Full wwPDB X-ray Structure Validation Report (i)

May 23, 2020 – 03:40 pm BST

PDB ID	:	4TVJ
Title	:	HUMAN ARTD2 (PARP2) - CATALYTIC DOMAIN IN COMPLEX WITH OLAPARIB
Authors	:	Karlberg, T.; Thorsell, A.G.; Ekblad, T.; Pinto, A.F.; Schuler, H.
Deposited on	:	2014-06-27
Resolution	:	2.10 Å(reported)

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

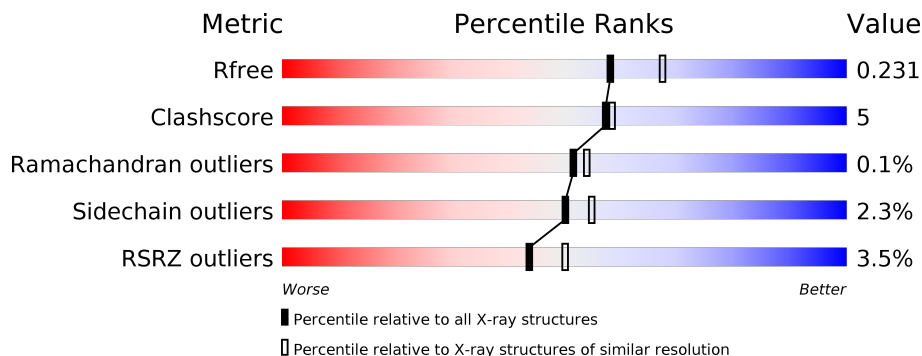|		
MolProbity	:	4.02b-467
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	2.11
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh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

Full wwPDB X-ray Structure Validation Report

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 2.10 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	Percentile Ranks	Value
Rfree		0.231
Clashscore		5
Ramachandran outliers		0.1%
Sidechain outliers		2.3%
RSRZ outliers		3.5%

Worse · *Better*

■ Percentile relative to all X-ray structures

▯ Percentile relative to X-ray structures of similar resolution

Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	130704	5197 (2.10-2.10)
Clashscore	141614	5710 (2.10-2.10)
Ramachandran outliers	138981	5647 (2.10-2.10)
Sidechain outliers	138945	5648 (2.10-2.10)
RSRZ outliers	127900	5083 (2.10-2.10)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments on the lower bar indicate the fraction of residues that contain outliers for >=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	368	4% · 86% · 10% · ·
1	B	368	3% · 85% · 10% · 5%

2 Entry composition (i)

There are 4 unique types of molecules in this entry. The entry contains 5958 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 Poly [ADP-ribose] polymerase 2.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	357	Total	C	N	O	S	0	0	0
			2828	1796	488	524	20			
1	B	351	Total	C	N	O	S	0	0	0
			2781	1767	480	514	20			

There are 48 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	212	MET	-	initiating methionine	UNP Q9UGN5
A	213	HIS	-	expression tag	UNP Q9UGN5
A	214	HIS	-	expression tag	UNP Q9UGN5
A	215	HIS	-	expression tag	UNP Q9UGN5
A	216	HIS	-	expression tag	UNP Q9UGN5
A	217	HIS	-	expression tag	UNP Q9UGN5
A	218	HIS	-	expression tag	UNP Q9UGN5
A	219	SER	-	expression tag	UNP Q9UGN5
A	220	SER	-	expression tag	UNP Q9UGN5
A	221	GLY	-	expression tag	UNP Q9UGN5
A	222	VAL	-	expression tag	UNP Q9UGN5
A	223	ASP	-	expression tag	UNP Q9UGN5
A	224	LEU	-	expression tag	UNP Q9UGN5
A	225	GLY	-	expression tag	UNP Q9UGN5
A	226	THR	-	expression tag	UNP Q9UGN5
A	227	GLU	-	expression tag	UNP Q9UGN5
A	228	ASN	-	expression tag	UNP Q9UGN5
A	229	LEU	-	expression tag	UNP Q9UGN5
A	230	TYR	-	expression tag	UNP Q9UGN5
A	231	PHE	-	expression tag	UNP Q9UGN5
A	232	GLN	-	expression tag	UNP Q9UGN5
A	233	SER	-	expression tag	UNP Q9UGN5
A	234	MET	-	expression tag	UNP Q9UGN5
A	447	HIS	PRO	conflict	UNP Q9UGN5
B	212	MET	-	initiating methionine	UNP Q9UGN5

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Chain	Residue	Modelled	Actual	Comment	Reference
B	213	HIS	-	expression tag	UNP Q9UGN5
B	214	HIS	-	expression tag	UNP Q9UGN5
B	215	HIS	-	expression tag	UNP Q9UGN5
B	216	HIS	-	expression tag	UNP Q9UGN5
B	217	HIS	-	expression tag	UNP Q9UGN5
B	218	HIS	-	expression tag	UNP Q9UGN5
B	219	SER	-	expression tag	UNP Q9UGN5
B	220	SER	-	expression tag	UNP Q9UGN5
B	221	GLY	-	expression tag	UNP Q9UGN5
B	222	VAL	-	expression tag	UNP Q9UGN5
B	223	ASP	-	expression tag	UNP Q9UGN5
B	224	LEU	-	expression tag	UNP Q9UGN5
B	225	GLY	-	expression tag	UNP Q9UGN5
B	226	THR	-	expression tag	UNP Q9UGN5
B	227	GLU	-	expression tag	UNP Q9UGN5
B	228	ASN	-	expression tag	UNP Q9UGN5
B	229	LEU	-	expression tag	UNP Q9UGN5
B	230	TYR	-	expression tag	UNP Q9UGN5
B	231	PHE	-	expression tag	UNP Q9UGN5
B	232	GLN	-	expression tag	UNP Q9UGN5
B	233	SER	-	expression tag	UNP Q9UGN5
B	234	MET	-	expression tag	UNP Q9UGN5
B	447	HIS	PRO	conflict	UNP Q9UGN5

- Molecule 2 is 4-(3-{[4-(cyclopropylcarbonyl)piperazin-1-yl]carbonyl}-4-fluorobenzyl)phthalazin-1(2H)-one (three-letter code: 09L) (formula: $C_{24}H_{23}FN_4O_3$).
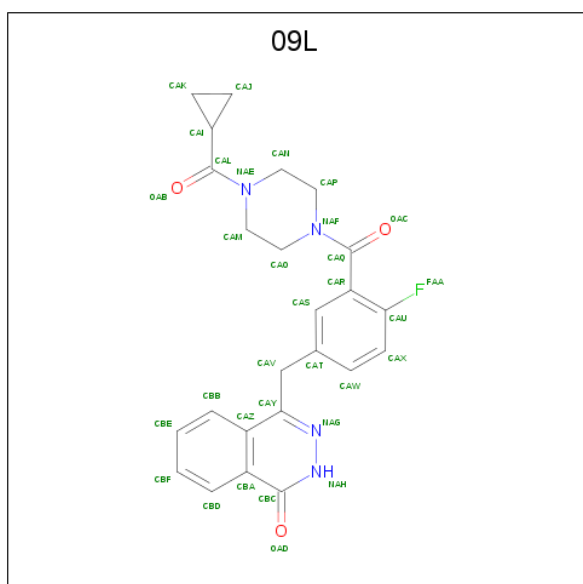
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
2	A	1	Total	C	F	N	O	0	0
			32	24	1	4	3		
2	B	1	Total	C	F	N	O	0	0
			32	24	1	4	3		

- Molecule 3 is GLYCEROL (three-letter code: GOL) (formula: $C_3H_8O_3$).

```
                        GOL




                    C3
                              OH O3

            C1      C2

          HO              OH
          O1              O2
```
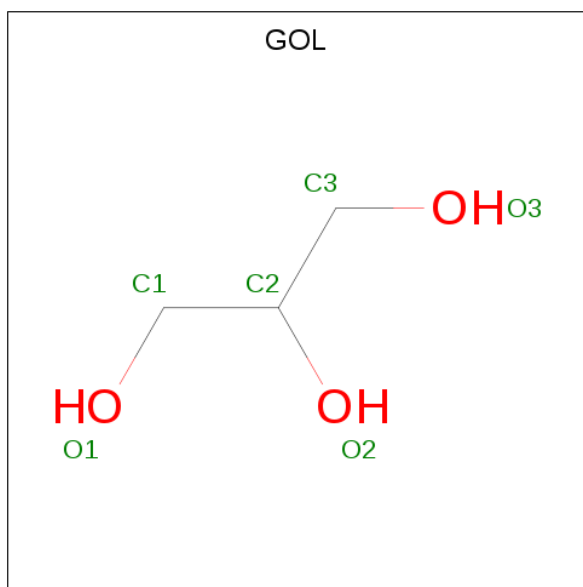
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	A	1	Total	C	O	0	0
			6	3	3		
3	A	1	Total	C	O	0	0
			6	3	3		
3	B	1	Total	C	O	0	0
			6	3	3		

- Molecule 4 is water.

| Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	160	Total	O	0	0
			160	160		
4	B	107	Total	O	0	0
			107	107		

3 Residue-property plots ⓘ

These plots are drawn for all protein, RNA and DNA chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry 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: Poly [ADP-ribose] polymerase 2
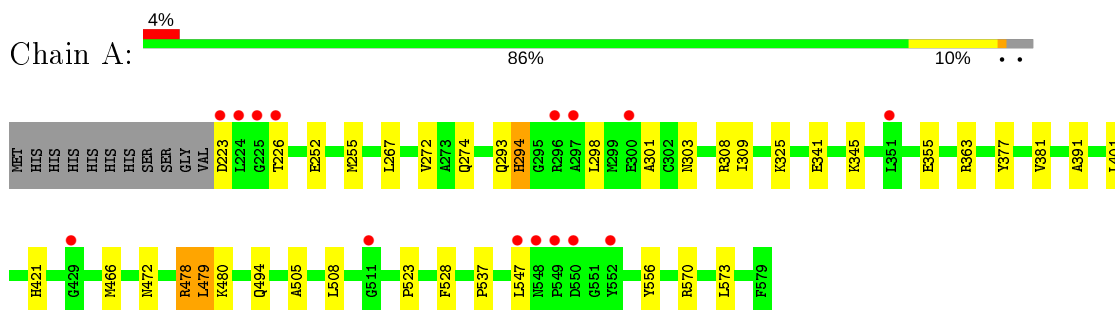
- Molecule 1: Poly [ADP-ribose] polymerase 2
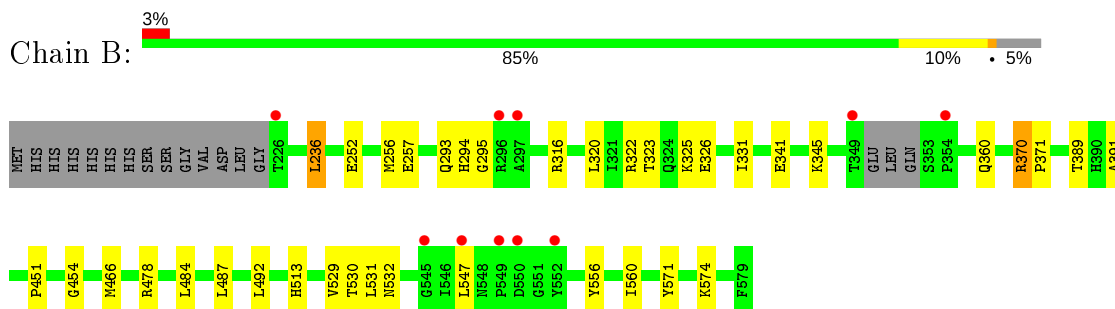
4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α, β, γ	58.08Å 134.12Å 58.35Å 90.00° 117.96° 90.00°	Depositor
Resolution (Å)	29.28 – 2.10 29.28 – 2.10	Depositor EDS
% Data completeness (in resolution range)	100.0 (29.28-2.10) 99.8 (29.28-2.10)	Depositor EDS
R_{merge}	0.11	Depositor
R_{sym}	0.11	Depositor
$<I/\sigma(I)>$ [1]	2.70 (at 2.10Å)	Xtriage
Refinement program	REFMAC 5.5.0102	Depositor
R, R_{free}	0.188 , 0.231 0.191 , 0.231	Depositor DCC
R_{free} test set	2293 reflections (5.00%)	wwPDB-VP
Wilson B-factor (Å^2)	25.7	Xtriage
Anisotropy	0.304	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.34 , 41.1	EDS
L-test for twinning[2]	$<|L|> = 0.49, <L^2> = 0.32$	Xtriage
Estimated twinning fraction	0.007 for -h-l,k,h 0.007 for l,k,-h-l 0.029 for h,-k,-h-l 0.054 for -h-l,-k,l 0.028 for l,-k,h	Xtriage
F_o,F_c correlation	0.95	EDS
Total number of atoms	5958	wwPDB-VP
Average B, all atoms (Å^2)	27.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 6.75% of the height of the origin peak. No significant pseudotranslation is detected.*

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[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: GOL, 09L

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	0.76	0/2888	0.77	0/3899
1	B	0.72	0/2840	0.72	2/3833 (0.1%)
All	All	0.74	0/5728	0.75	2/7732 (0.0%)

There are no bond length outliers.

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	B	316	ARG	NE-CZ-NH2	-6.46	117.07	120.30
1	B	478	ARG	NE-CZ-NH1	5.41	123.00	120.30

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	2828	0	2822	28	0
1	B	2781	0	2774	27	0
2	A	32	0	23	0	0
2	B	32	0	23	0	0
3	A	12	0	16	2	0
3	B	6	0	8	0	0
4	A	160	0	0	2	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
4	B	107	0	0	1	0
All	All	5958	0	5666	56	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 5.

All (56) 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:323:THR:HG21	1:B:325:LYS:NZ	1.62	1.12
1:B:323:THR:HG21	1:B:325:LYS:HZ2	1.28	0.97
1:B:320:LEU:HD12	1:B:322:ARG:HH21	1.27	0.93
1:B:323:THR:HG21	1:B:325:LYS:HZ3	1.39	0.86
1:A:505:ALA:HA	1:A:508:LEU:HD13	1.59	0.84
1:A:255:MET:HE2	1:A:255:MET:HA	1.76	0.68
1:B:323:THR:HG23	1:B:326:GLU:H	1.58	0.68
1:A:293:GLN:C	1:A:294:HIS:ND1	2.52	0.62
1:A:252:GLU:HG3	1:A:267:LEU:HD12	1.79	0.62
1:A:377:TYR:O	1:A:381:VAL:HG23	1.99	0.61
1:A:391:ALA:HB1	1:A:556:TYR:CZ	2.37	0.59
1:A:421:HIS:HE2	1:A:494:GLN:HG2	1.68	0.59
1:B:293:GLN:O	1:B:294:HIS:ND1	2.36	0.58
1:A:255:MET:CE	1:A:255:MET:HA	2.34	0.58
1:A:478:ARG:HG3	1:A:479:LEU:HD12	1.85	0.58
1:B:391:ALA:HB1	1:B:556:TYR:CZ	2.39	0.57
1:A:341:GLU:OE2	1:A:345:LYS:NZ	2.34	0.57
1:B:529:VAL:CG1	1:B:530:THR:N	2.69	0.56
1:B:323:THR:CG2	1:B:325:LYS:HZ3	2.16	0.56
1:B:532:ASN:ND2	4:B:762:HOH:O	2.36	0.55
1:A:294:HIS:N	1:A:294:HIS:ND1	2.55	0.53
1:A:479:LEU:CD1	1:A:479:LEU:H	2.22	0.53
1:B:331:ILE:HD11	1:B:451:PRO:HG2	1.91	0.52
1:A:308:ARG:O	1:A:309:ILE:HD13	2.11	0.51
1:B:484:LEU:HD23	1:B:574:LYS:HA	1.94	0.50
1:B:560:ILE:HD12	1:B:560:ILE:N	2.26	0.50
1:B:293:GLN:C	1:B:294:HIS:HD1	2.15	0.49
1:B:320:LEU:HD12	1:B:322:ARG:NH2	2.11	0.49
1:A:401:LEU:HD13	1:A:573:LEU:HD23	1.96	0.48
1:A:528:PHE:CD1	1:A:537:PRO:HA	2.49	0.47
1:A:298:LEU:O	1:A:301:ALA:HB3	2.15	0.47
1:B:331:ILE:HD13	1:B:454:GLY:HA3	1.97	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:529:VAL:HG13	1:B:530:THR:H	1.81	0.46
1:A:377:TYR:CZ	1:A:381:VAL:HG21	2.51	0.46
1:A:472:ASN:HA	3:A:602:GOL:H2	1.98	0.45
1:A:355:GLU:OE2	1:A:363:ARG:NH1	2.40	0.45
1:B:323:THR:CG2	1:B:325:LYS:HG3	2.46	0.45
1:B:341:GLU:OE2	1:B:345:LYS:NZ	2.47	0.44
1:B:389:THR:HB	1:B:466:MET:HA	2.00	0.43
1:A:421:HIS:NE2	1:A:494:GLN:HG2	2.33	0.43
1:A:293:GLN:O	1:A:294:HIS:ND1	2.52	0.43
1:B:252:GLU:O	1:B:256:MET:HG3	2.19	0.43
1:A:570:ARG:NH1	4:A:740:HOH:O	2.52	0.42
1:B:531:LEU:HD12	1:B:531:LEU:HA	1.93	0.42
1:B:487:LEU:HB2	1:B:571:TYR:HB2	2.02	0.42
1:A:466:MET:SD	1:A:523:PRO:HD3	2.60	0.41
1:A:223:ASP:O	1:A:226:THR:HG22	2.21	0.41
1:A:223:ASP:O	1:A:226:THR:CG2	2.68	0.41
1:A:255:MET:CA	1:A:255:MET:CE	2.98	0.41
1:B:370:ARG:HA	1:B:371:PRO:HD3	1.93	0.41
1:B:391:ALA:HB1	1:B:556:TYR:OH	2.20	0.41
1:A:479:LEU:N	1:A:479:LEU:HD12	2.35	0.41
1:B:236:LEU:O	1:B:236:LEU:HD12	2.21	0.41
1:B:492:LEU:O	1:B:513:HIS:HB2	2.21	0.41
3:A:603:GOL:H11	4:A:854:HOH:O	2.20	0.40
1:A:479:LEU:H	1:A:479:LEU:HD12	1.87	0.40

There are no symmetry-related clashes.

5.3 Torsion angles (i)

5.3.1 Protein backbone (i)

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

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

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	A	355/368 (96%)	348 (98%)	7 (2%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	B	347/368 (94%)	334 (96%)	12 (4%)	1 (0%)	41	41
All	All	702/736 (95%)	682 (97%)	19 (3%)	1 (0%)	51	54

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	295	GLY

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	307/320 (96%)	298 (97%)	9 (3%)	42	46
1	B	302/320 (94%)	297 (98%)	5 (2%)	60	67
All	All	609/640 (95%)	595 (98%)	14 (2%)	50	55

All (14) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	272	VAL
1	A	274	GLN
1	A	294	HIS
1	A	303	ASN
1	A	325	LYS
1	A	478	ARG
1	A	479	LEU
1	A	480	LYS
1	A	547	LEU
1	B	236	LEU
1	B	257	GLU
1	B	360	GLN
1	B	370	ARG
1	B	547	LEU

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (2) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	527	HIS
1	B	360	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 carbohydrates in this entry.

5.6   Ligand geometry (i)

5 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	$\#|Z| > 2$
3	GOL	A	602	-	5,5,5	0.33	0	5,5,5	0.60	0
3	GOL	B	602	-	5,5,5	0.42	0	5,5,5	1.10	0
3	GOL	A	603	-	5,5,5	0.35	0	5,5,5	0.74	0
2	09L	A	601	-	35,36,36	1.62	7 (20%)	44,52,52	1.81	12 (27%)
2	09L	B	601	-	35,36,36	2.21	9 (25%)	44,52,52	1.43	8 (18%)

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

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
3	GOL	A	602	-	-	1/4/4/4	-
3	GOL	B	602	-	-	3/4/4/4	-
3	GOL	A	603	-	-	2/4/4/4	-
2	09L	A	601	-	-	2/20/32/32	0/5/5/5
2	09L	B	601	-	-	3/20/32/32	0/5/5/5

All (16) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	601	09L	CAV-CAY	-8.45	1.44	1.51
2	B	601	09L	CAR-CAQ	-5.43	1.42	1.50
2	A	601	09L	CAY-CAZ	-4.30	1.38	1.43
2	B	601	09L	FAA-CAU	4.20	1.46	1.35
2	A	601	09L	CAV-CAY	-3.85	1.48	1.51
2	A	601	09L	CAR-CAQ	-3.53	1.45	1.50
2	A	601	09L	CAV-CAT	-3.12	1.42	1.52
2	B	601	09L	NAH-NAG	-2.95	1.26	1.34
2	B	601	09L	CAI-CAL	2.72	1.55	1.51
2	B	601	09L	CBE-CBB	2.49	1.42	1.36
2	A	601	09L	CAK-CAJ	-2.45	1.39	1.48
2	A	601	09L	CBC-NAH	2.22	1.40	1.31
2	B	601	09L	CAV-CAT	-2.15	1.45	1.52
2	A	601	09L	CAS-CAT	2.12	1.42	1.39
2	B	601	09L	CBC-NAH	2.10	1.39	1.31
2	B	601	09L	CAO-NAF	2.08	1.50	1.47

All (20) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	601	09L	CAR-CAQ-NAF	4.56	125.56	118.28
2	A	601	09L	CAK-CAI-CAL	-3.69	112.21	117.01
2	B	601	09L	CAR-CAQ-NAF	3.62	124.07	118.28
2	A	601	09L	CAY-CAZ-CBA	3.58	120.14	118.19
2	A	601	09L	CAN-NAE-CAM	3.31	118.99	112.62
2	A	601	09L	CBC-NAH-NAG	3.08	122.15	119.32
2	B	601	09L	CAX-CAU-CAR	-3.08	119.76	123.11
2	A	601	09L	OAC-CAQ-NAF	-2.93	117.50	122.34
2	A	601	09L	CAP-CAN-NAE	-2.85	104.32	110.44
2	A	601	09L	CBB-CAZ-CAY	-2.59	121.04	123.35
2	A	601	09L	CAX-CAU-CAR	-2.47	120.42	123.11
2	A	601	09L	CAM-CAO-NAF	-2.44	105.21	110.44
2	A	601	09L	CAP-NAF-CAO	2.34	117.13	112.62

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	B	601	09L	CAM-CAO-NAF	-2.28	105.56	110.44
2	B	601	09L	CBC-NAH-NAG	2.27	121.41	119.32
2	A	601	09L	CAK-CAI-CAJ	-2.26	54.97	58.81
2	B	601	09L	CAP-NAF-CAO	2.14	116.75	112.62
2	B	601	09L	CAK-CAI-CAL	-2.06	114.34	117.01
2	B	601	09L	CAW-CAX-CAU	2.04	121.51	119.05
2	B	601	09L	CBD-CBA-CAZ	2.04	121.37	118.54

There are no chirality outliers.

All (11) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	B	602	GOL	C1-C2-C3-O3
3	A	603	GOL	O1-C1-C2-C3
2	A	601	09L	CAK-CAI-CAL-OAB
2	A	601	09L	CAK-CAI-CAL-NAE
2	B	601	09L	CAK-CAI-CAL-OAB
2	B	601	09L	CAK-CAI-CAL-NAE
3	B	602	GOL	O2-C2-C3-O3
3	A	603	GOL	O1-C1-C2-O2
3	A	602	GOL	O1-C1-C2-O2
3	B	602	GOL	O1-C1-C2-O2
2	B	601	09L	NAF-CAQ-CAR-CAU

There are no ring outliers.

2 monomers are involved in 2 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	A	602	GOL	1	0
3	A	603	GOL	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 09L A 601	
Bond lengths	Bond angles
Torsions	Rings

Ligand 09L B 601	
Bond lengths	Bond angles
Torsions	Rings
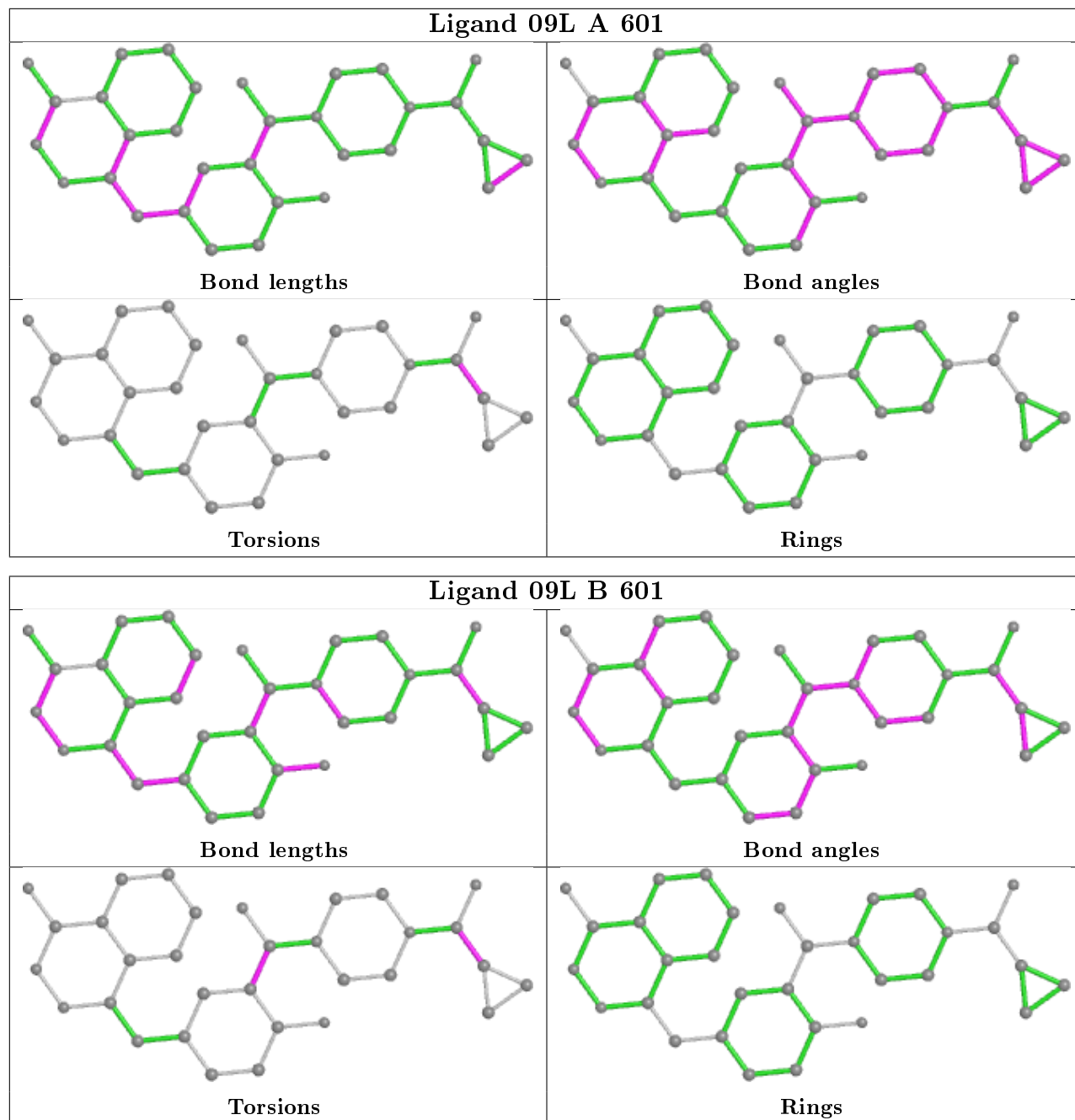
5.7 Other polymers (i)

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(Å²)	Q<0.9
1	A	357/368 (97%)	0.02	15 (4%)	36	42	11, 24, 45, 65	0
1	B	351/368 (95%)	-0.01	10 (2%)	53	59	16, 28, 52, 70	0
All	All	708/736 (96%)	0.01	25 (3%)	44	50	11, 26, 49, 70	0

All (25) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	226	THR	6.6
1	A	549	PRO	5.3
1	A	547	LEU	4.6
1	B	550	ASP	4.5
1	A	224	LEU	4.4
1	B	354	PRO	4.4
1	A	548	ASN	4.4
1	A	550	ASP	3.8
1	B	547	LEU	3.7
1	A	297	ALA	3.7
1	A	552	TYR	3.5
1	B	549	PRO	3.4
1	B	349	THR	3.1
1	A	223	ASP	3.1
1	B	297	ALA	3.1
1	A	300	GLU	2.9
1	A	226	THR	2.6
1	A	429	GLY	2.5
1	B	296	ARG	2.5
1	A	351	LEU	2.3
1	A	296	ARG	2.2
1	B	552	TYR	2.2
1	A	511	GLY	2.2
1	B	545	GLY	2.2

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Mol	Chain	Res	Type	RSRZ
1	A	225	GLY	2.1

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 carbohydrates 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.

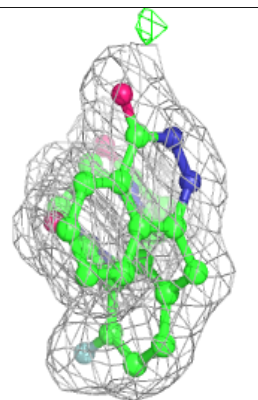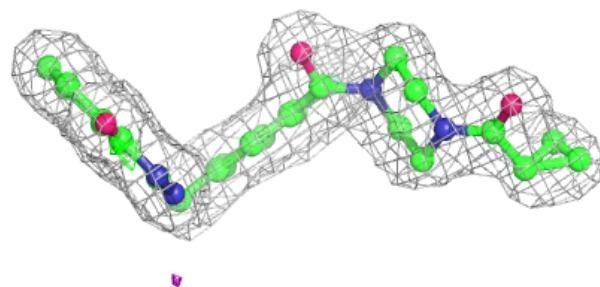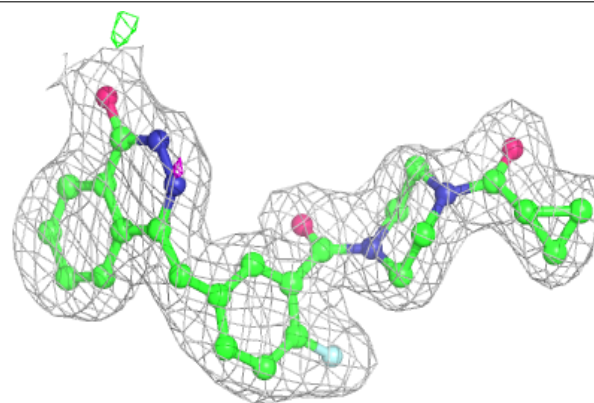| Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
3	GOL	A	603	6/6	0.93	0.18	26,30,31,32	0
3	GOL	A	602	6/6	0.94	0.09	23,24,25,26	0
2	09L	B	601	32/32	0.96	0.16	14,18,20,22	0
2	09L	A	601	32/32	0.97	0.17	9,14,23,25	0
3	GOL	B	602	6/6	0.97	0.09	24,27,27,28	0

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 09L B 601:

2mF$_o$-DF$_c$ (at 0.7 rmsd) in gray
mF$_o$-DF$_c$ (at 3 rmsd) in purple (negative)
and green (positive)
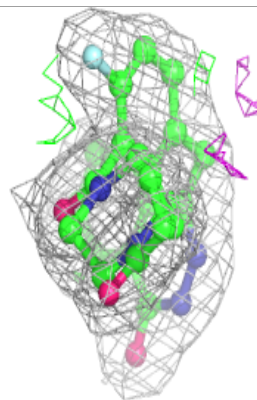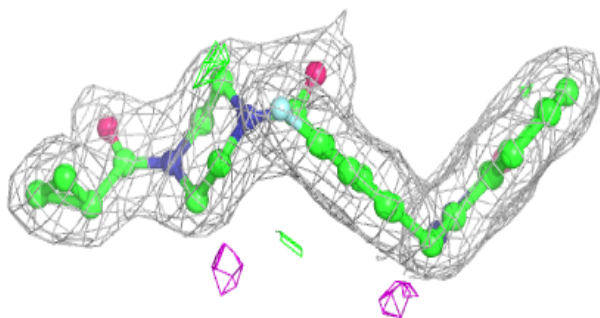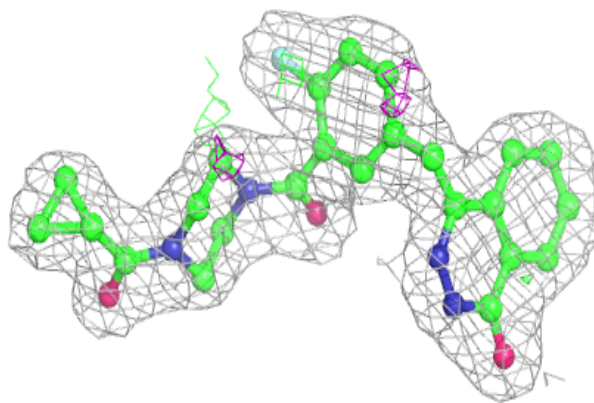
Electron density around 09L A 601:

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.