



Full wwPDB X-ray Structure Validation Report ⓘ

Sep 28, 2020 – 11:30 AM EDT

PDB ID : 6W7I
Title : LmFPPS mutant T164W in complex with 476A, IPP & Ca
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Deposited on : 2020-03-19
Resolution : 2.10 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 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 : 2.14.6
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) : 2.14.6

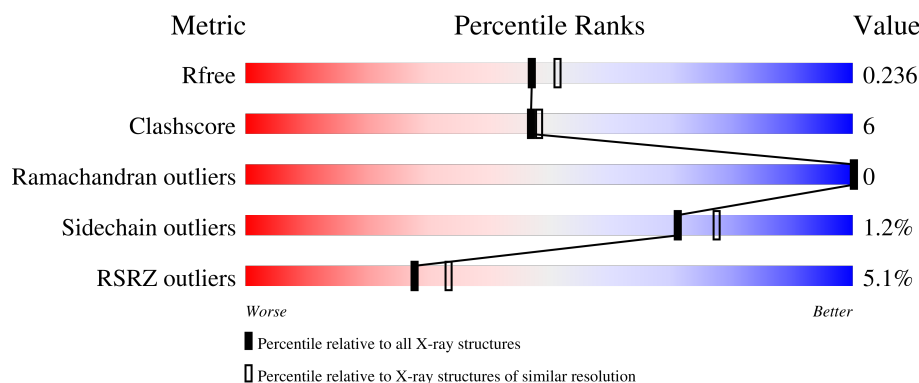
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.10 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	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 $\leq 5\%$. 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	362	
1	B	362	

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
6	PEG	A	407	-	-	X	-

2 Entry composition

There are 7 unique types of molecules in this entry. The entry contains 6384 atoms, of which 3 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 Farnesyl pyrophosphate synthase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	362	Total	C	N	O	S	0	7	0
			2931	1878	482	546	25			
1	B	362	Total	C	N	O	S	0	7	0
			2925	1876	481	543	25			

There are 4 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	1	FME	-	expression tag	UNP Q4QBL1
A	164	TRP	THR	engineered mutation	UNP Q4QBL1
B	1	FME	-	expression tag	UNP Q4QBL1
B	164	TRP	THR	engineered mutation	UNP Q4QBL1

- Molecule 2 is CALCIUM ION (three-letter code: CA) (formula: Ca).

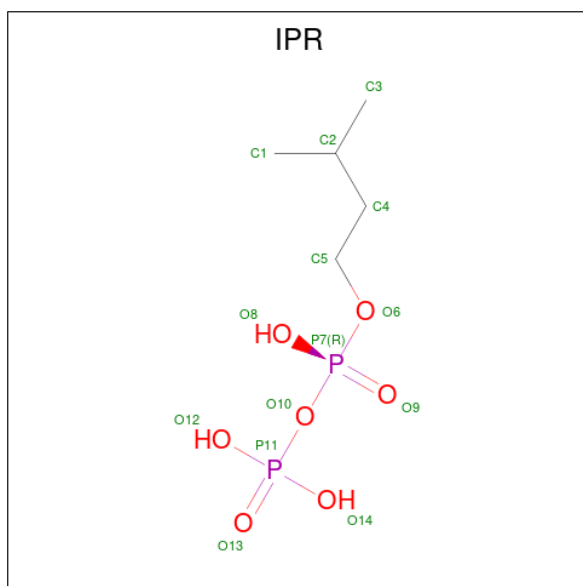
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	B	3	Total	Ca	0	0
			3	3		
2	A	3	Total	Ca	0	0
			3	3		

- Molecule 3 is ACETATE ION (three-letter code: ACT) (formula: C₂H₃O₂).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
3	A	1	Total	C	H	O	0	0
			7	2	3	2		

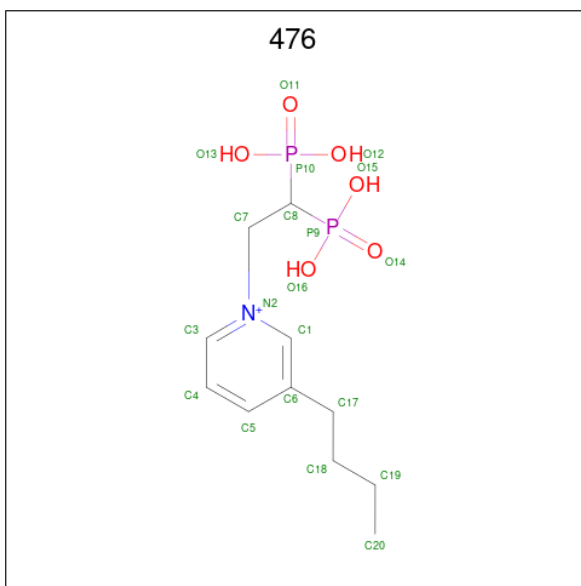
- Molecule 4 is ISOPENTYL PYROPHOSPHATE (three-letter code: IPR) (formula: $C_5H_{14}O_7P_2$).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
4	A	1	Total	C	O	P	0	0
			14	5	7	2		
4	B	1	Total	C	O	P	0	0
			14	5	7	2		

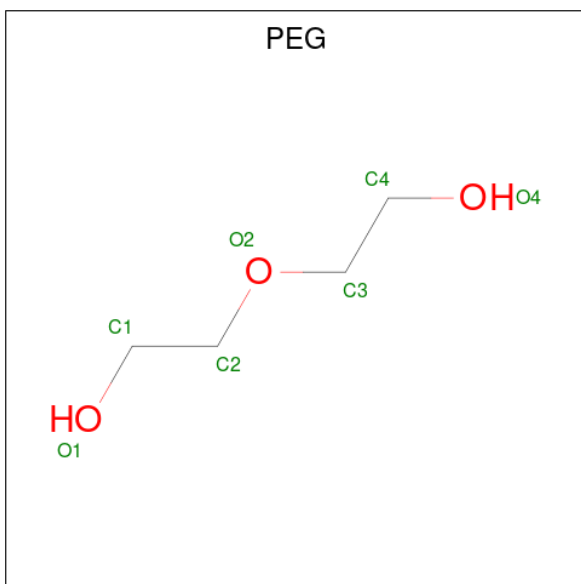
- Molecule 5 is 3-butyl-1-(2,2-diphosphonoethyl)pyridinium (three-letter code: 476) (formula:

C₁₁H₂₀NO₆P₂) (labeled as "Ligand of Interest" by author).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
5	A	1	Total	C	N	O	P	0	0
			20	11	1	6	2		
5	B	1	Total	C	N	O	P	0	0
			20	11	1	6	2		

- Molecule 6 is DI(HYDROXYETHYL)ETHER (three-letter code: PEG) (formula: C₄H₁₀O₃).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
6	A	1	Total	C	O	0	0
			7	4	3		

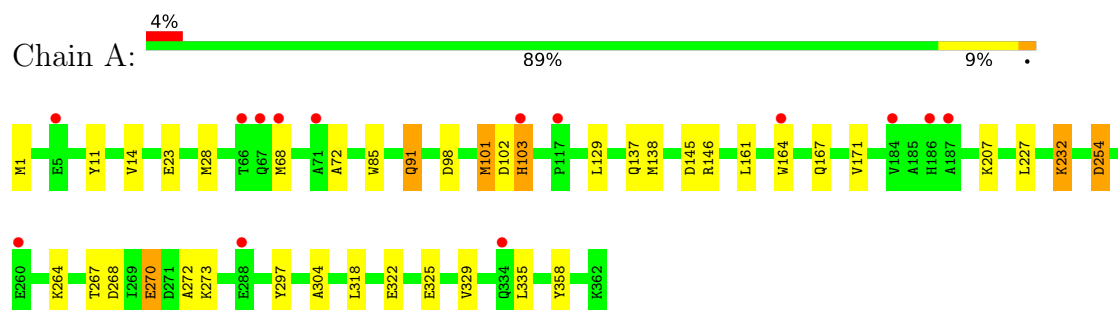
- Molecule 7 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
7	A	226	Total 226	O 226	0	0
7	B	214	Total 214	O 214	0	0

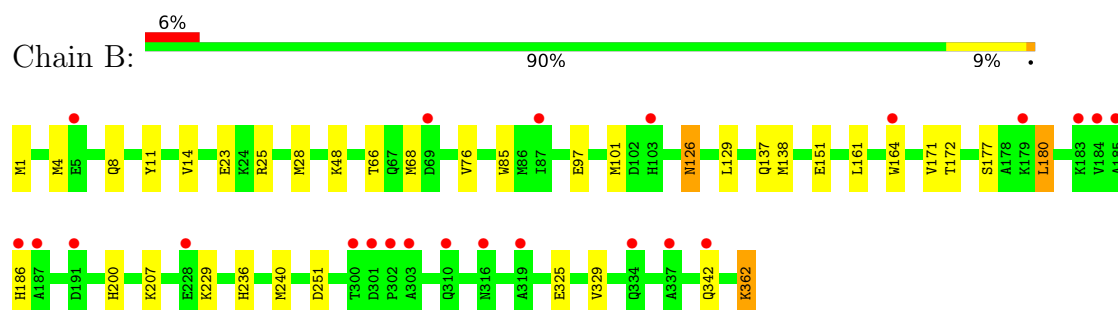
3 Residue-property plots [i](#)

These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron density. Residues are color-coded according to the number of geometric quality criteria for which they contain at least one outlier: green = 0, yellow = 1, orange = 2 and red = 3 or more. A red dot above a residue indicates a poor fit to the electron density ($RSRZ > 2$). Stretches of 2 or more consecutive residues without any outlier are shown as a green connector. Residues present in the sample, but not in the model, are shown in grey.

- Molecule 1: Farnesyl pyrophosphate synthase



- Molecule 1: Farnesyl pyrophosphate synthase



4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	58.93Å 79.98Å 81.17Å 90.00° 106.39° 90.00°	Depositor
Resolution (Å)	77.85 – 2.10 24.11 – 2.10	Depositor EDS
% Data completeness (in resolution range)	92.0 (77.85-2.10) 92.0 (24.11-2.10)	Depositor EDS
R_{merge}	0.07	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	5.11 (at 2.10Å)	Xtriage
Refinement program	REFMAC 5.2.0019	Depositor
R, R_{free}	0.184 , 0.238 0.186 , 0.236	Depositor DCC
R_{free} test set	1953 reflections (5.03%)	wwPDB-VP
Wilson B-factor (Å ²)	20.9	Xtriage
Anisotropy	0.224	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.41 , 47.7	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	0.94	EDS
Total number of atoms	6384	wwPDB-VP
Average B, all atoms (Å ²)	19.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 7.80% 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

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: PEG, CA, IPR, 476, ACT, FME

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	0.57	3/2994 (0.1%)	0.59	4/4057 (0.1%)
1	B	0.56	2/2998 (0.1%)	0.60	0/4062
All	All	0.56	5/5992 (0.1%)	0.60	4/8119 (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	A	0	2

All (5) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	270	GLU	CD-OE2	-7.93	1.17	1.25
1	B	97	GLU	CD-OE1	-6.80	1.18	1.25
1	B	97	GLU	CD-OE2	-6.02	1.19	1.25
1	A	270	GLU	CD-OE1	-5.83	1.19	1.25
1	A	254	ASP	C-O	-5.06	1.13	1.23

All (4) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	102	ASP	O-C-N	5.70	131.82	122.70
1	A	103	HIS	O-C-N	-5.61	113.73	122.70
1	A	102	ASP	CB-CG-OD2	5.21	122.99	118.30
1	A	103	HIS	C-N-CA	5.17	134.62	121.70

There are no chirality outliers.

All (2) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	101[A]	MET	Mainchain
1	A	101[B]	MET	Mainchain

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	2931	0	2897	48	0
1	B	2925	0	2899	34	0
2	A	3	0	0	0	0
2	B	3	0	0	0	0
3	A	4	3	3	0	0
4	A	14	0	10	0	0
4	B	14	0	10	0	0
5	A	20	0	18	8	0
5	B	20	0	18	1	0
6	A	7	0	10	9	0
7	A	226	0	0	5	0
7	B	214	0	0	5	0
All	All	6381	3	5865	73	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 6.

All (73) 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:164:TRP:CZ2	1:B:129:LEU:HD13	1.89	1.07
1:A:164:TRP:CH2	5:A:406:476:H18	1.92	1.04
1:A:164:TRP:CZ2	5:A:406:476:H18	1.98	0.99
1:A:264:LYS:HE3	6:A:407:PEG:H42	1.44	0.98
1:A:164:TRP:CZ2	1:B:129:LEU:CD1	2.54	0.90
7:A:573:HOH:O	1:B:101:MET:SD	2.30	0.88
1:A:164:TRP:CE2	1:B:129:LEU:HD13	2.18	0.78
1:A:101[A]:MET:CE	1:A:167:GLN:HE21	2.00	0.75

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:264:LYS:HG3	6:A:407:PEG:C4	2.17	0.74
1:A:14[A]:VAL:HG11	1:A:138:MET:SD	2.30	0.72
1:A:268:ASP:HA	1:A:273:LYS:HG3	1.72	0.72
1:B:14:VAL:HG11	1:B:138:MET:SD	2.31	0.70
1:B:25:ARG:HH12	1:B:137:GLN:HE22	1.40	0.69
1:A:264:LYS:HG3	6:A:407:PEG:H42	1.74	0.67
6:A:407:PEG:H12	7:A:619:HOH:O	1.96	0.65
1:A:101[B]:MET:CE	1:A:171:VAL:HG11	2.28	0.64
1:A:264:LYS:CE	6:A:407:PEG:H42	2.26	0.61
1:A:304:ALA:HB2	7:A:567:HOH:O	2.02	0.59
1:A:264:LYS:HG3	6:A:407:PEG:H41	1.84	0.59
7:A:573:HOH:O	1:B:171:VAL:HG11	2.01	0.58
1:A:101[A]:MET:HE1	5:A:406:476:H20	1.86	0.57
1:B:151[A]:GLU:HG3	7:B:520:HOH:O	2.04	0.57
1:B:25:ARG:HH12	1:B:137:GLN:NE2	2.03	0.56
1:A:164:TRP:CH2	5:A:406:476:C20	2.80	0.56
1:A:103:HIS:ND1	1:A:103:HIS:O	2.40	0.55
5:A:406:476:O11	6:A:407:PEG:H31	2.07	0.54
1:A:91:GLN:HA	1:A:91:GLN:HE21	1.72	0.54
1:A:207:LYS:O	5:A:406:476:H9	2.08	0.54
1:A:98:ASP:HA	1:A:101[A]:MET:HE3	1.91	0.53
1:B:342:GLN:HB3	7:B:598:HOH:O	2.08	0.53
1:B:200:HIS:HE1	1:B:251:ASP:OD2	1.91	0.53
1:A:318:LEU:O	1:A:322:GLU:HG2	2.10	0.52
1:B:23:GLU:HA	1:B:28:MET:HB3	1.92	0.52
1:A:272:ALA:HA	1:A:297:TYR:CE2	2.46	0.51
1:B:207:LYS:O	5:B:405:476:H9	2.10	0.50
1:A:101[A]:MET:HE3	1:A:167:GLN:HE21	1.74	0.50
1:A:101[B]:MET:HE2	1:A:171:VAL:HG11	1.93	0.50
1:B:11:TYR:HB2	1:B:85:TRP:CZ2	2.46	0.50
1:A:101[A]:MET:HE1	1:A:167:GLN:HE21	1.76	0.50
1:B:68:MET:SD	1:B:76:VAL:HG21	2.52	0.49
1:B:172:THR:HB	1:B:180:LEU:HD11	1.95	0.47
1:A:161:LEU:HD22	1:B:137:GLN:HG3	1.95	0.47
1:A:164:TRP:CH2	1:B:129:LEU:HD12	2.49	0.47
1:A:68:MET:HB3	1:A:72:ALA:HB3	1.97	0.47
1:A:137:GLN:HG3	1:B:161:LEU:HD22	1.96	0.47
1:A:164:TRP:CZ2	1:B:129:LEU:HD12	2.48	0.47
1:B:325:GLU:O	1:B:329:VAL:HG23	2.14	0.47
1:A:129:LEU:HD21	1:B:129:LEU:HD21	1.97	0.47
1:B:14:VAL:CG1	1:B:138:MET:SD	3.02	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:335:LEU:HD22	7:A:516:HOH:O	2.16	0.46
1:A:129:LEU:HD22	1:B:164:TRP:CZ2	2.51	0.45
1:B:66:THR:HG22	1:B:229:LYS:HE3	1.98	0.45
5:A:406:476:O12	6:A:407:PEG:H22	2.17	0.45
1:A:23:GLU:HA	1:A:28:MET:HB3	1.98	0.44
1:A:325:GLU:O	1:A:329:VAL:HG23	2.18	0.44
1:A:267:THR:HB	1:A:270:GLU:HG2	2.00	0.44
1:A:227:LEU:HD11	1:A:232:LYS:HD2	1.99	0.44
1:A:145:ASP:OD1	1:A:146:ARG:NH1	2.51	0.44
1:A:14[A]:VAL:CG1	1:A:138:MET:SD	3.03	0.44
1:B:362:LYS:NZ	7:B:511:HOH:O	2.51	0.43
1:A:164:TRP:CZ3	1:B:126:ASN:HA	2.54	0.43
1:A:129:LEU:HB3	1:B:164:TRP:CD2	2.54	0.42
1:B:177:SER:O	1:B:180:LEU:HB2	2.20	0.41
1:B:186:HIS:CD2	7:B:502:HOH:O	2.73	0.41
1:B:186:HIS:HD2	7:B:502:HOH:O	2.03	0.41
1:A:129:LEU:HB3	1:B:164:TRP:CE2	2.55	0.41
1:A:329:VAL:CG2	1:A:358:TYR:CE1	3.04	0.41
1:A:264:LYS:CG	6:A:407:PEG:H42	2.48	0.41
1:A:101[A]:MET:CE	1:A:167:GLN:NE2	2.76	0.40
1:B:4:MET:O	1:B:8[B]:GLN:HG3	2.21	0.40
1:A:11:TYR:HB2	1:A:85:TRP:CZ2	2.57	0.40
1:A:101[A]:MET:CE	5:A:406:476:H20	2.52	0.40
1:B:236:HIS:O	1:B:240:MET:HG2	2.21	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	367/362 (101%)	363 (99%)	4 (1%)	0	100 100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	B	367/362 (101%)	364 (99%)	3 (1%)	0	100	100
All	All	734/724 (101%)	727 (99%)	7 (1%)	0	100	100

There are no Ramachandran outliers to report.

5.3.2 Protein sidechains ⓘ

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	309/302 (102%)	306 (99%)	3 (1%)	76	82
1	B	309/302 (102%)	305 (99%)	4 (1%)	69	75
All	All	618/604 (102%)	611 (99%)	7 (1%)	71	79

All (7) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	91	GLN
1	A	232	LYS
1	A	254	ASP
1	B	48	LYS
1	B	126	ASN
1	B	180	LEU
1	B	362	LYS

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (9) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	8	GLN
1	A	91	GLN
1	A	167	GLN
1	A	186	HIS
1	A	236	HIS
1	A	361	GLN

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Mol	Chain	Res	Type
1	B	116	HIS
1	B	137	GLN
1	B	200	HIS

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

5.4 Non-standard residues in protein, DNA, RNA chains ⓘ

2 non-standard protein/DNA/RNA residues 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	$\# Z > 2$
1	FME	A	1	1	8,9,10	0.80	0	7,9,11	2.88	1 (14%)
1	FME	B	1	1	8,9,10	0.89	0	7,9,11	2.81	2 (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
1	FME	A	1	1	-	3/7/9/11	-
1	FME	B	1	1	-	2/7/9/11	-

There are no bond length outliers.

All (3) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	1	FME	CA-N-CN	-7.30	111.60	122.82
1	B	1	FME	CA-N-CN	-6.80	112.37	122.82

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	1	FME	O-C-CA	-2.05	119.41	124.78

There are no chirality outliers.

All (5) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
1	A	1	FME	O1-CN-N-CA
1	B	1	FME	CA-CB-CG-SD
1	B	1	FME	O1-CN-N-CA
1	A	1	FME	CA-CB-CG-SD
1	A	1	FME	CB-CA-N-CN

There are no ring outliers.

No monomer is involved in short contacts.

5.5 Carbohydrates [i](#)

There are no monosaccharides in this entry.

5.6 Ligand geometry [i](#)

Of 12 ligands modelled in this entry, 6 are monoatomic - leaving 6 for Mogul analysis.

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\# Z > 2$	Counts	RMSZ	$\# Z > 2$
6	PEG	A	407	-	6,6,6	0.59	0	5,5,5	0.53	0
3	ACT	A	404	-	1,3,3	4.74	1 (100%)	0,3,3	0.00	-
5	476	B	405	2	19,20,20	1.21	3 (15%)	25,29,29	1.10	2 (8%)
4	IPR	B	404	-	11,13,13	1.19	1 (9%)	16,19,19	1.22	1 (6%)
4	IPR	A	405	-	11,13,13	1.15	1 (9%)	16,19,19	1.10	0
5	476	A	406	2	19,20,20	1.33	4 (21%)	25,29,29	1.32	3 (12%)

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	PEG	A	407	-	-	3/4/4/4	-
4	IPR	A	405	-	-	3/13/13/13	-
5	476	A	406	2	-	4/18/20/20	0/1/1/1
5	476	B	405	2	-	3/18/20/20	0/1/1/1
4	IPR	B	404	-	-	1/13/13/13	-

All (10) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	A	404	ACT	CH3-C	-4.74	1.42	1.48
4	A	405	IPR	C3-C2	-3.34	1.33	1.51
4	B	404	IPR	C3-C2	-3.29	1.33	1.51
5	A	406	476	P10-O12	-2.63	1.50	1.54
5	A	406	476	P10-O13	-2.61	1.50	1.54
5	B	405	476	P9-O15	-2.47	1.50	1.54
5	A	406	476	P9-O16	-2.24	1.51	1.54
5	B	405	476	P10-O13	-2.12	1.51	1.54
5	A	406	476	P10-C8	2.02	1.84	1.81
5	B	405	476	P9-O14	2.01	1.53	1.49

All (6) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	A	406	476	O11-P10-C8	-2.79	104.37	112.29
5	B	405	476	O14-P9-C8	-2.67	104.71	112.29
5	A	406	476	C17-C6-C5	-2.41	115.15	121.23
4	B	404	IPR	O12-P11-O14	2.24	116.18	107.64
5	B	405	476	O11-P10-C8	-2.14	106.22	112.29
5	A	406	476	C1-C6-C5	2.05	120.36	117.57

There are no chirality outliers.

All (14) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
5	B	405	476	C8-C7-N2-C1
5	B	405	476	C8-C7-N2-C3
5	A	406	476	C8-C7-N2-C1

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Mol	Chain	Res	Type	Atoms
5	A	406	476	C8-C7-N2-C3
6	A	407	PEG	O2-C3-C4-O4
6	A	407	PEG	O1-C1-C2-O2
4	A	405	IPR	C1-C2-C4-C5
6	A	407	PEG	C4-C3-O2-C2
4	B	404	IPR	C1-C2-C4-C5
5	A	406	476	C18-C17-C6-C1
5	B	405	476	C18-C17-C6-C5
4	A	405	IPR	P11-O10-P7-O8
4	A	405	IPR	P11-O10-P7-O9
5	A	406	476	C18-C17-C6-C5

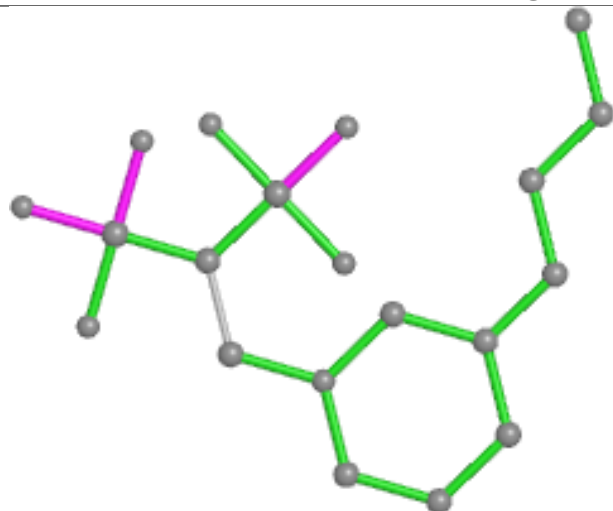
There are no ring outliers.

3 monomers are involved in 16 short contacts:

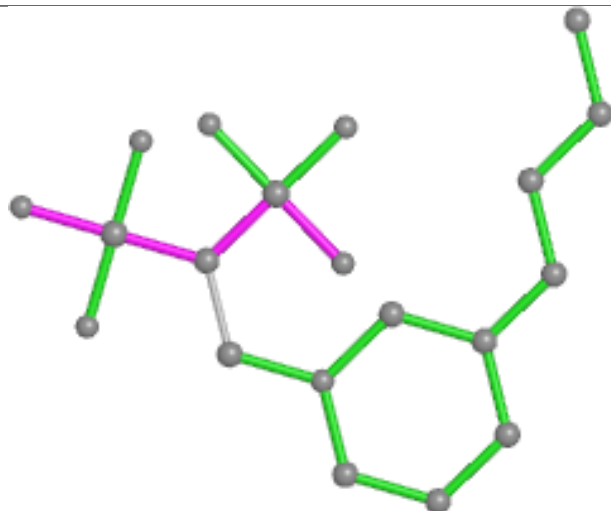
Mol	Chain	Res	Type	Clashes	Symm-Clashes
6	A	407	PEG	9	0
5	B	405	476	1	0
5	A	406	476	8	0

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.

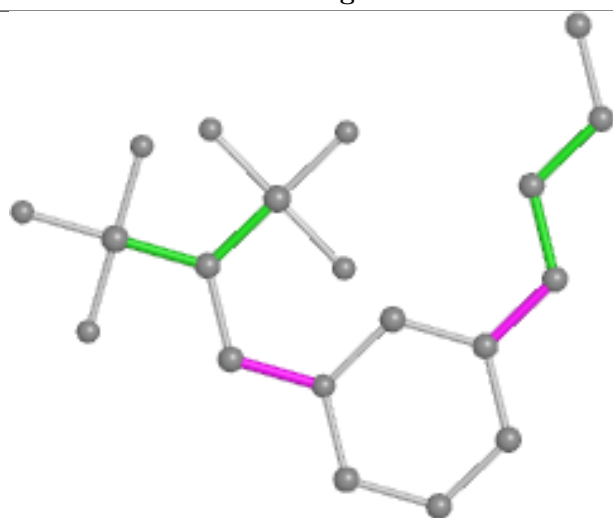
Ligand 476 B 405



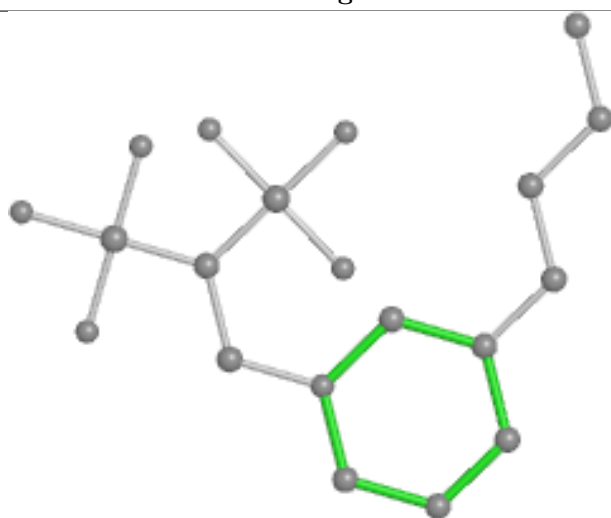
Bond lengths



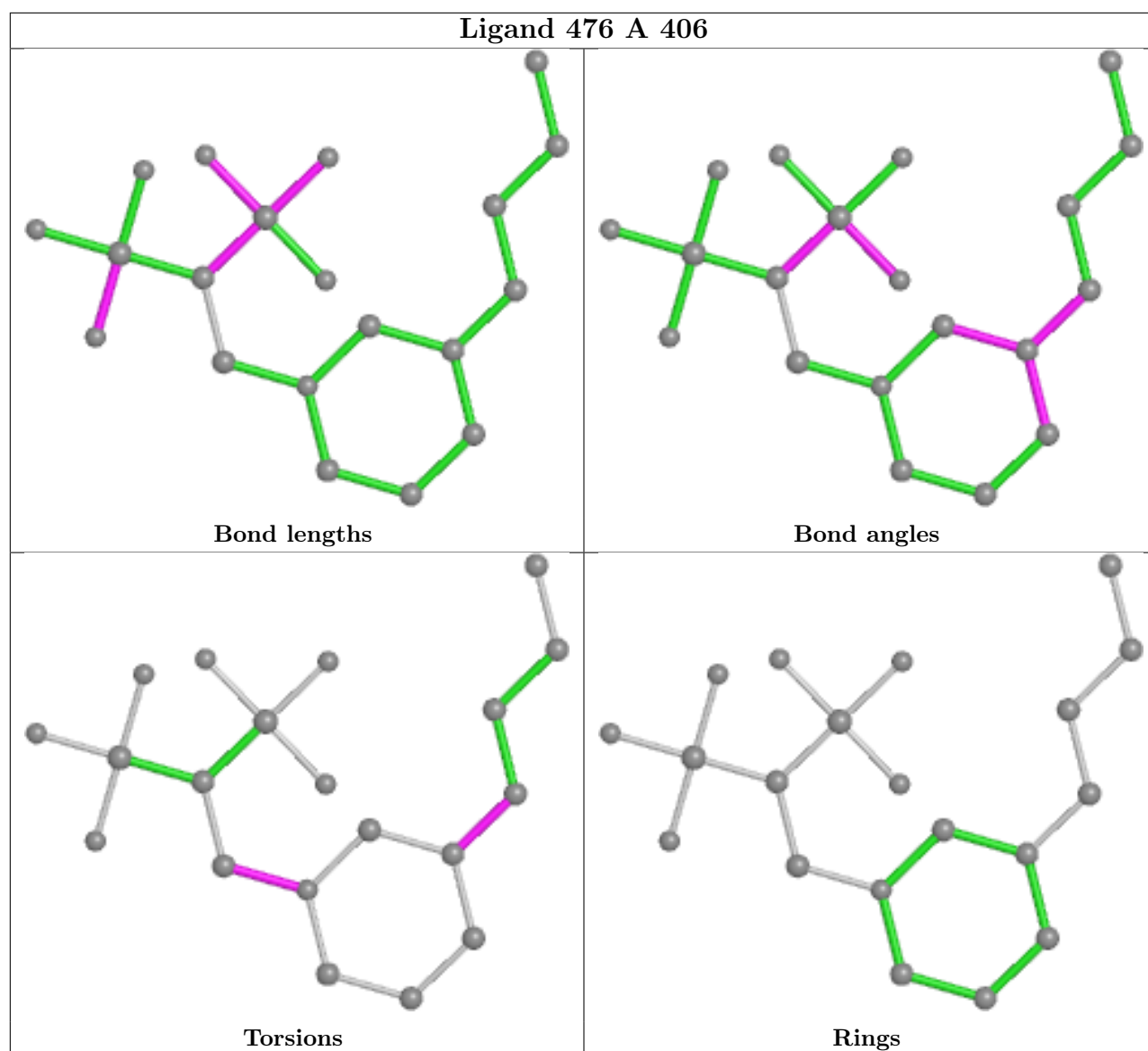
Bond angles



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

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	361/362 (99%)	0.08	14 (3%) 39 45	9, 17, 31, 42	0
1	B	361/362 (99%)	0.23	23 (6%) 19 24	8, 19, 33, 44	0
All	All	722/724 (99%)	0.15	37 (5%) 28 33	8, 18, 33, 44	0

All (37) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	67	GLN	5.3
1	B	302	PRO	4.7
1	B	185	ALA	4.3
1	B	334	GLN	4.0
1	A	103	HIS	4.0
1	A	186	HIS	3.9
1	B	186	HIS	3.8
1	B	183	LYS	3.7
1	B	228	GLU	3.5
1	B	184	VAL	3.3
1	A	117	PRO	3.2
1	B	191	ASP	3.0
1	A	164	TRP	3.0
1	B	303	ALA	2.9
1	B	319	ALA	2.8
1	A	184	VAL	2.7
1	B	164	TRP	2.7
1	A	260	GLU	2.6
1	B	301	ASP	2.6
1	A	187	ALA	2.5
1	B	187	ALA	2.5
1	B	179	LYS	2.5
1	A	66	THR	2.5
1	B	300	THR	2.5

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Mol	Chain	Res	Type	RSRZ
1	A	334[A]	GLN	2.5
1	B	316	ASN	2.4
1	B	337	ALA	2.4
1	A	288[A]	GLU	2.3
1	B	342	GLN	2.3
1	A	5	GLU	2.3
1	B	5	GLU	2.3
1	A	71	ALA	2.2
1	B	310	GLN	2.2
1	B	87	ILE	2.1
1	A	68	MET	2.1
1	B	103[A]	HIS	2.1
1	B	69[A]	ASP	2.0

6.2 Non-standard residues in protein, DNA, RNA chains [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
1	FME	B	1	10/11	0.74	0.40	33,35,42,43	0
1	FME	A	1	10/11	0.83	0.27	29,32,39,41	0

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
6	PEG	A	407	7/7	0.79	0.29	20,21,25,26	0
3	ACT	A	404	4/4	0.80	0.22	20,20,20,20	0
5	476	B	405	20/20	0.96	0.11	12,15,16,16	0

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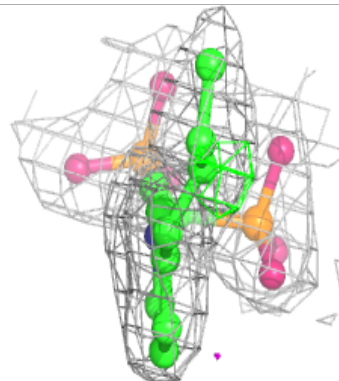
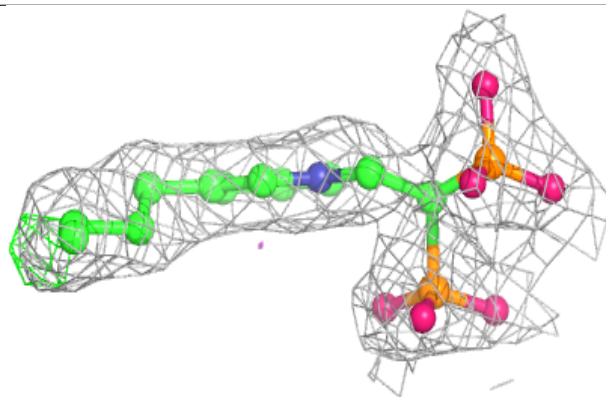
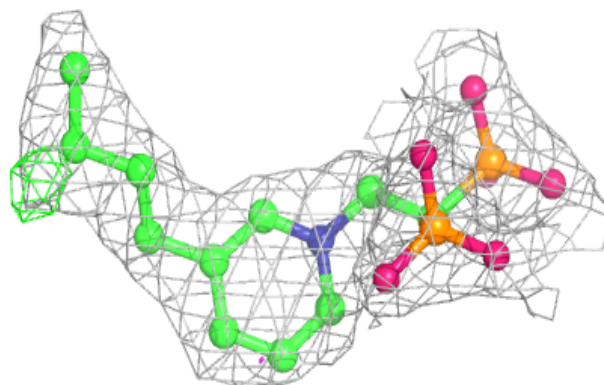
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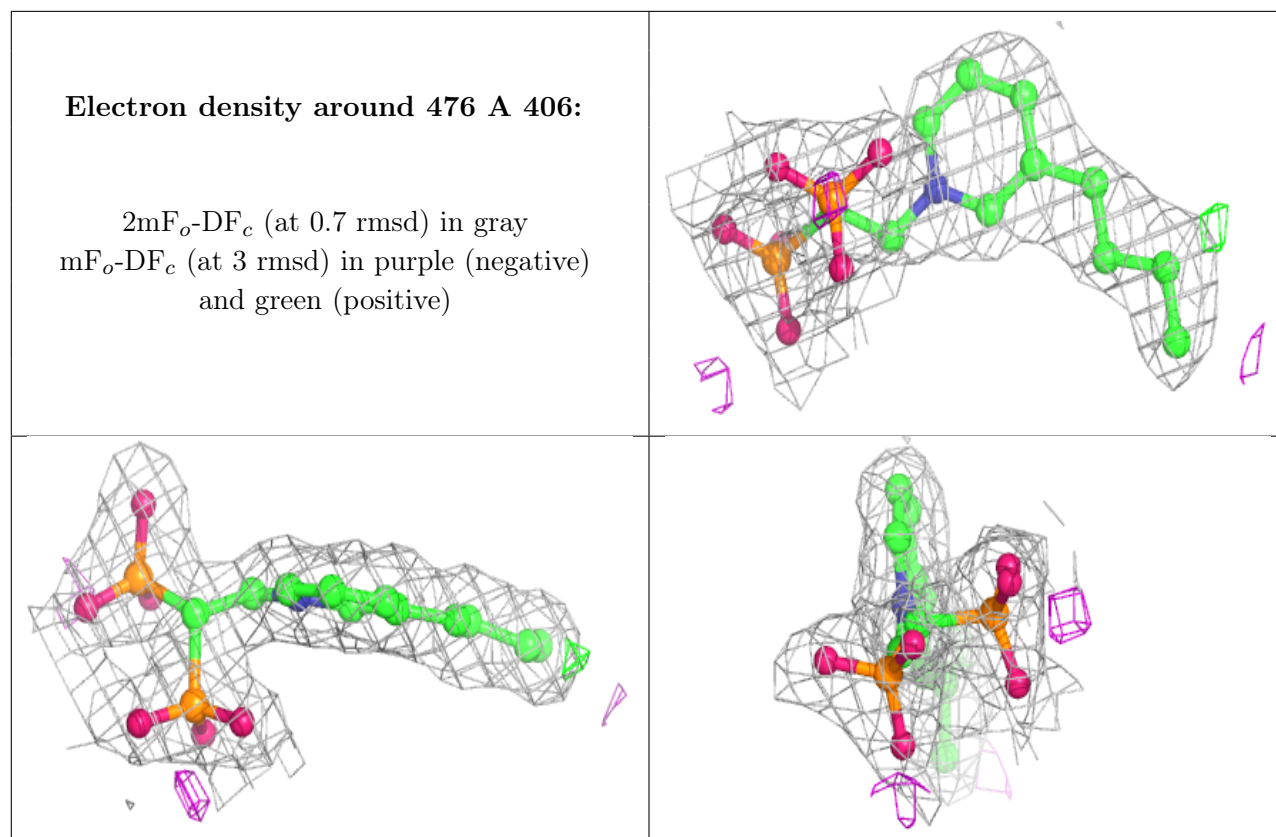
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(\AA^2)	Q<0.9
4	IPR	B	404	14/14	0.96	0.11	11,15,16,17	0
4	IPR	A	405	14/14	0.97	0.10	11,14,16,16	0
5	476	A	406	20/20	0.97	0.12	10,14,16,17	0
2	CA	B	401	1/1	0.99	0.06	15,15,15,15	0
2	CA	B	403	1/1	0.99	0.09	17,17,17,17	0
2	CA	A	401	1/1	1.00	0.08	12,12,12,12	0
2	CA	A	402	1/1	1.00	0.04	18,18,18,18	0
2	CA	B	402	1/1	1.00	0.06	18,18,18,18	0
2	CA	A	403	1/1	1.00	0.08	13,13,13,13	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 476 B 405:

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.