	308	PG4	O4-C7-C8-O5
4	A	306	GOL	O2-C2-C3-O3
7	B	308	PG4	C4-C3-O2-C2
4	C	305	GOL	O1-C1-C2-O2
2	A	301	5XN	C1-C24-C25-N29
2	B	301	5XN	C1-C24-C25-N29
2	C	301	5XN	C1-C24-C25-N29
2	D	301	5XN	C1-C24-C25-N29
2	A	301	5XN	C15-C11-N9-N10
2	B	301	5XN	C15-C11-N9-N10
2	C	301	5XN	C15-C11-N9-N10
2	D	301	5XN	C15-C11-N9-N10
6	D	309	EDO	O1-C1-C2-O2
2	A	301	5XN	C15-C11-N9-N8
2	B	301	5XN	C15-C11-N9-N8
2	C	301	5XN	C15-C11-N9-N8

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Mol	Chain	Res	Type	Atoms
2	D	301	5XN	C15-C11-N9-N8
7	B	308	PG4	C6-C5-O3-C4
7	B	308	PG4	O2-C3-C4-O3

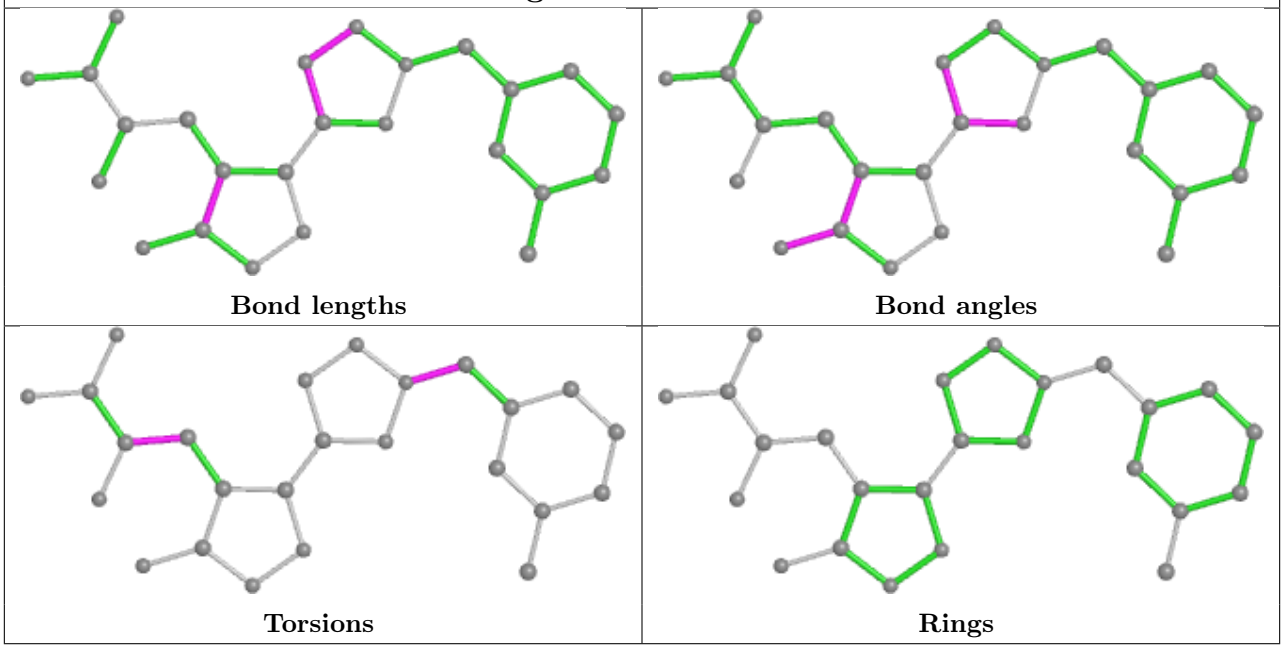
There are no ring outliers.

1 monomer is involved in 1 short contact:

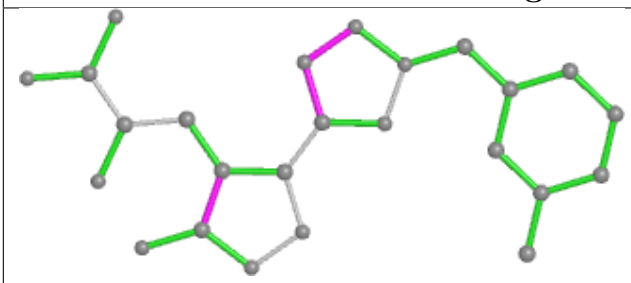
Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	D	302	SO4	1	0

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

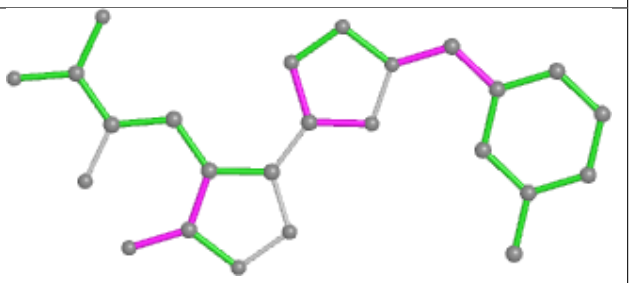
Ligand 5XN B 301



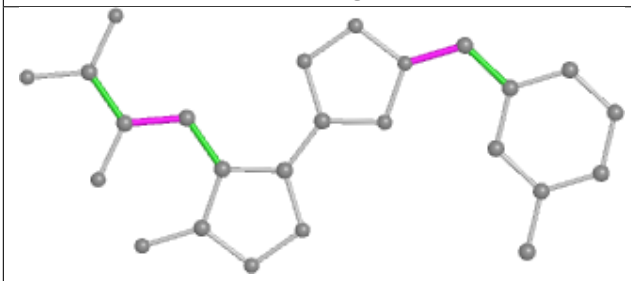
Ligand 5XN C 301



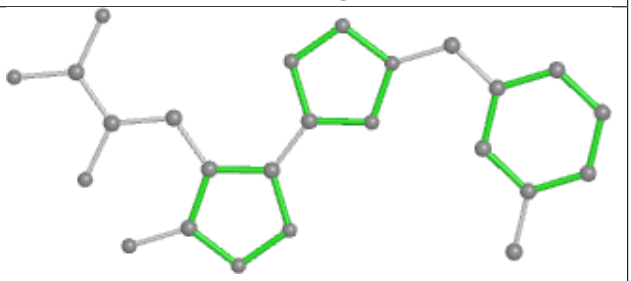
Bond lengths



Bond angles

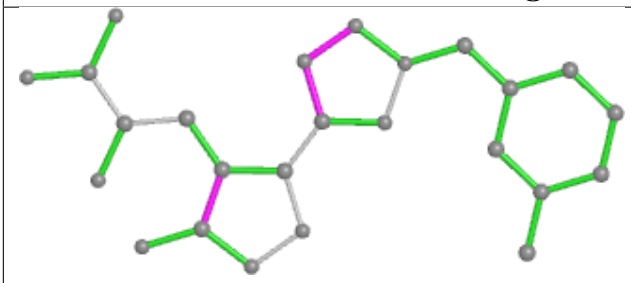


Torsions

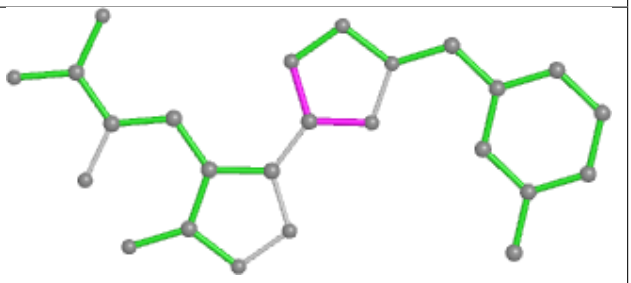


Rings

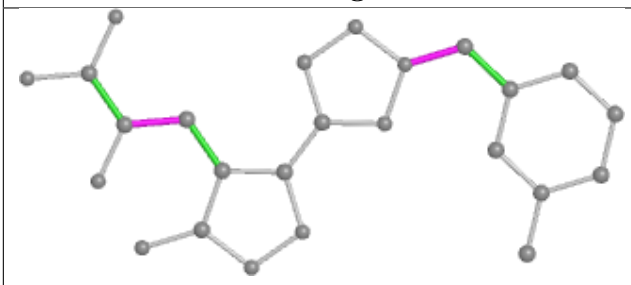
Ligand 5XN A 301



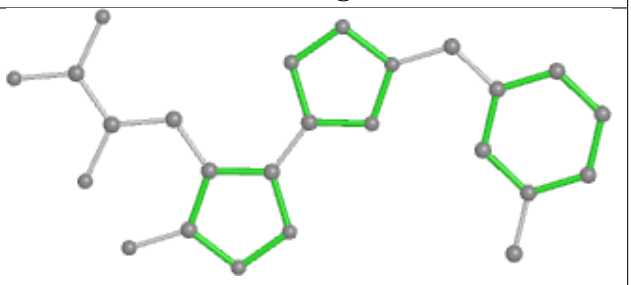
Bond lengths



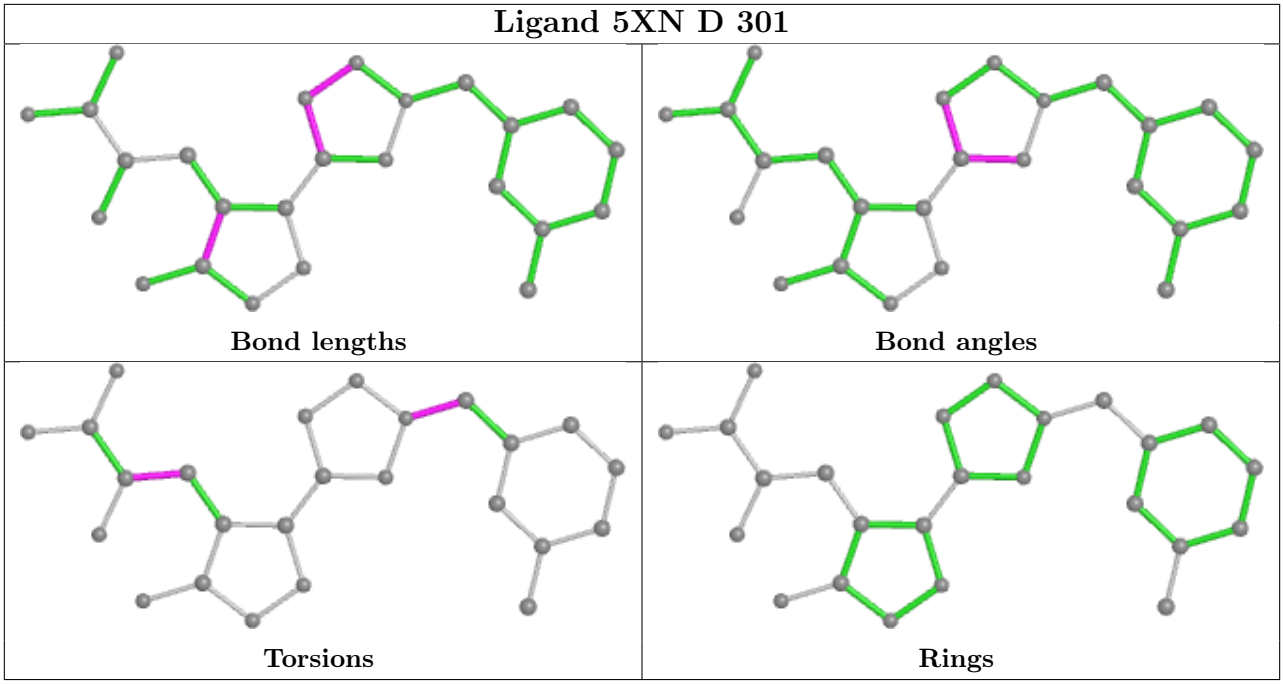
Bond angles



Torsions



Rings



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, 95th percentile and maximum values of the occupancy-weighted average B-factor per residue. The column labelled 'Q< 0.9' lists the number of (and percentage) of residues with an average occupancy less than 0.9.

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2			OWAB(Å^2)	Q<0.9
1	A	254/264 (96%)	0.15	6 (2%)	59	66	22, 33, 58, 70	0
1	B	255/264 (96%)	0.02	1 (0%)	92	95	17, 26, 48, 70	0
1	C	259/264 (98%)	0.01	6 (2%)	60	67	20, 28, 47, 74	0
1	D	256/264 (96%)	0.14	6 (2%)	60	67	17, 29, 49, 76	0
All	All	1024/1056 (96%)	0.08	19 (1%)	66	73	17, 29, 51, 76	0

All (19) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	C	3	ASN	3.8
1	C	4	LYS	3.4
1	D	25	MET	3.1
1	D	21	LYS	2.9
1	D	121	ILE	2.9
1	A	205	PRO	2.9
1	A	185	LYS	2.7
1	B	121	ILE	2.5
1	D	203	ARG	2.4
1	C	261	CYS	2.4
1	C	257	ASP	2.4
1	C	122	GLU	2.4
1	D	122	GLU	2.3
1	A	122	GLU	2.3
1	A	121	ILE	2.2
1	A	151	LYS	2.0
1	C	255[A]	TRP	2.0
1	D	202	GLN	2.0
1	A	123	SER	2.0

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, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
4	GOL	A	306	6/6	0.69	0.24	41,50,58,58	0
3	SO4	B	305	5/5	0.76	0.32	73,74,88,100	0
7	PG4	B	308	13/13	0.76	0.29	35,54,65,65	0
3	SO4	D	302	5/5	0.80	0.27	64,73,91,93	0
6	EDO	C	310	4/4	0.80	0.25	38,46,54,54	0
3	SO4	D	303	5/5	0.80	0.30	64,71,89,95	0
6	EDO	A	313	4/4	0.81	0.22	37,44,47,54	0
5	CL	D	307	1/1	0.82	0.16	86,86,86,86	0
4	GOL	C	304	6/6	0.82	0.21	36,48,56,57	0
6	EDO	D	309	4/4	0.83	0.17	37,45,49,51	0
4	GOL	C	305	6/6	0.83	0.17	33,40,50,50	0
6	EDO	A	309	4/4	0.84	0.18	36,47,52,56	0
6	EDO	A	310	4/4	0.84	0.17	41,50,57,59	0
4	GOL	D	304	6/6	0.86	0.29	26,37,42,49	0
3	SO4	C	303	5/5	0.86	0.22	81,84,88,97	0
6	EDO	C	309	4/4	0.87	0.15	35,42,49,49	0
6	EDO	C	308	4/4	0.87	0.14	30,44,52,59	0
5	CL	B	311	1/1	0.88	0.15	58,58,58,58	0
4	GOL	B	306	6/6	0.88	0.23	44,55,65,66	0
6	EDO	B	312	4/4	0.88	0.12	39,46,53,53	0
3	SO4	B	304	5/5	0.88	0.23	76,80,88,93	0
6	EDO	A	311	4/4	0.89	0.17	36,49,59,69	0
4	GOL	B	307	6/6	0.90	0.20	34,46,59,64	0
2	5XN	D	301	25/25	0.90	0.16	20,31,49,54	0
6	EDO	D	310	4/4	0.90	0.12	36,43,48,48	0
5	CL	A	308	1/1	0.90	0.12	65,65,65,65	0
3	SO4	B	303	5/5	0.91	0.14	75,77,79,89	0

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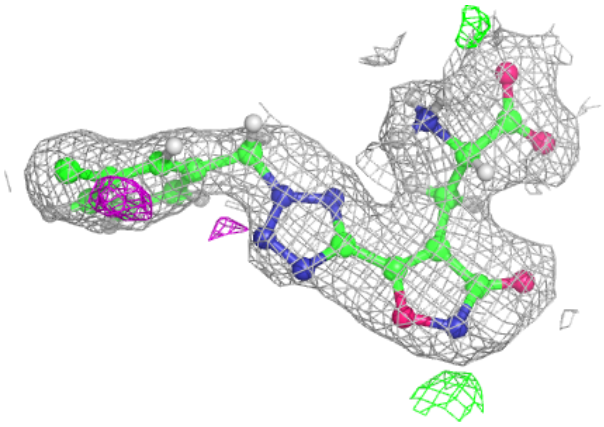
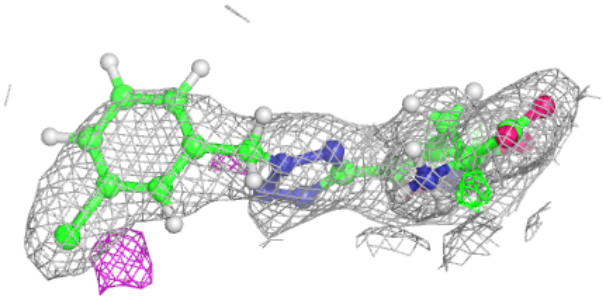
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
3	SO4	A	304	5/5	0.91	0.21	67,70,75,77	0
5	CL	D	305	1/1	0.91	0.10	58,58,58,58	0
3	SO4	A	305	5/5	0.92	0.16	69,71,80,83	0
5	CL	D	306	1/1	0.92	0.10	62,62,62,62	0
6	EDO	C	307	4/4	0.92	0.13	31,45,46,56	0
6	EDO	D	308	4/4	0.93	0.10	31,38,44,44	0
2	5XN	C	301	25/25	0.93	0.15	18,30,39,44	0
5	CL	B	309	1/1	0.93	0.12	53,53,53,53	0
2	5XN	B	301	25/25	0.93	0.16	15,28,40,42	0
3	SO4	C	302	5/5	0.94	0.13	48,50,62,66	0
5	CL	C	306	1/1	0.94	0.12	58,58,58,58	0
3	SO4	A	303	5/5	0.94	0.12	47,51,59,63	0
2	5XN	A	301	25/25	0.94	0.16	18,34,50,55	0
6	EDO	A	312	4/4	0.94	0.13	33,41,47,53	0
6	EDO	B	313	4/4	0.96	0.18	35,43,47,52	0
5	CL	B	310	1/1	0.96	0.10	55,55,55,55	0
5	CL	A	307	1/1	0.96	0.09	58,58,58,58	0
3	SO4	A	302	5/5	0.98	0.14	47,48,52,64	0
3	SO4	B	302	5/5	0.99	0.13	42,42,47,52	0

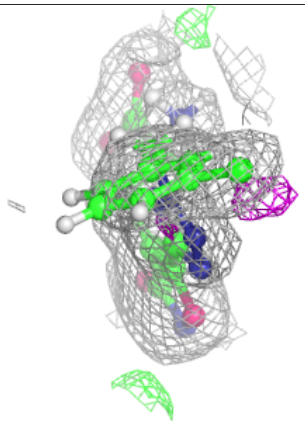
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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

Electron density around 5XN D 301:

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

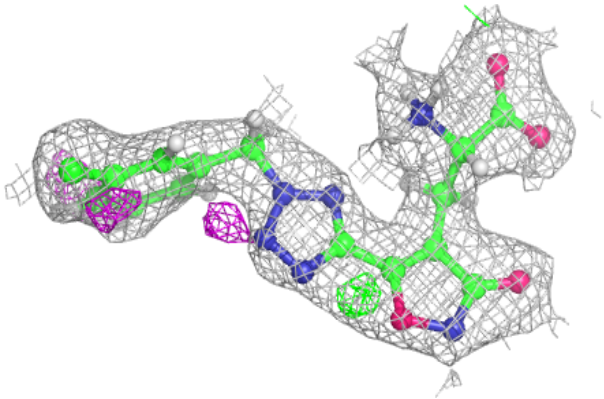


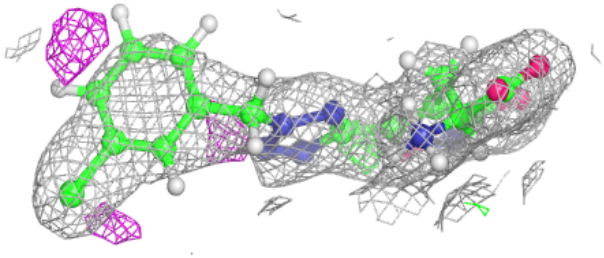


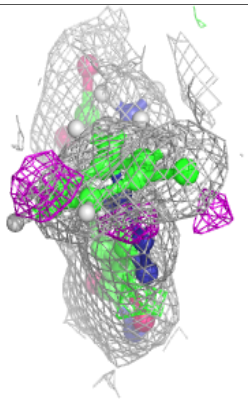


Electron density around 5XN C 301:

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

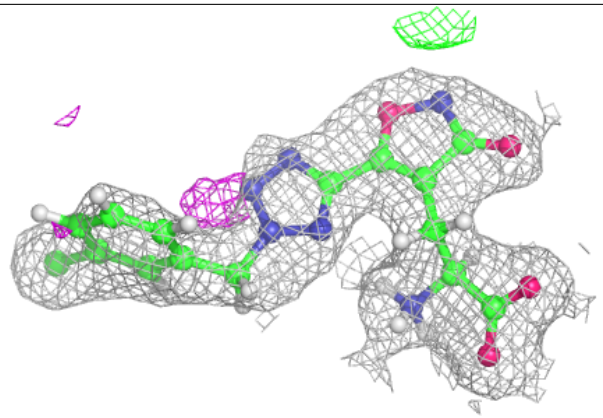


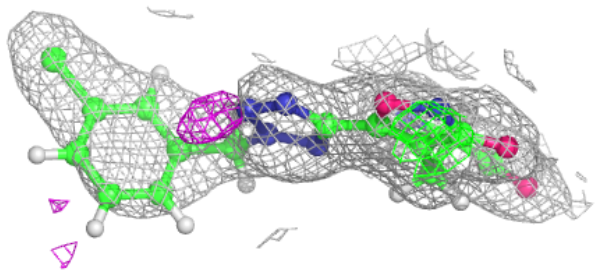


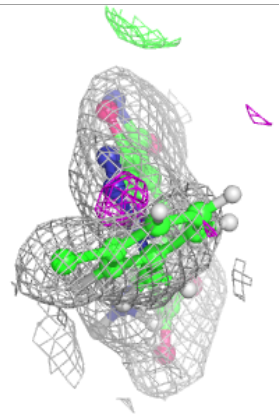


Electron density around 5XN B 301:

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

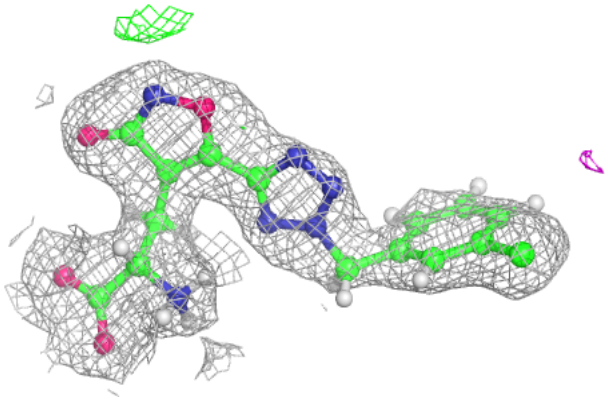


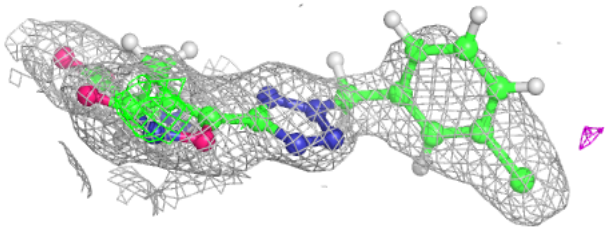


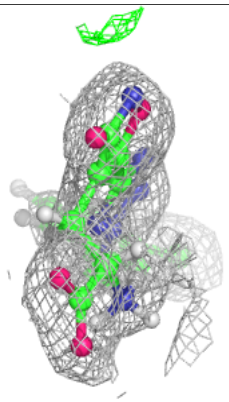


Electron density around 5XN A 301:

$2mF_o$-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.