



Full wwPDB X-ray Structure Validation Report ⓘ

Jan 22, 2023 – 12:20 am GMT

PDB ID : 7QVJ
Title : ESTROGEN RECEPTOR ALPHA IN COMPLEX WITH COMPOUND 29
Authors : Breed, J.
Deposited on : 2022-01-21
Resolution : 1.68 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 ⓘ 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 ⓘ](#)) were used in the production of this report:

MolProbity : 4.02b-467
Mogul : 1.8.4, CSD as541be (2020)
Xtriage (Phenix) : 1.13
EDS : 2.31.3
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) : 2.31.3

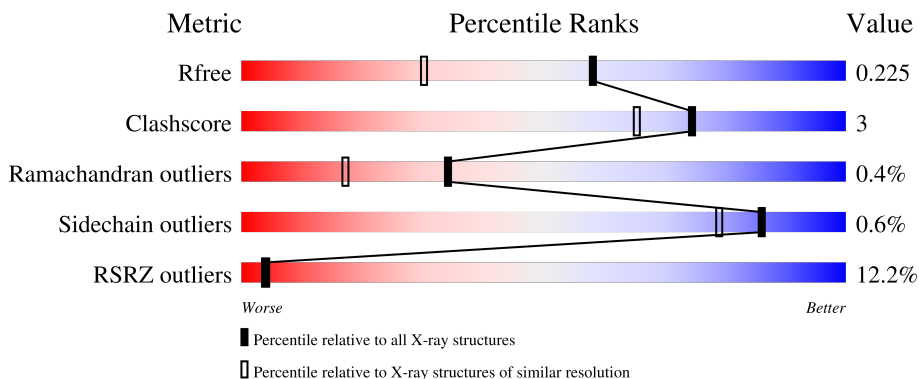
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.68 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	6780 (1.70-1.66)
Clashscore	141614	7310 (1.70-1.66)
Ramachandran outliers	138981	7173 (1.70-1.66)
Sidechain outliers	138945	7172 (1.70-1.66)
RSRZ outliers	127900	6661 (1.70-1.66)

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 $\leq 5\%$. 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	252	 10% 86% 8% 6%
1	B	252	 13% 89% 5% 5%

2 Entry composition [i](#)

There are 3 unique types of molecules in this entry. The entry contains 3755 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.

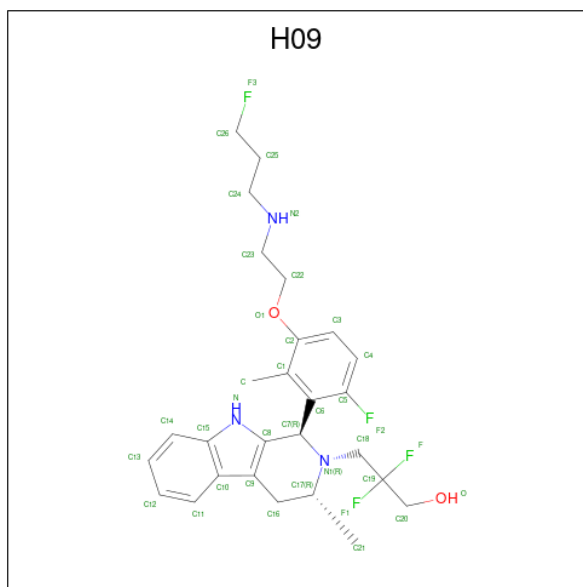
- Molecule 1 is a protein called Estrogen receptor.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	238	1823	1163	322	324	14	0	3	0
1	B	239	1795	1152	309	320	14	0	1	0

There are 16 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	303	GLY	-	expression tag	UNP P03372
A	304	SER	-	expression tag	UNP P03372
A	305	HIS	-	expression tag	UNP P03372
A	306	MET	-	expression tag	UNP P03372
A	381	SER	CYS	engineered mutation	UNP P03372
A	417	SER	CYS	engineered mutation	UNP P03372
A	530	SER	CYS	engineered mutation	UNP P03372
A	536	SER	LEU	engineered mutation	UNP P03372
B	303	GLY	-	expression tag	UNP P03372
B	304	SER	-	expression tag	UNP P03372
B	305	HIS	-	expression tag	UNP P03372
B	306	MET	-	expression tag	UNP P03372
B	381	SER	CYS	engineered mutation	UNP P03372
B	417	SER	CYS	engineered mutation	UNP P03372
B	530	SER	CYS	engineered mutation	UNP P03372
B	536	SER	LEU	engineered mutation	UNP P03372

- Molecule 2 is 2,2-bis(fluoranyl)-3-[(1 {R},3 {R})-1-[6-fluoranyl-3-[2-(3-fluoranylpropylamino)ethoxy]-2-methyl-phenyl]-3-methyl-1,3,4,9-tetrahydropyrido[3,4-b]indol-2-yl]propan-1-ol (three-letter code: H09) (formula: C₂₇H₃₃F₄N₃O₂) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
2	A	1	Total	C	F	N	O	0	0
			36	27	4	3	2		
2	B	1	Total	C	F	N	O	0	0
			36	27	4	3	2		

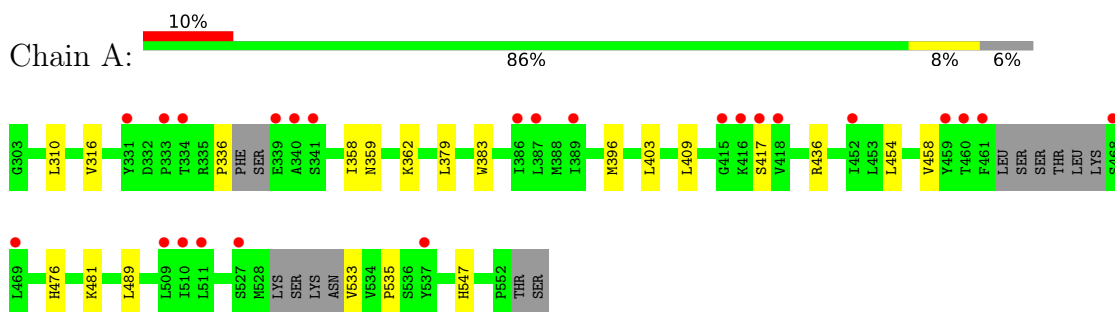
- Molecule 3 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	37	Total	O	0	0
			37	37		
3	B	28	Total	O	0	0
			28	28		

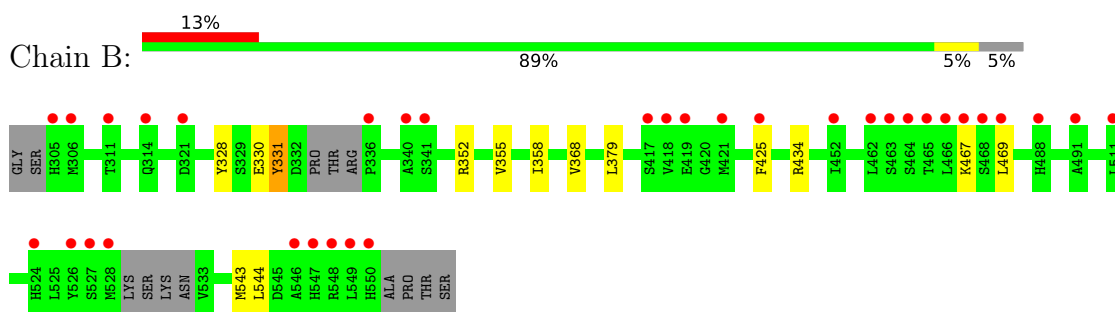
3 Residue-property plots [i](#)

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: Estrogen receptor



- Molecule 1: Estrogen receptor



4 Data and refinement statistics

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, α , β , γ	106.90Å 51.79Å 85.51Å 90.00° 93.86° 90.00°	Depositor
Resolution (Å)	43.91 – 1.68 34.46 – 1.68	Depositor EDS
% Data completeness (in resolution range)	95.3 (43.91-1.68) 95.3 (34.46-1.68)	Depositor EDS
R_{merge}	0.04	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.55 (at 1.68Å)	Xtrriage
Refinement program	BUSTER 2.11.6	Depositor
R, R_{free}	0.205 , 0.216 0.213 , 0.225	Depositor DCC
R_{free} test set	2466 reflections (4.84%)	wwPDB-VP
Wilson B-factor (Å ²)	34.5	Xtrriage
Anisotropy	0.292	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.34 , 46.9	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.32$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
F_o, F_c correlation	0.96	EDS
Total number of atoms	3755	wwPDB-VP
Average B, all atoms (Å ²)	46.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 6.39% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

²Theoretical 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: H09

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	0.46	0/1856	0.67	1/2519 (0.0%)
1	B	0.46	0/1825	0.65	0/2477
All	All	0.46	0/3681	0.66	1/4996 (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	B	0	1

There are no bond length outliers.

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed($^{\circ}$)	Ideal($^{\circ}$)
1	A	336	PRO	N-CA-CB	5.52	109.93	103.30

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	B	467	LYS	Peptide

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	1823	0	1774	17	1
1	B	1795	0	1737	7	1
2	A	36	0	0	2	0
2	B	36	0	0	0	0
3	A	37	0	0	0	0
3	B	28	0	0	1	0
All	All	3755	0	3511	23	1

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 3.

All (23) 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:359[B]:ASN:OD1	1:A:547:HIS:CD2	2.34	0.79
1:A:533:VAL:O	2:A:601:H09:C24	2.40	0.69
1:B:368:VAL:HG22	3:B:702:HOH:O	1.92	0.69
1:A:454:LEU:O	1:A:458:VAL:CG1	2.47	0.62
1:B:358:ILE:HD13	1:B:543:MET:HB3	1.85	0.58
1:A:358:ILE:HD13	1:A:379:LEU:HD21	1.85	0.58
1:A:359[B]:ASN:OD1	1:A:547:HIS:NE2	2.36	0.57
1:A:316:VAL:HG21	1:A:489:LEU:HD21	1.89	0.54
1:A:454:LEU:O	1:A:458:VAL:HG13	2.08	0.53
1:B:352:ARG:O	1:B:355:VAL:HG12	2.10	0.52
1:A:362:LYS:HD3	1:A:547:HIS:ND1	2.26	0.51
1:A:310:LEU:O	1:A:481:LYS:HE3	2.11	0.51
1:A:359[B]:ASN:OD1	1:A:547:HIS:HD2	1.93	0.50
1:A:383:TRP:CZ2	1:A:535:PRO:HD2	2.47	0.49
1:A:533:VAL:O	2:A:601:H09:C23	2.62	0.48
1:A:476[B]:HIS:HD2	1:B:434:ARG:HH22	1.62	0.47
1:B:379:LEU:HD12	1:B:544:LEU:HD11	1.98	0.46
1:B:330:GLU:O	1:B:331:TYR:O	2.35	0.45
1:A:403:LEU:HD13	1:A:409:LEU:HD13	2.01	0.43
1:A:396:MET:O	1:A:436:ARG:HD3	2.19	0.42
1:A:476[B]:HIS:ND1	1:A:476[B]:HIS:C	2.73	0.42
1:A:362:LYS:HD3	1:A:547:HIS:CE1	2.54	0.42
1:B:330:GLU:C	1:B:331:TYR:O	2.59	0.41

All (1) symmetry-related close contacts are listed below. The label for Atom-2 includes the symmetry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:359[B]:ASN:ND2	1:B:328:TYR:OH[3_545]	1.36	0.84

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	233/252 (92%)	231 (99%)	2 (1%)	0	100	100
1	B	234/252 (93%)	227 (97%)	5 (2%)	2 (1%)	17	4
All	All	467/504 (93%)	458 (98%)	7 (2%)	2 (0%)	34	17

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	331	TYR
1	B	469	LEU

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	188/226 (83%)	187 (100%)	1 (0%)	88	83
1	B	179/226 (79%)	178 (99%)	1 (1%)	86	79
All	All	367/452 (81%)	365 (100%)	2 (0%)	86	83

All (2) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	417	SER
1	B	425	PHE

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	519	ASN
1	B	513	HIS
1	B	519	ASN

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](#)

2 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	$\# Z > 2$
2	H09	A	601	-	35,39,39	0.65	0	41,56,56	0.64	0
2	H09	B	601	-	35,39,39	0.68	1 (2%)	41,56,56	0.59	0

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral

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

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	H09	A	601	-	-	6/18/36/36	0/4/4/4
2	H09	B	601	-	-	4/18/36/36	0/4/4/4

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	601	H09	C6-C7	2.05	1.55	1.53

There are no bond angle outliers.

There are no chirality outliers.

All (10) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	601	H09	N2-C24-C25-C26
2	A	601	H09	O1-C22-C23-N2
2	A	601	H09	C22-C23-N2-C24
2	B	601	H09	C23-C22-O1-C2
2	B	601	H09	F-C19-C20-O
2	A	601	H09	F1-C19-C20-O
2	B	601	H09	F1-C19-C20-O
2	A	601	H09	F-C19-C20-O
2	A	601	H09	C25-C24-N2-C23
2	B	601	H09	O1-C22-C23-N2

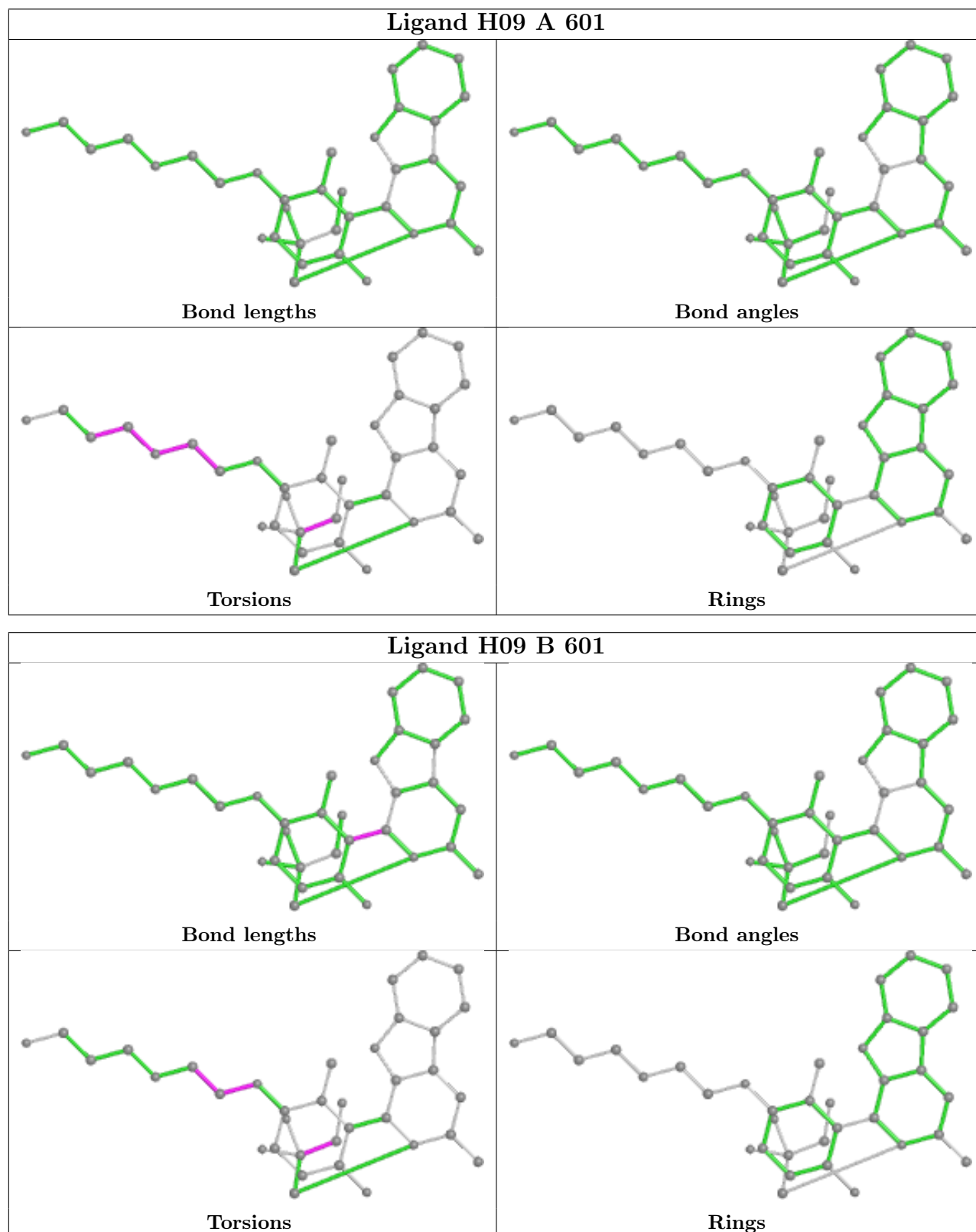
There are no ring outliers.

1 monomer is involved in 2 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	A	601	H09	2	0

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less than 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the

average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.



5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

6 Fit of model and data

6.1 Protein, DNA and RNA chains

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	238/252 (94%)	0.57	24 (10%) 7 7	27, 45, 77, 102	1 (0%)
1	B	239/252 (94%)	0.81	34 (14%) 2 2	27, 45, 88, 118	1 (0%)
All	All	477/504 (94%)	0.69	58 (12%) 4 4	27, 45, 82, 118	2 (0%)

All (58) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	466	LEU	15.8
1	B	465	THR	12.3
1	A	461	PHE	11.3
1	B	549	LEU	8.2
1	B	464	SER	7.4
1	A	340	ALA	7.1
1	B	467	LYS	6.0
1	B	305	HIS	5.9
1	B	417	SER	5.7
1	B	469	LEU	5.3
1	B	527	SER	5.0
1	B	548	ARG	4.8
1	B	547	HIS	4.7
1	B	546	ALA	4.6
1	A	460	THR	4.5
1	A	468	SER	4.4
1	A	418	VAL	4.4
1	B	526	TYR	4.1
1	B	550	HIS	4.0
1	A	417	SER	3.6
1	B	340	ALA	3.4
1	B	311	THR	3.3
1	A	416	LYS	3.1
1	A	331	TYR	3.0

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	RSRZ
1	A	333	PRO	3.0
1	A	386	ILE	3.0
1	B	341	SER	2.9
1	B	491	ALA	2.9
1	A	341	SER	2.7
1	B	468	SER	2.7
1	B	463	SER	2.7
1	A	469	LEU	2.7
1	A	527	SER	2.7
1	B	418	VAL	2.7
1	A	510	ILE	2.6
1	B	321	ASP	2.6
1	A	459	TYR	2.6
1	B	425	PHE	2.6
1	A	389	ILE	2.5
1	B	314	GLN	2.5
1	A	339	GLU	2.5
1	A	415	GLY	2.4
1	B	306	MET	2.4
1	A	452	ILE	2.3
1	A	509	LEU	2.3
1	B	462	LEU	2.3
1	A	511	LEU	2.3
1	B	336	PRO	2.3
1	A	537	TYR	2.3
1	B	421	MET	2.3
1	A	387	LEU	2.2
1	B	524	HIS	2.2
1	B	528	MET	2.2
1	B	419	GLU	2.1
1	B	511	LEU	2.1
1	B	488	HIS	2.1
1	A	334	THR	2.0
1	B	452	ILE	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](#)

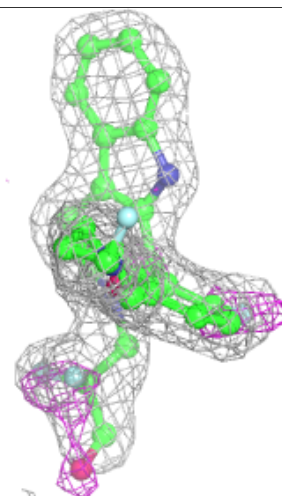
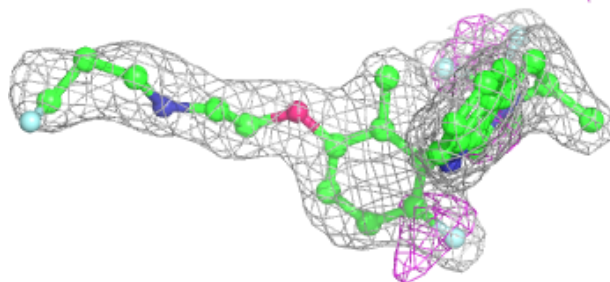
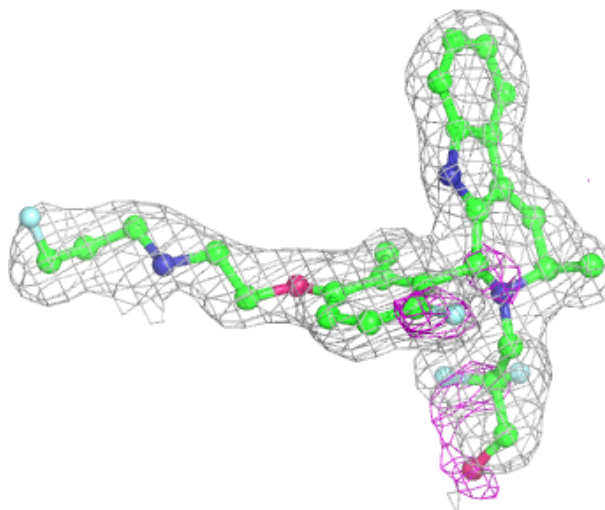
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists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

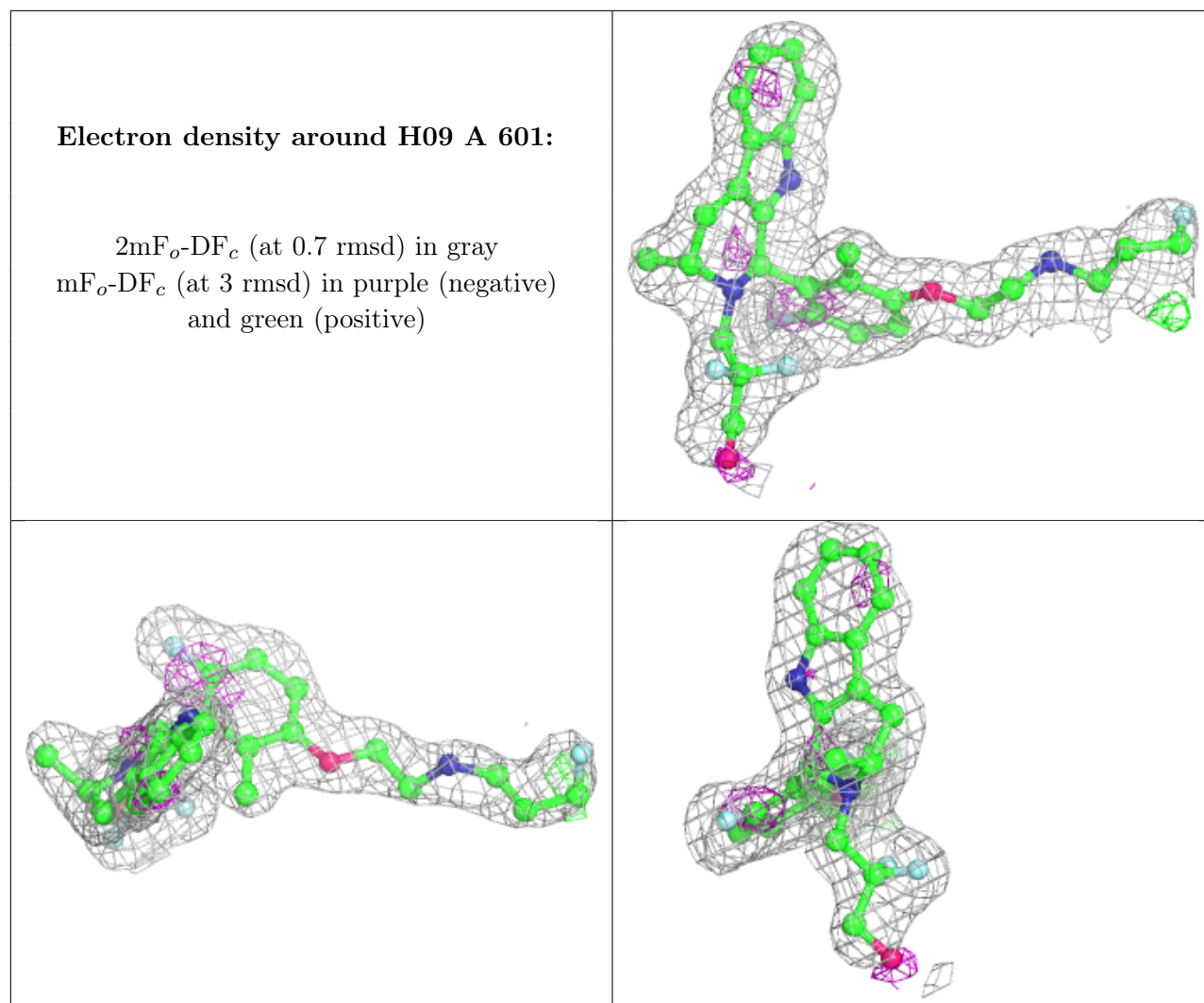
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
2	H09	B	601	36/36	0.85	0.16	36,42,70,76	0
2	H09	A	601	36/36	0.87	0.14	38,43,65,70	0

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 H09 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)





6.5 Other polymers [i](#)

There are no such residues in this entry.