



# wwPDB X-ray Structure Validation Summary Report ⓘ

Mar 9, 2026 – 06:02 AM UTC

PDB ID : 5ECP / pdb\_00005ecp  
Title : Crystal Structure of FIN219-FIP1 complex with JA, MET and ATP  
Authors : Chen, C.Y.; Cheng, Y.S.  
Deposited on : 2015-10-20  
Resolution : 2.25 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 : 4-5-2 with Phenix2.0  
Mogul : 2022.3.0, CSD as543be (2022)  
Xtriage (Phenix) : 2.0  
EDS : 3.0  
Buster-report : wwPDB partial adaption of 1.1.7 (2018)  
Percentile statistics : 20250101.v01 (using entries in the PDB archive January 1st 2025)  
CCP4 : 9.0.010 (Gargrove)  
Density-Fitness : 1.0.12  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.49

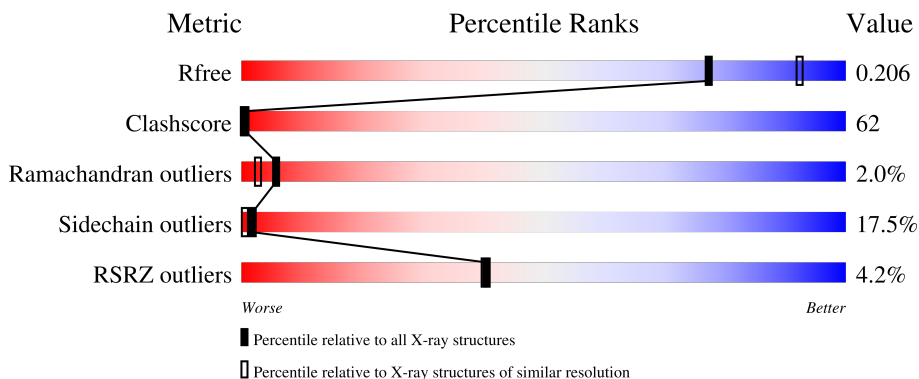
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 2.25 Å.

Percentile scores (ranging between 0-100) for global validation metrics of the entry are shown in the following graphic. The table shows the number of entries on which the scores are based.



Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
$R_{free}$	180053	1898 (2.26-2.26)
Clashscore	190562	2005 (2.26-2.26)
Ramachandran outliers	187476	1965 (2.26-2.26)
Sidechain outliers	187428	1966 (2.26-2.26)
RSRZ outliers	180081	1898 (2.26-2.26)

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	575	
1	D	575	
2	B	223	
2	C	223	
2	E	223	

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Mol	Chain	Length	Quality of chain
2	F	223	 25%                      52%                      17%                      . .

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

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
5	ATP	A	603	-	X	X	-
5	ATP	D	603	-	-	X	-

## 2 Entry composition [i](#)

There are 7 unique types of molecules in this entry. The entry contains 17707 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 Jasmonic acid-amido synthetase JAR1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	569	4479	2859	748	850	22	0	0	0
1	D	569	4479	2859	748	850	22	0	0	0

- Molecule 2 is a protein called Glutathione S-transferase U20.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
2	B	214	1748	1136	284	323	5	0	0	0
2	C	214	1748	1136	284	323	5	0	0	0
2	E	214	1748	1136	284	323	5	0	0	0
2	F	214	1748	1136	284	323	5	0	0	0

There are 24 discrepancies between the modelled and reference sequences:

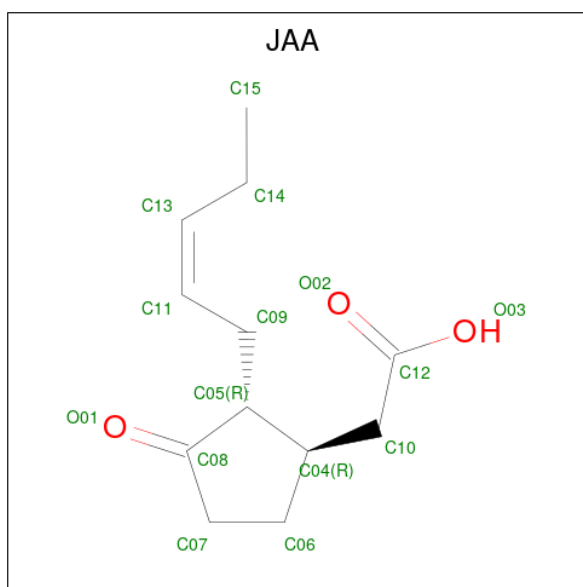
Chain	Residue	Modelled	Actual	Comment	Reference
B	-5	HIS	-	expression tag	UNP Q8L7C9
B	-4	HIS	-	expression tag	UNP Q8L7C9
B	-3	HIS	-	expression tag	UNP Q8L7C9
B	-2	HIS	-	expression tag	UNP Q8L7C9
B	-1	HIS	-	expression tag	UNP Q8L7C9
B	0	HIS	-	expression tag	UNP Q8L7C9
C	-5	HIS	-	expression tag	UNP Q8L7C9
C	-4	HIS	-	expression tag	UNP Q8L7C9
C	-3	HIS	-	expression tag	UNP Q8L7C9
C	-2	HIS	-	expression tag	UNP Q8L7C9
C	-1	HIS	-	expression tag	UNP Q8L7C9
C	0	HIS	-	expression tag	UNP Q8L7C9

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Chain	Residue	Modelled	Actual	Comment	Reference
E	-5	HIS	-	expression tag	UNP Q8L7C9
E	-4	HIS	-	expression tag	UNP Q8L7C9
E	-3	HIS	-	expression tag	UNP Q8L7C9
E	-2	HIS	-	expression tag	UNP Q8L7C9
E	-1	HIS	-	expression tag	UNP Q8L7C9
E	0	HIS	-	expression tag	UNP Q8L7C9
F	-5	HIS	-	expression tag	UNP Q8L7C9
F	-4	HIS	-	expression tag	UNP Q8L7C9
F	-3	HIS	-	expression tag	UNP Q8L7C9
F	-2	HIS	-	expression tag	UNP Q8L7C9
F	-1	HIS	-	expression tag	UNP Q8L7C9
F	0	HIS	-	expression tag	UNP Q8L7C9

- Molecule 3 is {(1R,2R)-3-oxo-2-[(2Z)-pent-2-en-1-yl]cyclopentyl}acetic acid (CCD ID: JAA) (formula: C<sub>12</sub>H<sub>18</sub>O<sub>3</sub>).

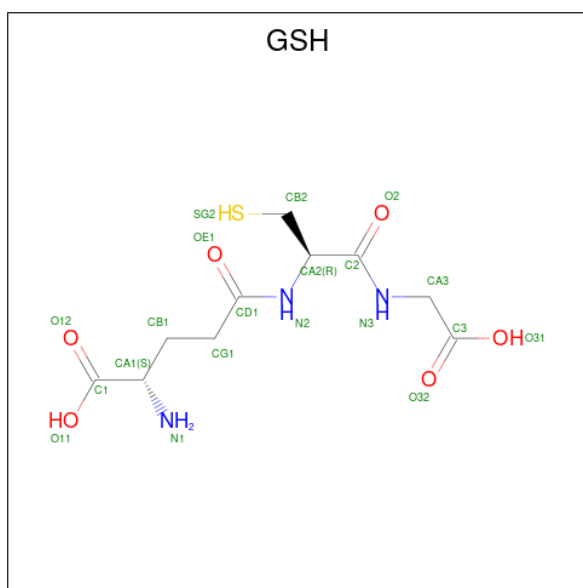


Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	A	1	Total	C	O	0	0
			15	12	3		
3	D	1	Total	C	O	0	0
			15	12	3		

- Molecule 4 is METHIONINE (CCD ID: MET) (formula: C<sub>5</sub>H<sub>11</sub>NO<sub>2</sub>S).



- Molecule 6 is GLUTATHIONE (CCD ID: GSH) (formula: C<sub>10</sub>H<sub>17</sub>N<sub>3</sub>O<sub>6</sub>S).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
6	B	1	Total	C	N	O	S	0	0
			20	10	3	6	1		
6	C	1	Total	C	N	O	S	0	0
			20	10	3	6	1		
6	E	1	Total	C	N	O	S	0	0
			20	10	3	6	1		
6	F	1	Total	C	N	O	S	0	0
			20	10	3	6	1		

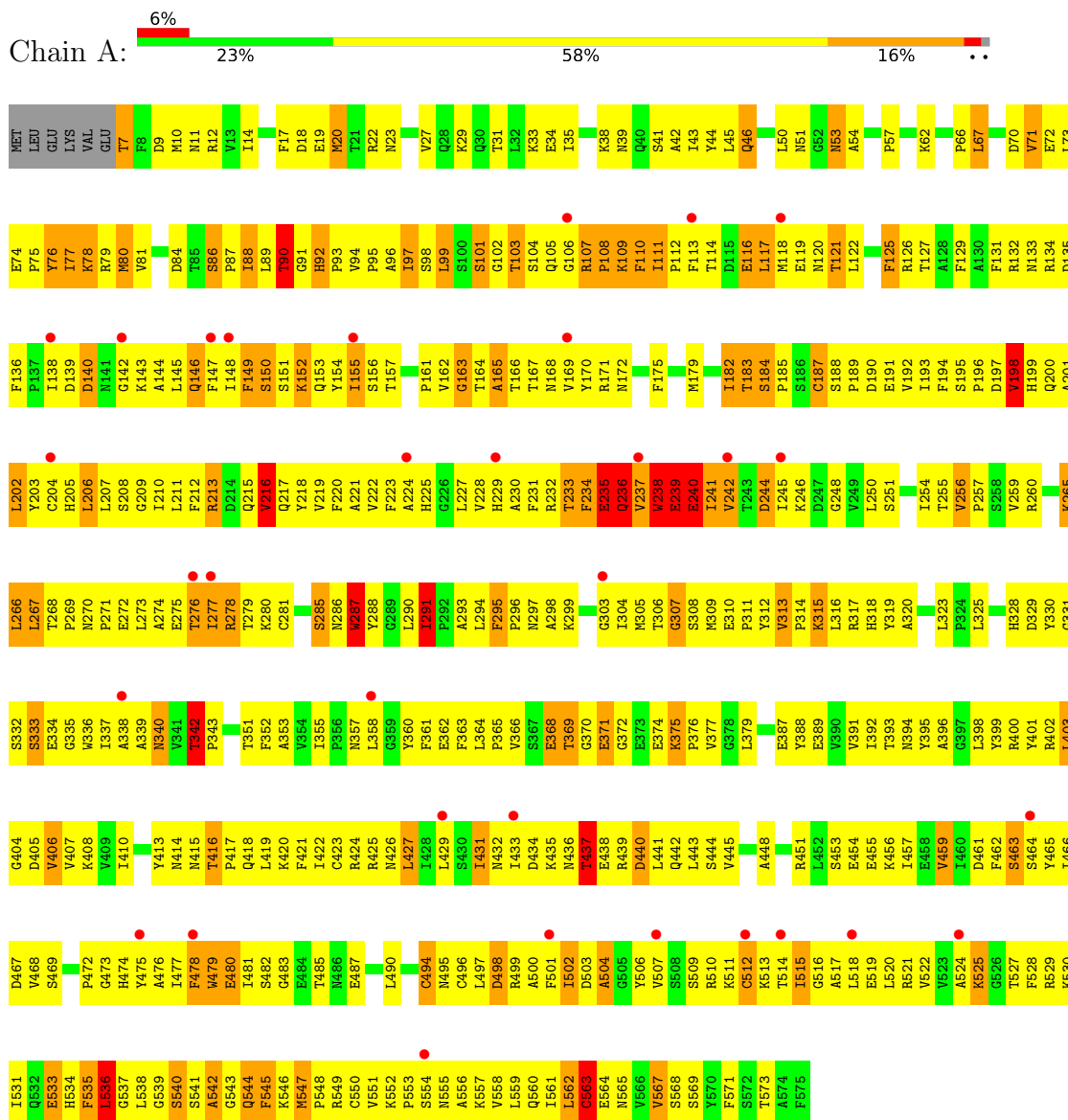
- Molecule 7 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
7	A	357	Total	O	0	0
			357	357		
7	B	193	Total	O	0	0
			193	193		
7	C	214	Total	O	0	0
			214	214		
7	D	403	Total	O	0	0
			403	403		
7	E	201	Total	O	0	0
			201	201		
7	F	199	Total	O	0	0
			199	199		

### 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: Jasmonic acid-amido synthetase JAR1



- Molecule 1: Jasmonic acid-amido synthetase JAR1







M190	E191	K192	E193	S194	V195	S196	K197	S198	L199	P200	D201	S202	E203	R204	I205	V206	A207	Y208	A209	A210	E211	Y212	R213	K214	M215	R216	L217
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## 4 Data and refinement statistics i

Property	Value	Source
Space group	P 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	53.71Å 53.70Å 192.03Å 89.96° 90.16° 113.24°	Depositor
Resolution (Å)	23.35 – 2.25 23.35 – 2.25	Depositor EDS
% Data completeness (in resolution range)	95.5 (23.35-2.25) 95.4 (23.35-2.25)	Depositor EDS
$R_{merge}$	0.13	Depositor
$R_{sym}$	0.13	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	1.65 (at 2.24Å)	Xtrriage
Refinement program	PHENIX 1.9_1692	Depositor
R, $R_{free}$	0.185 , 0.208 0.184 , 0.206	Depositor DCC
$R_{free}$ test set	2254 reflections (2.40%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	11.4	Xtrriage
Anisotropy	0.085	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.39 , 197.1	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.42$ , $\langle L^2 \rangle = 0.25$	Xtrriage
Estimated twinning fraction	0.053 for -h,-k,l 0.076 for -k,-h,-l 0.076 for k,h,-l	Xtrriage
$F_o, F_c$ correlation	0.87	EDS
Total number of atoms	17707	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	11.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The analyses of the Patterson function reveals a significant off-origin peak that is 27.70 % 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 2.1005e-03. The detected translational NCS is most likely also responsible for the elevated intensity ratio.*

<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: ATP, JAA, GSH

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	0.83	1/4581 (0.0%)	1.22	39/6219 (0.6%)
1	D	0.84	0/4581	1.19	38/6219 (0.6%)
2	B	0.83	1/1799 (0.1%)	1.06	4/2428 (0.2%)
2	C	0.96	0/1799	1.09	4/2428 (0.2%)
2	E	0.85	0/1799	1.11	8/2428 (0.3%)
2	F	1.06	2/1799 (0.1%)	1.27	11/2428 (0.5%)
All	All	0.88	4/16358 (0.0%)	1.18	104/22150 (0.5%)

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	1

All (4) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	153	VAL	CA-CB	5.62	1.61	1.54
2	F	134	ILE	CA-CB	5.23	1.60	1.54
2	F	163	TRP	CA-C	-5.03	1.46	1.52
1	A	216	VAL	CA-CB	5.01	1.59	1.54

The worst 5 of 104 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	295	PHE	CA-C-N	12.35	135.28	119.84
1	A	295	PHE	C-N-CA	12.35	135.28	119.84
2	E	11	TRP	CA-C-N	-9.95	109.00	121.04

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	E	11	TRP	C-N-CA	-9.95	109.00	121.04
1	D	295	PHE	CA-C-N	9.46	129.69	119.28

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	234	PHE	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	4479	0	4434	636	6
1	D	4479	0	4434	656	5
2	B	1748	0	1704	189	1
2	C	1748	0	1704	197	1
2	E	1748	0	1704	180	1
2	F	1748	0	1704	212	1
3	A	15	0	0	2	0
3	D	15	0	0	2	0
4	A	9	0	8	4	0
4	D	9	0	8	5	0
5	A	31	0	8	17	0
5	D	31	0	8	26	0
6	B	20	0	15	1	0
6	C	20	0	15	0	0
6	E	20	0	15	3	0
6	F	20	0	15	0	0
7	A	357	0	0	77	7
7	B	193	0	0	29	2
7	C	214	0	0	30	1
7	D	403	0	0	74	4
7	E	201	0	0	28	1
7	F	199	0	0	34	3
All	All	17707	0	15776	1980	22

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 62.

The worst 5 of 1980 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:121:THR:HG21	1:A:175:PHE:CE1	1.69	1.27
1:A:121:THR:CG2	1:A:175:PHE:HE1	1.56	1.18
1:A:120:ASN:HD21	1:A:358:LEU:HD22	1.17	1.10
1:A:121:THR:HG21	1:A:175:PHE:HE1	0.93	1.05
1:D:334:GLU:O	1:D:394:ASN:ND2	1.93	1.02

The worst 5 of 22 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:D:297:ASN:ND2	1:D:435:LYS:O[1_655]	1.96	0.24
7:F:552:HOH:O	7:F:577:HOH:O[1_665]	2.00	0.20
1:A:239:GLU:OE1	2:F:178:GLU:N[1_554]	2.01	0.19
7:D:936:HOH:O	7:D:988:HOH:O[1_655]	2.04	0.16
7:D:989:HOH:O	7:D:1008:HOH:O[1_665]	2.04	0.16

## 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	567/575 (99%)	514 (91%)	38 (7%)	15 (3%)	4 2
1	D	567/575 (99%)	516 (91%)	36 (6%)	15 (3%)	4 2
2	B	212/223 (95%)	200 (94%)	10 (5%)	2 (1%)	14 12
2	C	212/223 (95%)	198 (93%)	12 (6%)	2 (1%)	14 12
2	E	212/223 (95%)	199 (94%)	12 (6%)	1 (0%)	24 24
2	F	212/223 (95%)	196 (92%)	11 (5%)	5 (2%)	4 2

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles
All	All	1982/2042 (97%)	1823 (92%)	119 (6%)	40 (2%)	<b>6</b> <b>3</b>

5 of 40 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	238	TRP
1	A	241	ILE
1	A	368	GLU
1	A	540	SER
1	A	542	ALA

### 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	499/505 (99%)	411 (82%)	88 (18%)	<b>2</b> <b>0</b>
1	D	499/505 (99%)	396 (79%)	103 (21%)	<b>1</b> <b>0</b>
2	B	187/195 (96%)	172 (92%)	15 (8%)	<b>11</b> <b>9</b>
2	C	187/195 (96%)	160 (86%)	27 (14%)	<b>3</b> <b>1</b>
2	E	187/195 (96%)	156 (83%)	31 (17%)	<b>2</b> <b>0</b>
2	F	187/195 (96%)	145 (78%)	42 (22%)	<b>1</b> <b>0</b>
All	All	1746/1790 (98%)	1440 (82%)	306 (18%)	<b>2</b> <b>0</b>

5 of 306 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	D	565	ASN
2	F	139	LEU
2	E	51	HIS
2	E	190	MET
2	F	190	MET

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 27 such sidechains are listed below:

Mol	Chain	Res	Type
1	D	39	ASN
1	D	495	ASN
2	F	110	GLN
1	D	432	ASN
1	D	534	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 oligosaccharides in this entry.

### 5.6 Ligand geometry [i](#)

10 ligands are modelled in this entry.

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# $ Z  > 2$	Counts	RMSZ	# $ Z  > 2$
6	GSH	C	301	-	18,19,19	1.55	4 (22%)	21,24,24	2.67	5 (23%)
3	JAA	A	601	-	15,15,15	5.38	6 (40%)	14,19,19	2.78	8 (57%)
5	ATP	D	603	-	32,33,33	4.73	20 (62%)	48,52,52	2.90	21 (43%)
3	JAA	D	601	-	15,15,15	5.34	7 (46%)	14,19,19	2.61	7 (50%)
6	GSH	F	301	-	18,19,19	1.58	4 (22%)	21,24,24	3.50	7 (33%)
4	MET	A	602	-	7,8,8	1.12	1 (14%)	5,9,9	0.94	0
6	GSH	E	301	-	18,19,19	1.50	4 (22%)	21,24,24	2.72	6 (28%)
5	ATP	A	603	-	32,33,33	4.34	21 (65%)	48,52,52	3.34	25 (52%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
4	MET	D	602	-	7,8,8	0.96	1 (14%)	5,9,9	0.93	1 (20%)
6	GSH	B	301	-	18,19,19	1.73	4 (22%)	21,24,24	2.74	6 (28%)

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
6	GSH	C	301	-	-	3/24/24/24	-
3	JAA	A	601	-	-	4/9/22/22	0/1/1/1
5	ATP	D	603	-	-	5/22/38/38	0/3/3/3
3	JAA	D	601	-	-	4/9/22/22	0/1/1/1
6	GSH	F	301	-	-	5/24/24/24	-
4	MET	A	602	-	-	3/8/8/8	-
6	GSH	E	301	-	-	4/24/24/24	-
5	ATP	A	603	-	-	8/22/38/38	0/3/3/3
4	MET	D	602	-	-	4/8/8/8	-
6	GSH	B	301	-	-	3/24/24/24	-

The worst 5 of 72 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	A	601	JAA	C05-C08	-13.88	1.29	1.52
3	D	601	JAA	C05-C08	-13.62	1.30	1.52
3	D	601	JAA	C06-C04	-11.40	1.25	1.53
5	D	603	ATP	C1'-N9	-11.02	1.15	1.46
3	A	601	JAA	C06-C04	-11.01	1.26	1.53

The worst 5 of 86 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
6	F	301	GSH	CA2-CB2-SG2	-13.78	98.63	114.16
5	A	603	ATP	C4-C5-N7	-12.20	96.64	110.58
6	B	301	GSH	CA2-CB2-SG2	-10.33	102.51	114.16
6	E	301	GSH	CA2-CB2-SG2	-10.15	102.72	114.16
6	C	301	GSH	CA2-CB2-SG2	-9.68	103.25	114.16

There are no chirality outliers.

5 of 43 torsion outliers are listed below:

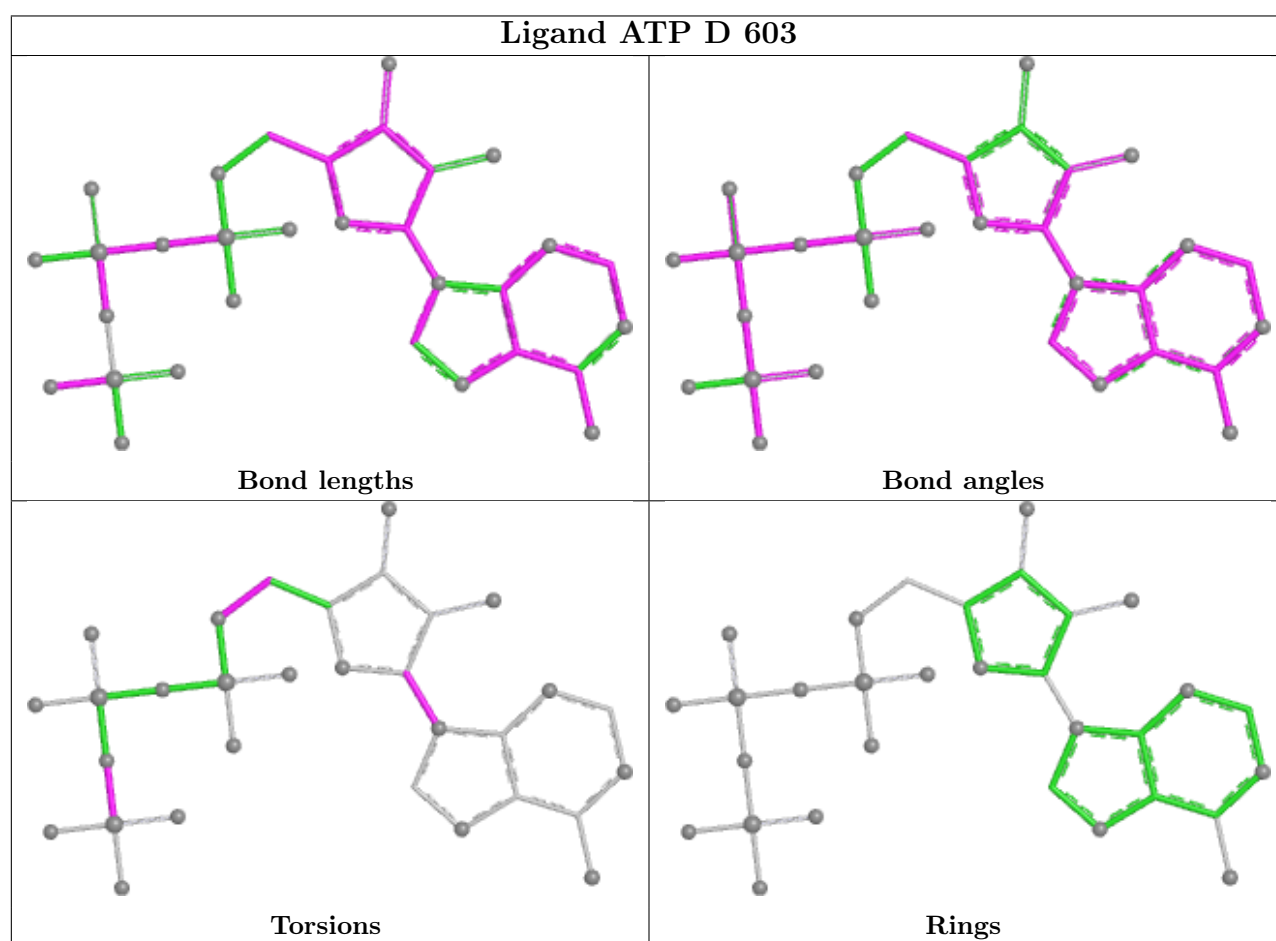
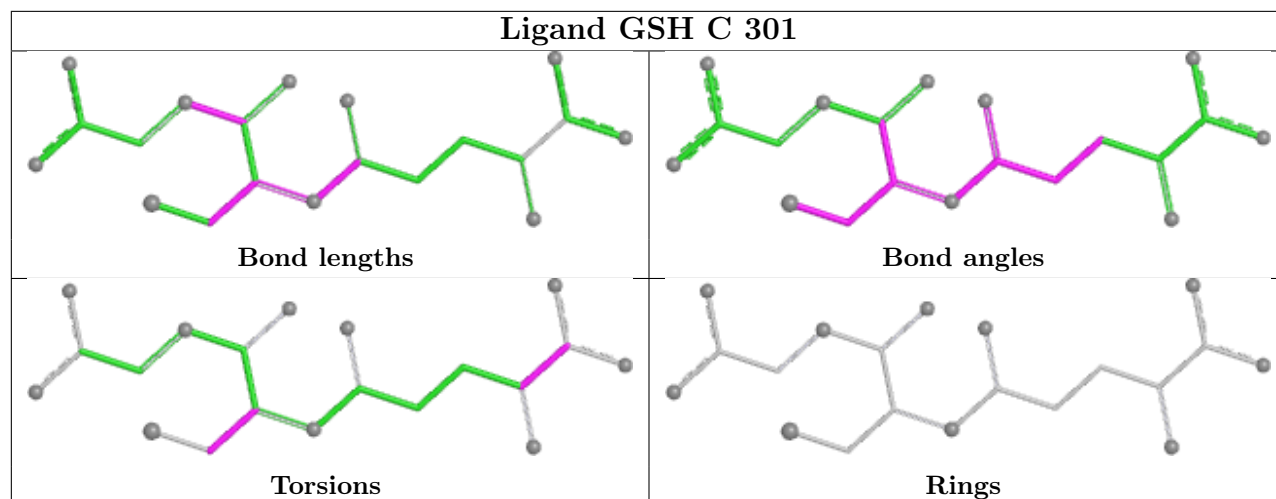
Mol	Chain	Res	Type	Atoms
3	A	601	JAA	C08-C05-C09-C11
4	A	602	MET	N-CA-CB-CG
4	A	602	MET	C-CA-CB-CG
4	D	602	MET	N-CA-CB-CG
4	D	602	MET	C-CA-CB-CG

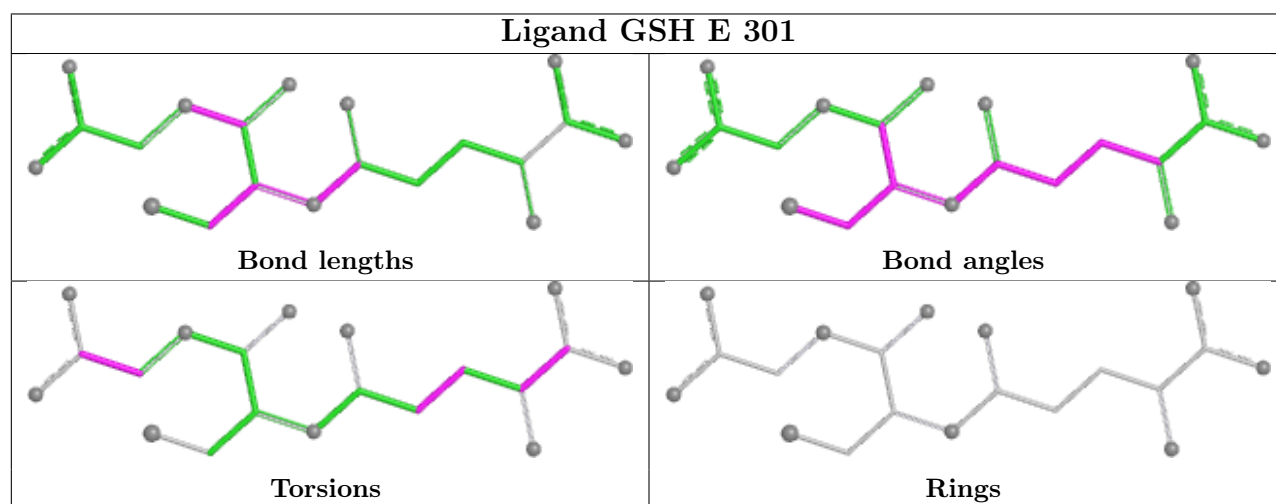
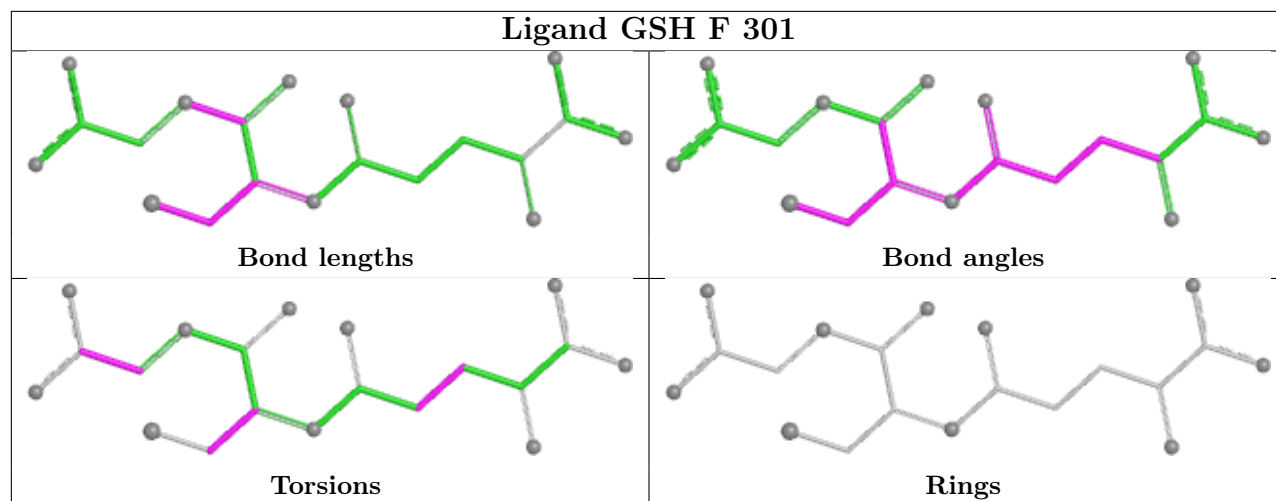
There are no ring outliers.

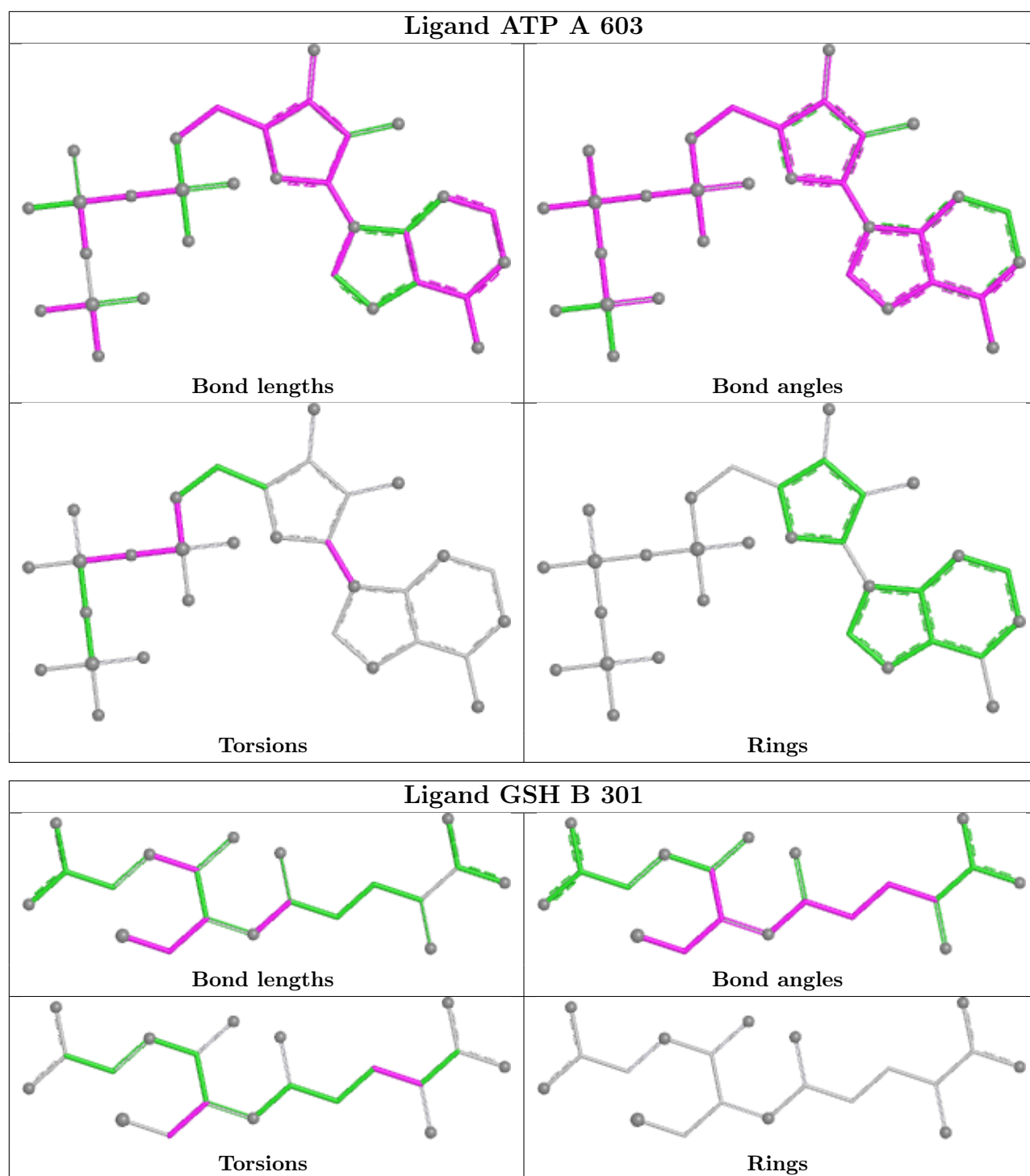
8 monomers are involved in 56 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	A	601	JAA	2	0
5	D	603	ATP	26	0
3	D	601	JAA	2	0
4	A	602	MET	4	0
6	E	301	GSH	3	0
5	A	603	ATP	17	0
4	D	602	MET	5	0
6	B	301	GSH	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

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	569/575 (98%)	0.60	32 (5%) 30 28	3, 14, 22, 28	0
1	D	569/575 (98%)	0.70	31 (5%) 31 29	3, 15, 24, 31	0
2	B	214/223 (95%)	0.40	10 (4%) 36 35	4, 11, 20, 28	0
2	C	214/223 (95%)	0.07	2 (0%) 81 82	2, 3, 7, 11	0
2	E	214/223 (95%)	0.37	9 (4%) 40 40	4, 9, 16, 27	0
2	F	214/223 (95%)	0.04	0 100 100	2, 3, 7, 11	0
All	All	1994/2042 (97%)	0.46	84 (4%) 40 40	2, 12, 22, 31	0

The worst 5 of 84 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
2	B	153	VAL	3.8
1	D	276	THR	3.6
1	A	554	SER	3.6
1	D	30	GLN	3.5
1	D	554	SER	3.4

### 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 oligosaccharides in this entry.

## 6.4 Ligands

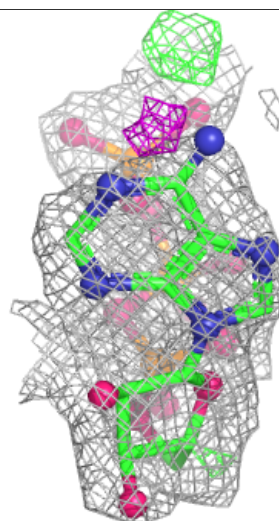
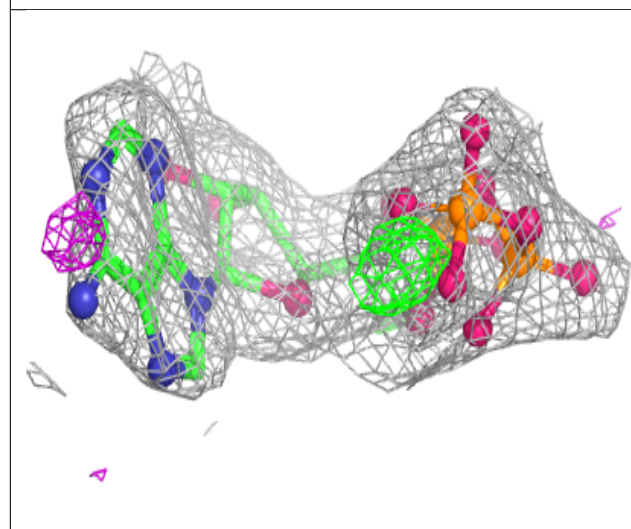
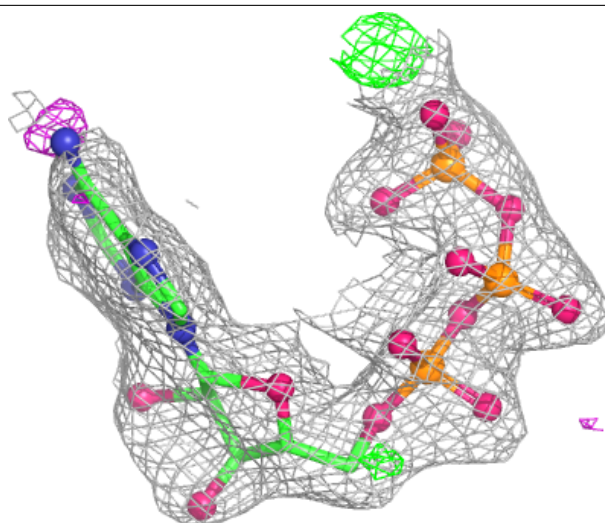
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95<sup>th</sup> percentile and maximum values of B factors of atoms in the group. The column labelled 'Q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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å <sup>2</sup> )	Q<0.9
3	JAA	D	601	15/15	0.79	0.18	12,19,30,35	0
3	JAA	A	601	15/15	0.82	0.13	12,19,24,28	0
4	MET	D	602	9/9	0.87	0.14	14,20,29,39	0
4	MET	A	602	9/9	0.91	0.14	14,20,24,26	0
5	ATP	D	603	31/31	0.91	0.10	13,20,30,32	0
6	GSH	F	301	20/20	0.92	0.09	9,16,23,25	0
6	GSH	E	301	20/20	0.94	0.09	6,13,21,22	0
5	ATP	A	603	31/31	0.95	0.10	8,19,26,28	0
6	GSH	B	301	20/20	0.96	0.07	3,5,8,8	0
6	GSH	C	301	20/20	0.96	0.07	5,9,17,20	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.

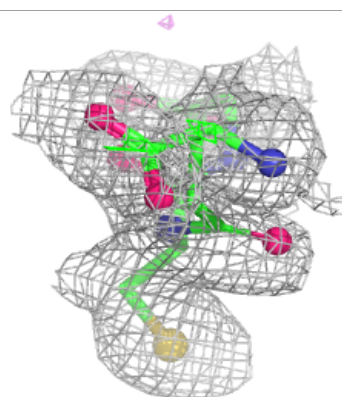
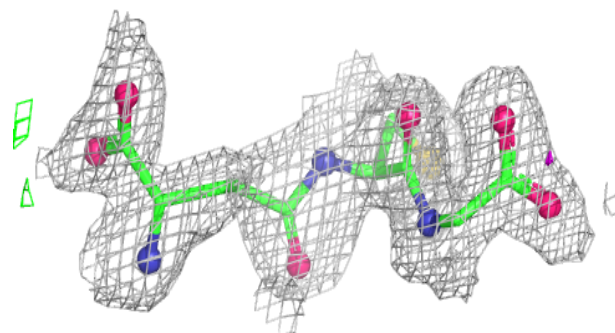
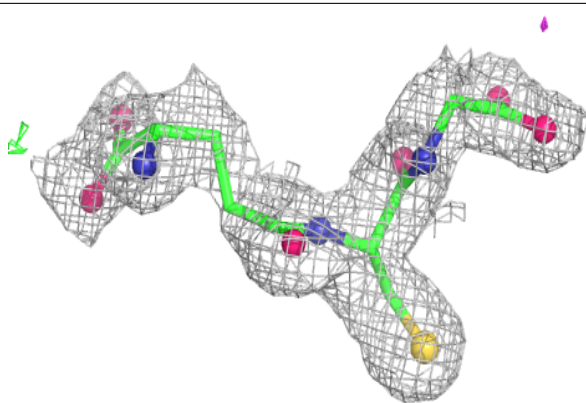
**Electron density around ATP D 603:**

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

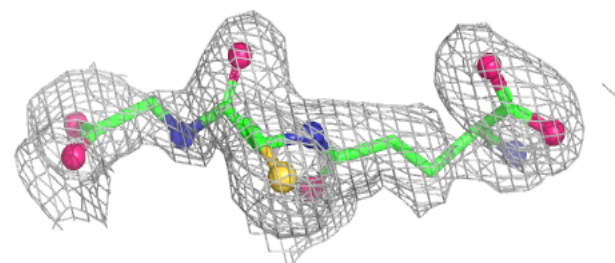
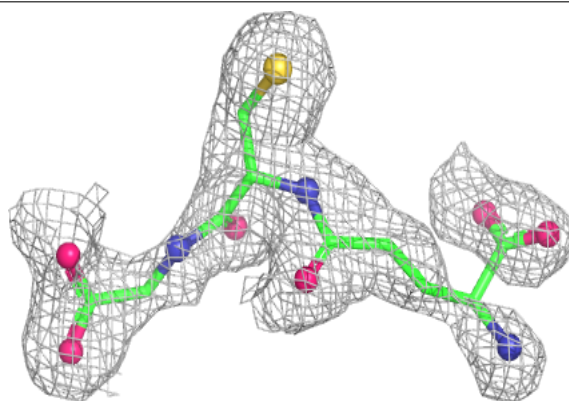


**Electron density around GSH F 301:**

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

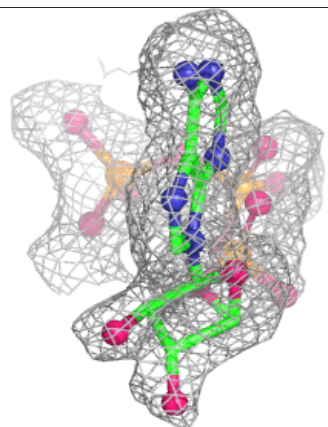
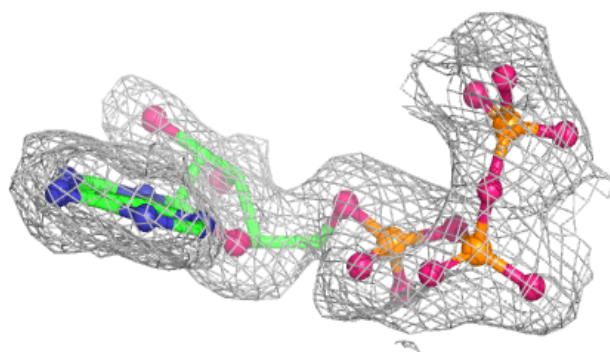
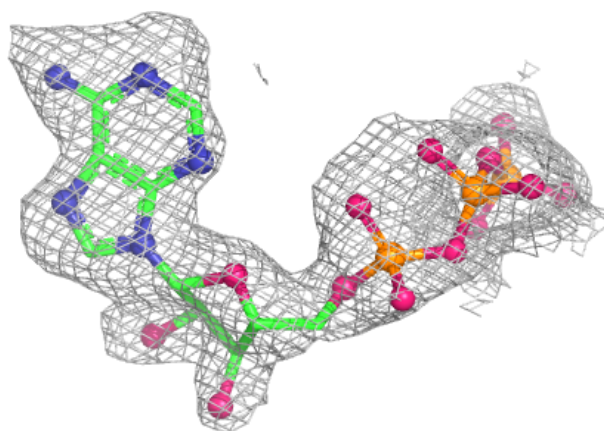
**Electron density around GSH E 301:**

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

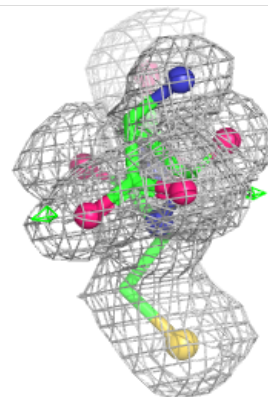
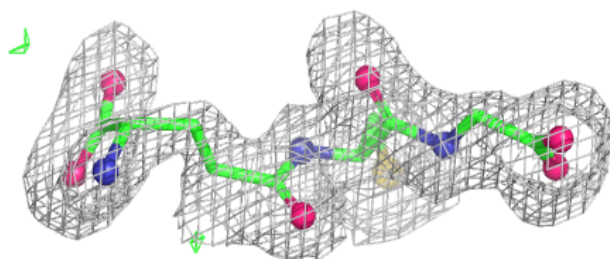
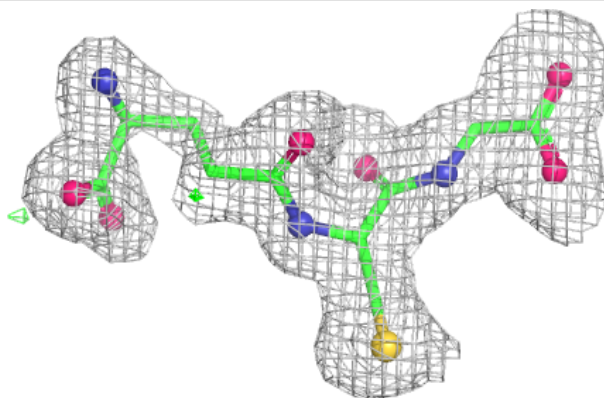


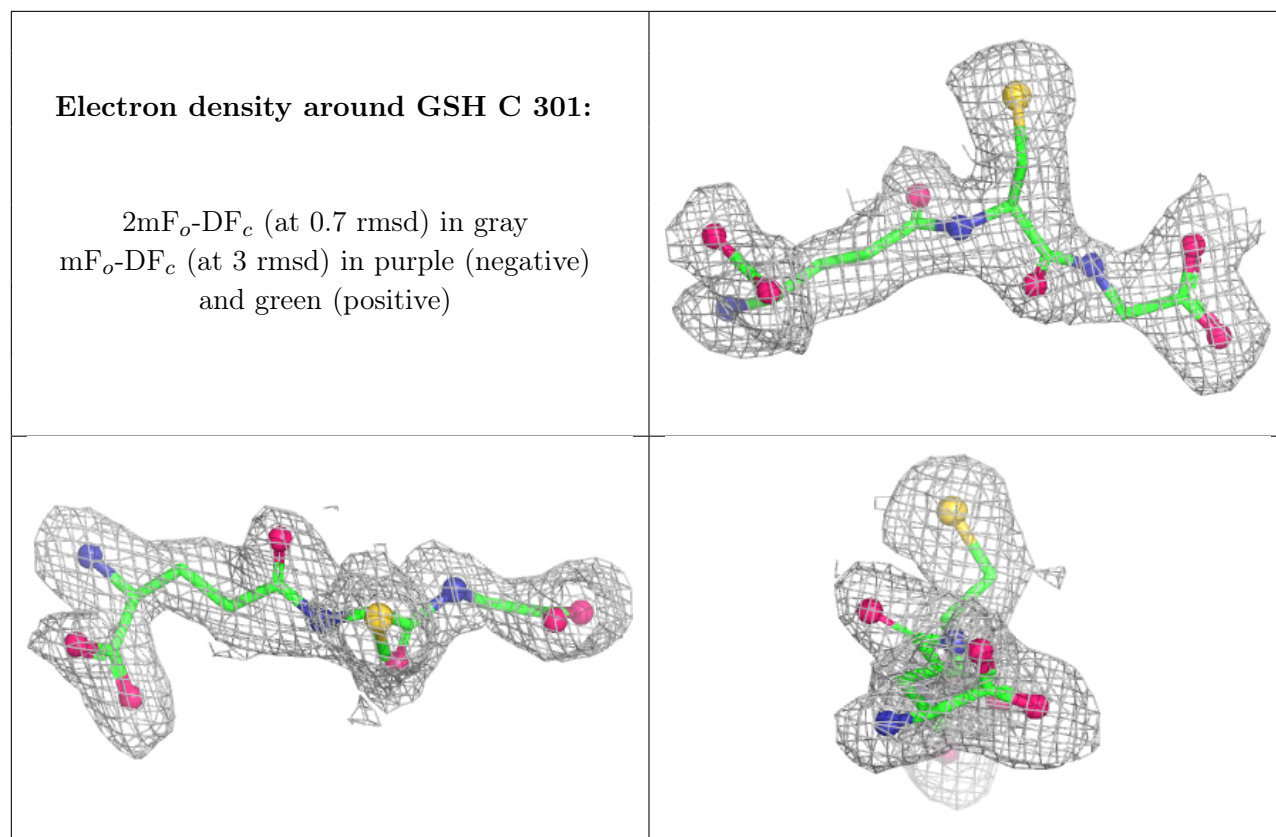
**Electron density around ATP A 603:**

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

**Electron density around GSH 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)





## 6.5 Other polymers [i](#)

There are no such residues in this entry.