



wwPDB X-ray Structure Validation Summary Report ⓘ

Dec 12, 2022 – 12:10 PM JST

PDB ID : 7WAQ
Title : SbSOMT2 in complex with resveratrol
Authors : Pow, K.C.; Hao, Q.
Deposited on : 2021-12-14
Resolution : 2.56 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

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	:	1.8.5 (274361), 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

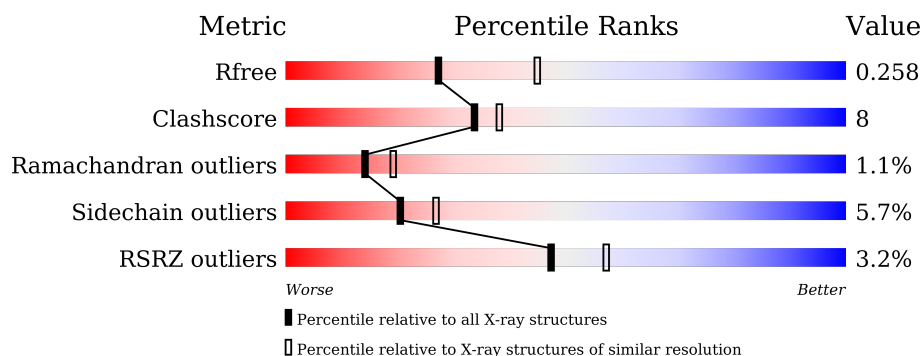
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.56 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	1279 (2.58-2.54)
Clashscore	141614	1327 (2.58-2.54)
Ramachandran outliers	138981	1312 (2.58-2.54)
Sidechain outliers	138945	1312 (2.58-2.54)
RSRZ outliers	127900	1269 (2.58-2.54)

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	376	<div> <div>4%</div> <div> <div></div> <div>72%</div> <div>21%</div> <div>...</div> </div> </div>
1	B	376	<div> <div>2%</div> <div> <div></div> <div>73%</div> <div>20%</div> <div>...</div> </div> </div>
1	C	376	<div> <div>3%</div> <div> <div></div> <div>74%</div> <div>20%</div> <div>..</div> </div> </div>
1	D	376	<div> <div>3%</div> <div> <div></div> <div>74%</div> <div>18%</div> <div>...</div> </div> </div>

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 crite-

ria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
3	EDO	A	402	-	-	X	-
3	EDO	B	402	-	-	X	-
3	EDO	C	402	-	-	X	-
3	EDO	D	402	-	-	X	-

2 Entry composition [i](#)

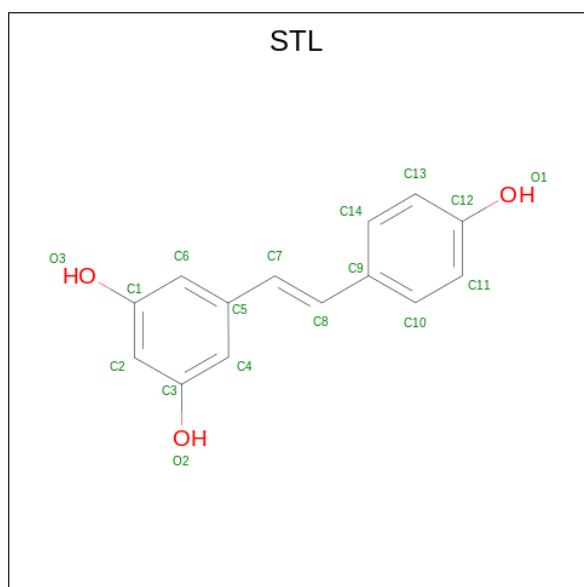
There are 4 unique types of molecules in this entry. The entry contains 11441 atoms, of which 0 are hydrogens and 0 are deuteriums.

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 stilbene O-methyltransferase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	B	363	Total	C	N	O	S	0	1	0
			2821	1801	475	522	23			
1	A	364	Total	C	N	O	S	0	1	0
			2823	1801	474	525	23			
1	C	364	Total	C	N	O	S	0	0	0
			2817	1798	473	523	23			
1	D	365	Total	C	N	O	S	0	0	0
			2825	1802	474	526	23			

- Molecule 2 is RESVERATROL (three-letter code: STL) (formula: $C_{14}H_{12}O_3$) (labeled as "Ligand of Interest" by depositor).



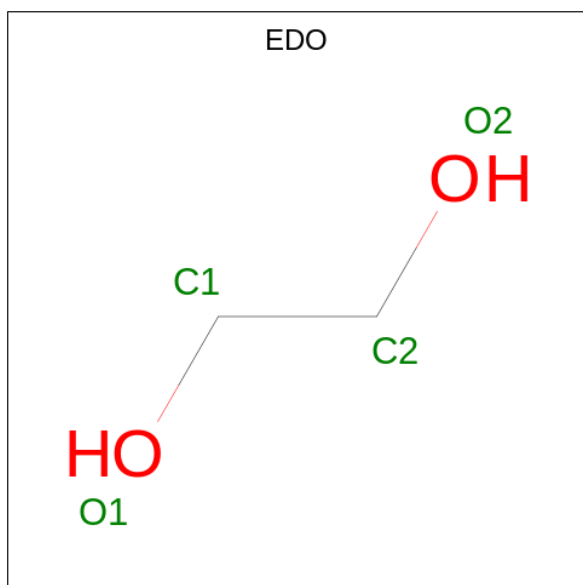
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
2	B	1	Total	C	O	0	0
			17	14	3		
2	A	1	Total	C	O	0	0
			17	14	3		

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Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
2	C	1	Total	C	O	0	0
			17	14	3		
2	D	1	Total	C	O	0	0
			17	14	3		

- Molecule 3 is 1,2-ETHANEDIOL (three-letter code: EDO) (formula: $C_2H_6O_2$).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	B	1	Total	C	O	0	0
			4	2	2		
3	A	1	Total	C	O	0	0
			4	2	2		
3	C	1	Total	C	O	0	0
			4	2	2		
3	C	1	Total	C	O	0	0
			4	2	2		
3	D	1	Total	C	O	0	0
			4	2	2		
3	D	1	Total	C	O	0	0
			4	2	2		

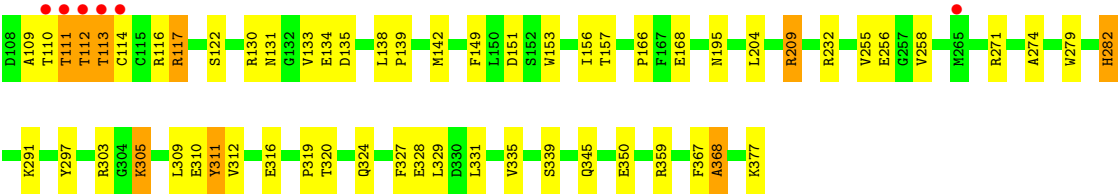
- Molecule 4 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	B	19	Total	O	0	0
			19	19		

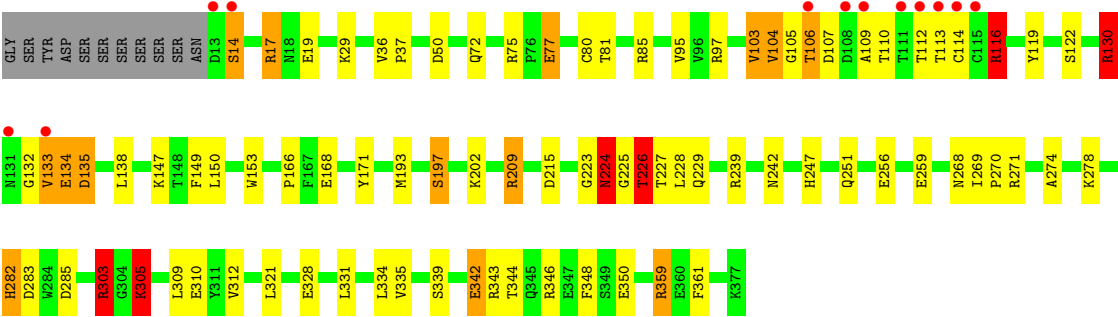
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Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	18	Total 18	O 18	0	0
4	C	16	Total 16	O 16	0	0
4	D	10	Total 10	O 10	0	0



● Molecule 1: stilbene O-methyltransferase



4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	97.48Å 111.73Å 131.10Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	48.96 – 2.56 48.91 – 2.56	Depositor EDS
% Data completeness (in resolution range)	99.9 (48.96-2.56) 100.0 (48.91-2.56)	Depositor EDS
R_{merge}	0.12	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.74 (at 2.54Å)	Xtriage
Refinement program	REFMAC 5.8.0352	Depositor
R, R_{free}	0.186 , 0.257 0.194 , 0.258	Depositor DCC
R_{free} test set	2368 reflections (5.06%)	wwPDB-VP
Wilson B-factor (Å ²)	50.1	Xtriage
Anisotropy	0.348	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.31 , 35.5	EDS
L-test for twinning ²	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.33$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.96	EDS
Total number of atoms	11441	wwPDB-VP
Average B, all atoms (Å ²)	68.0	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 22.72 % 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 5.3841e-03. The detected translational NCS is most likely also responsible for the elevated intensity ratio.*

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: EDO, STL

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	0.89	8/2881 (0.3%)	1.22	9/3905 (0.2%)
1	B	0.97	16/2880 (0.6%)	1.26	10/3904 (0.3%)
1	C	0.90	6/2875 (0.2%)	1.20	9/3897 (0.2%)
1	D	0.92	8/2883 (0.3%)	1.27	15/3908 (0.4%)
All	All	0.92	38/11519 (0.3%)	1.24	43/15614 (0.3%)

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	9
1	B	0	10
1	C	0	10
1	D	0	10
All	All	0	39

The worst 5 of 38 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	62	GLU	CD-OE1	10.23	1.36	1.25
1	D	342	GLU	CD-OE1	9.18	1.35	1.25
1	D	168	GLU	CD-OE1	9.15	1.35	1.25
1	D	328	GLU	CD-OE2	8.44	1.34	1.25
1	A	20	GLU	CD-OE2	8.42	1.34	1.25

The worst 5 of 43 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	D	303	ARG	NE-CZ-NH1	10.17	125.39	120.30
1	A	17	ARG	NE-CZ-NH1	8.23	124.42	120.30
1	B	232	ARG	NE-CZ-NH2	-7.86	116.37	120.30
1	D	75	ARG	NE-CZ-NH1	7.81	124.20	120.30
1	C	311	TYR	CB-CG-CD2	-7.54	116.48	121.00

There are no chirality outliers.

5 of 39 planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	B	114	CYS	Peptide
1	B	116	ARG	Sidechain
1	B	130	ARG	Sidechain
1	B	17	ARG	Sidechain
1	B	57	ARG	Sidechain

5.2 Too-close contacts [i](#)

In the following table, the Non-H and H(model) columns list the number of non-hydrogen atoms and hydrogen atoms in the chain respectively. The H(added) column lists the number of hydrogen atoms added and optimized by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, whereas Symm-Clashes lists symmetry-related clashes.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	2823	0	2812	52	0
1	B	2821	0	2809	38	0
1	C	2817	0	2808	49	0
1	D	2825	0	2812	64	0
2	A	17	0	11	2	0
2	B	17	0	12	1	0
2	C	17	0	12	0	0
2	D	17	0	12	0	0
3	A	4	0	6	4	0
3	B	4	0	6	4	0
3	C	8	0	12	6	0
3	D	8	0	12	17	0
4	A	18	0	0	2	0
4	B	19	0	0	0	0
4	C	16	0	0	0	0
4	D	10	0	0	0	0
All	All	11441	0	11324	192	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 8.

The worst 5 of 192 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:D:226:THR:O	1:D:227:THR:HB	1.49	1.11
1:D:342:GLU:HA	3:D:402:EDO:H22	1.41	0.99
1:C:112:THR:HG22	1:C:113:THR:H	1.32	0.95
1:D:282:HIS:HA	3:D:402:EDO:O1	1.72	0.89
1:C:49:MET:HB3	3:C:402:EDO:H11	1.52	0.89

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	363/376 (96%)	348 (96%)	11 (3%)	4 (1%)	14	19
1	B	362/376 (96%)	352 (97%)	8 (2%)	2 (1%)	25	33
1	C	362/376 (96%)	348 (96%)	12 (3%)	2 (1%)	25	33
1	D	363/376 (96%)	343 (94%)	12 (3%)	8 (2%)	6	7
All	All	1450/1504 (96%)	1391 (96%)	43 (3%)	16 (1%)	14	19

5 of 16 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	C	105	GLY
1	D	14	SER
1	D	103	VAL
1	D	133	VAL
1	D	135	ASP

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	302/312 (97%)	278 (92%)	24 (8%)	12	15
1	B	301/312 (96%)	287 (95%)	14 (5%)	26	35
1	C	301/312 (96%)	287 (95%)	14 (5%)	26	35
1	D	302/312 (97%)	284 (94%)	18 (6%)	19	24
All	All	1206/1248 (97%)	1136 (94%)	70 (6%)	20	26

5 of 70 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	D	147	LYS
1	D	202	LYS
1	D	303	ARG
1	A	204	LEU
1	A	180	SER

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 6 such sidechains are listed below:

Mol	Chain	Res	Type
1	C	268	ASN
1	D	72	GLN
1	D	242	ASN
1	C	131	ASN
1	B	131	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](#)

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
2	STL	C	401	-	18,18,18	1.36	2 (11%)	24,24,24	1.88	8 (33%)
3	EDO	B	402	-	3,3,3	1.62	0	2,2,2	1.39	0
3	EDO	C	402	-	3,3,3	1.26	0	2,2,2	1.46	0
3	EDO	A	402	-	3,3,3	1.71	1 (33%)	2,2,2	1.67	0
3	EDO	D	402	-	3,3,3	0.99	0	2,2,2	0.99	0
2	STL	D	401	-	18,18,18	0.80	0	24,24,24	1.94	8 (33%)
3	EDO	C	403	-	3,3,3	1.18	0	2,2,2	1.08	0
3	EDO	D	403	-	3,3,3	0.46	0	2,2,2	0.58	0
2	STL	A	401	-	18,18,18	0.98	0	24,24,24	1.25	2 (8%)
2	STL	B	401	-	18,18,18	0.94	1 (5%)	24,24,24	1.01	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	STL	C	401	-	-	0/5/5/5	0/2/2/2
3	EDO	B	402	-	-	0/1/1/1	-
3	EDO	C	402	-	-	1/1/1/1	-
3	EDO	A	402	-	-	0/1/1/1	-
3	EDO	D	402	-	-	1/1/1/1	-
2	STL	D	401	-	-	0/5/5/5	0/2/2/2
3	EDO	C	403	-	-	0/1/1/1	-
3	EDO	D	403	-	-	1/1/1/1	-
2	STL	A	401	-	-	0/5/5/5	0/2/2/2

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	STL	B	401	-	-	0/5/5/5	0/2/2/2

All (4) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	C	401	STL	O1-C12	3.33	1.44	1.37
2	C	401	STL	C13-C12	2.61	1.43	1.38
2	B	401	STL	O3-C1	2.20	1.42	1.37
3	A	402	EDO	O2-C2	2.17	1.53	1.42

The worst 5 of 18 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	D	401	STL	C5-C6-C1	-4.59	116.19	120.28
2	C	401	STL	O2-C3-C2	3.87	129.90	119.84
2	C	401	STL	C5-C4-C3	3.57	123.46	120.28
2	A	401	STL	O1-C12-C11	-3.37	110.41	120.02
2	C	401	STL	O2-C3-C4	-3.28	111.33	119.84

There are no chirality outliers.

All (3) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	C	402	EDO	O1-C1-C2-O2
3	D	403	EDO	O1-C1-C2-O2
3	D	402	EDO	O1-C1-C2-O2

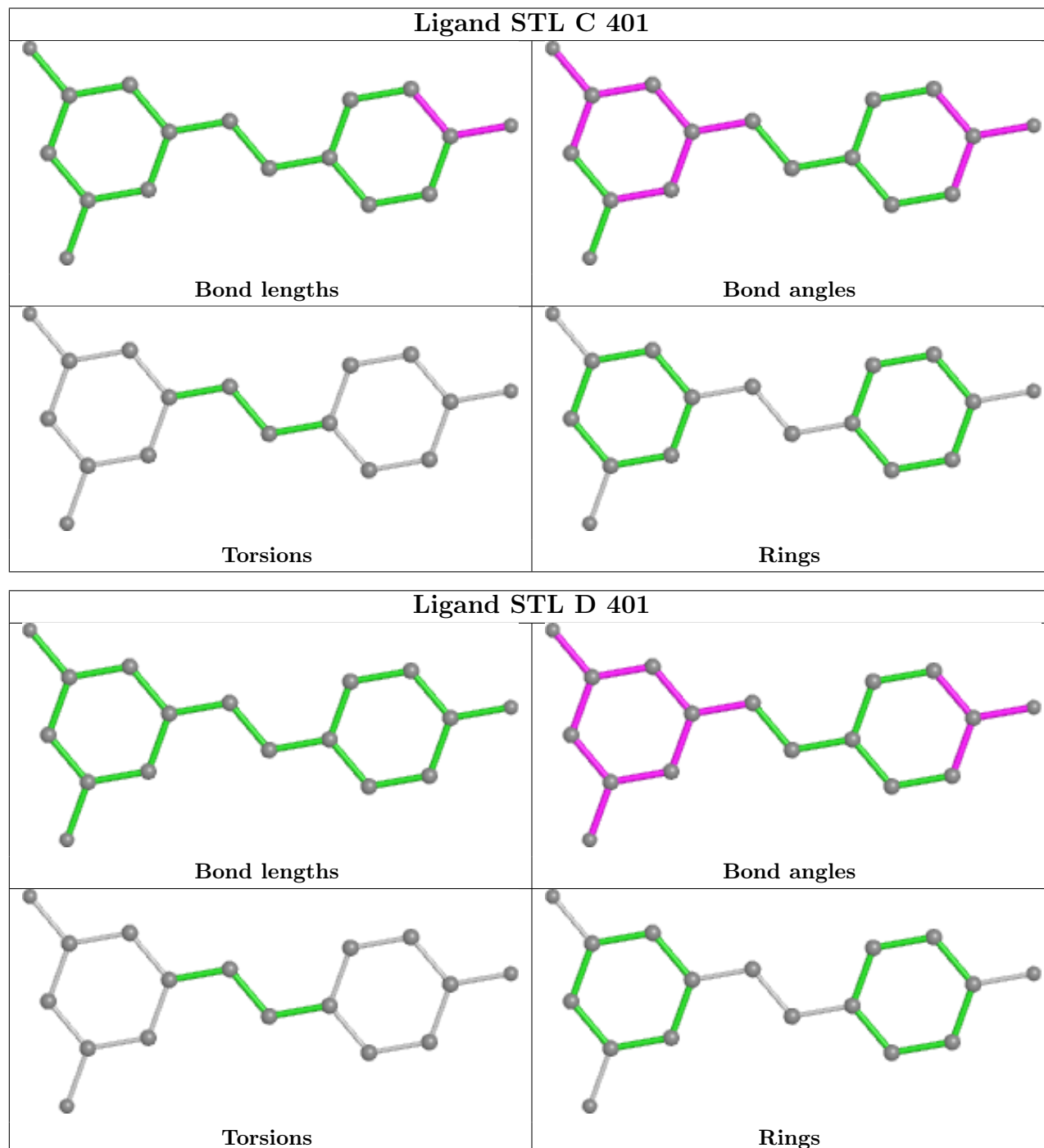
There are no ring outliers.

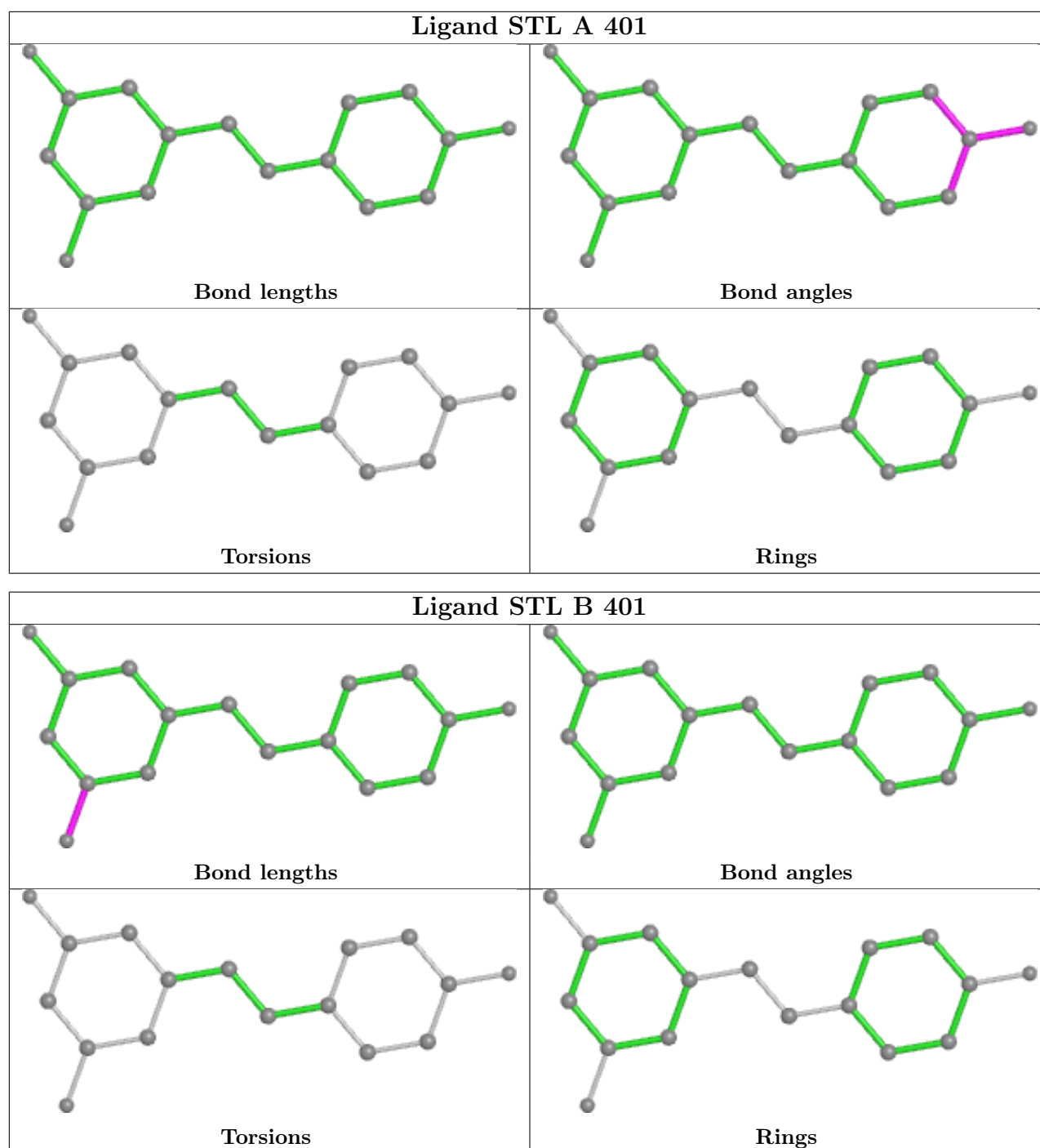
7 monomers are involved in 34 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	B	402	EDO	4	0
3	C	402	EDO	6	0
3	A	402	EDO	4	0
3	D	402	EDO	16	0
3	D	403	EDO	1	0
2	A	401	STL	2	0
2	B	401	STL	1	0

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In

addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less than 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.





5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

6 Fit of model and data [i](#)

6.1 Protein, DNA and RNA chains [i](#)

In the following table, the column labelled ‘#RSRZ> 2’ contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 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	364/376 (96%)	0.08	15 (4%) 37 46	37, 74, 127, 166	0
1	B	363/376 (96%)	-0.24	9 (2%) 57 65	35, 54, 105, 166	0
1	C	364/376 (96%)	-0.08	10 (2%) 54 63	34, 59, 105, 187	0
1	D	365/376 (97%)	-0.04	12 (3%) 46 56	33, 64, 114, 148	0
All	All	1456/1504 (96%)	-0.07	46 (3%) 47 57	33, 62, 118, 187	0

The worst 5 of 46 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	111	THR	9.4
1	C	114	CYS	9.2
1	D	111	THR	9.2
1	C	112	THR	7.6
1	D	112	THR	7.4

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 monosaccharides in this entry.

6.4 Ligands [i](#)

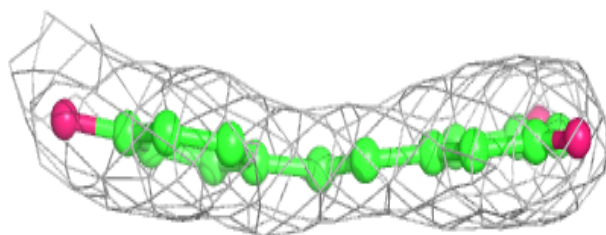
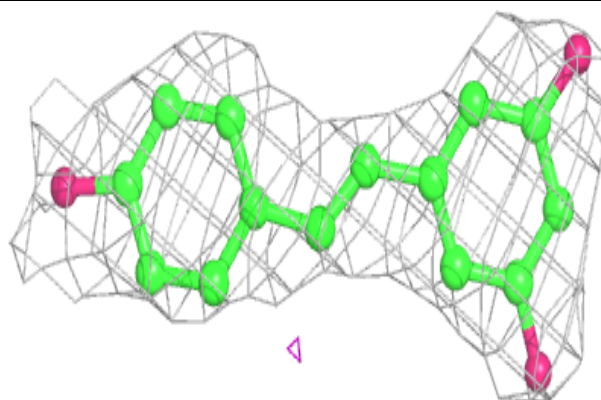
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled ‘Q< 0.9’ lists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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(\AA^2)	Q<0.9
3	EDO	D	403	4/4	0.76	0.26	84,85,86,88	0
3	EDO	A	402	4/4	0.81	0.21	62,66,72,79	0
3	EDO	C	403	4/4	0.85	0.33	76,77,81,82	0
3	EDO	C	402	4/4	0.87	0.29	58,71,71,78	0
3	EDO	D	402	4/4	0.93	0.46	59,62,77,85	0
3	EDO	B	402	4/4	0.95	0.28	47,49,54,67	0
2	STL	A	401	17/17	0.95	0.18	50,57,66,68	0
2	STL	C	401	17/17	0.97	0.17	31,49,57,64	0
2	STL	D	401	17/17	0.97	0.19	41,52,58,68	0
2	STL	B	401	17/17	0.98	0.14	34,41,49,52	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.

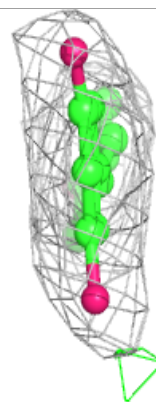
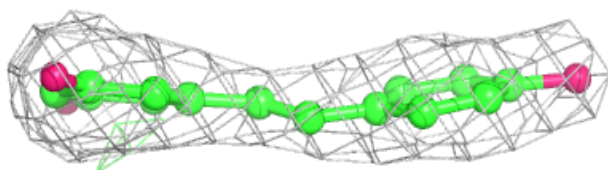
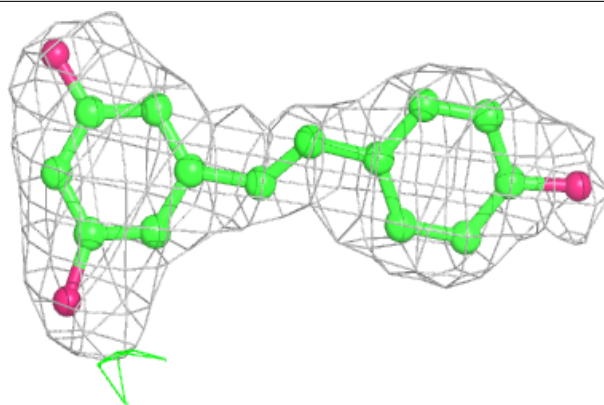
Electron density around STL A 401:

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

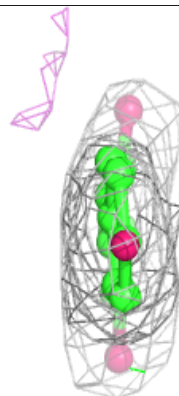
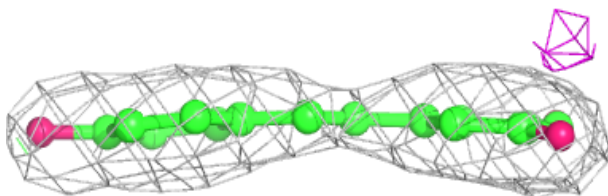
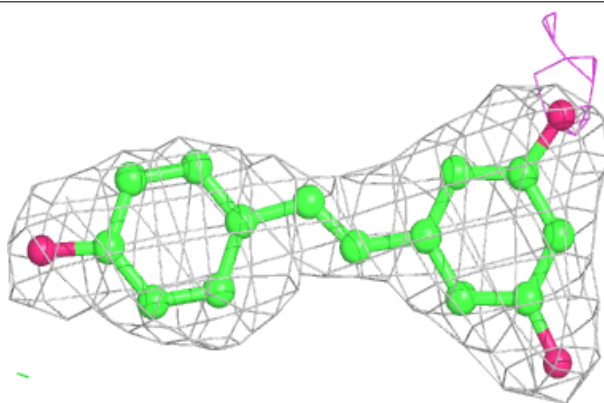


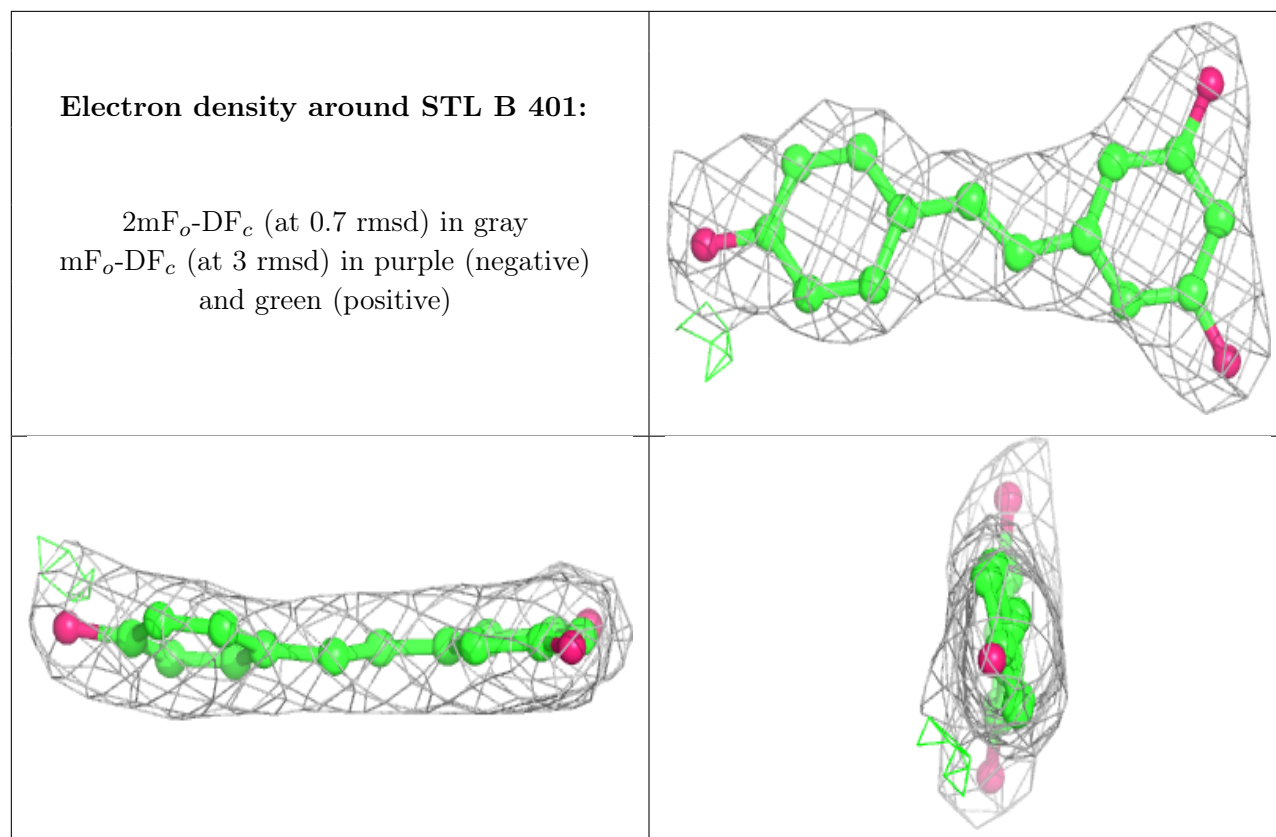
Electron density around STL C 401:

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

**Electron density around STL D 401:**

$2mF_o-DF_c$ (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.