



# wwPDB X-ray Structure Validation Summary Report ⓘ

Aug 7, 2020 – 07:48 PM BST

PDB ID : 4X97  
Title : Crystal structure of Lysosomal Phospholipase A2 in complex with methyl arachidonyl fluorophosphonate (MAFP)  
Authors : Glukhova, A.; Tesmer, J.J.G.  
Deposited on : 2014-12-11  
Resolution : 2.65 Å(reported)

This is a wwPDB X-ray Structure Validation Summary Report for a publicly released PDB entry.

We welcome your comments at [validation@mail.wwpdb.org](mailto:validation@mail.wwpdb.org)

A user guide is available at

<https://www.wwpdb.org/validation/2017/XrayValidationReportHelp>

with specific help available everywhere you see the ⓘ symbol.

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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 : 2.13.1  
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) : 2.13.1

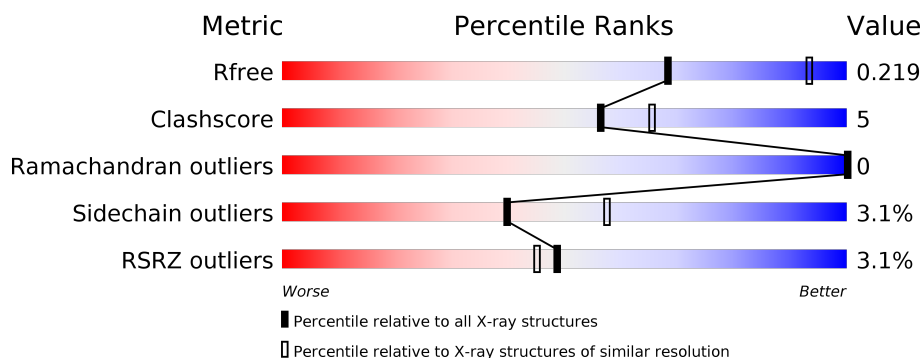
# 1 Overall quality at a glance ⓘ

The following experimental techniques were used to determine the structure:

## *X-RAY DIFFRACTION*

The reported resolution of this entry is 2.65 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	1332 (2.68-2.64)
Clashscore	141614	1374 (2.68-2.64)
Ramachandran outliers	138981	1349 (2.68-2.64)
Sidechain outliers	138945	1349 (2.68-2.64)
RSRZ outliers	127900	1318 (2.68-2.64)

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  $\geq 3$ , 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions  $\leq 5\%$ . The upper red bar (where present) indicates the fraction of residues that have poor fit to the electron density. The numeric value is given above the bar.

Mol	Chain	Length	Quality of chain
1	A	380	<div> <div style="width: 100%; height: 10px; background: linear-gradient(to right, red 1%, orange 1%, yellow 11%, green 87%, grey 2%);"></div> <div style="display: flex; justify-content: space-between; width: 100%;"> <span>%</span> <span>87%</span> <span>11% ..</span> </div> </div>
1	B	380	<div> <div style="width: 100%; height: 10px; background: linear-gradient(to right, red 1%, orange 1%, yellow 9%, green 89%, grey 2%);"></div> <div style="display: flex; justify-content: space-between; width: 100%;"> <span>%</span> <span>89%</span> <span>9% ..</span> </div> </div>
1	C	380	<div> <div style="width: 100%; height: 10px; background: linear-gradient(to right, red 2%, orange 1%, yellow 11%, green 87%, grey 2%);"></div> <div style="display: flex; justify-content: space-between; width: 100%;"> <span>2%</span> <span>87%</span> <span>11% ..</span> </div> </div>
1	D	380	<div> <div style="width: 100%; height: 10px; background: linear-gradient(to right, red 9%, orange 1%, yellow 9%, green 89%, grey 2%);"></div> <div style="display: flex; justify-content: space-between; width: 100%;"> <span>9%</span> <span>89%</span> <span>9% ..</span> </div> </div>

## 2 Entry composition

There are 7 unique types of molecules in this entry. The entry contains 12763 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 Group XV phospholipase A2.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	377	Total	C	N	O	S	0	2	0
			3038	1961	511	551	15			
1	B	377	Total	C	N	O	S	0	3	0
			3050	1967	513	555	15			
1	C	376	Total	C	N	O	S	0	3	0
			3037	1961	510	551	15			
1	D	376	Total	C	N	O	S	0	3	0
			3034	1960	509	550	15			

There are 4 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	0	GLY	-	cloning artifact	UNP Q8NCC3
B	0	GLY	-	cloning artifact	UNP Q8NCC3
C	0	GLY	-	cloning artifact	UNP Q8NCC3
D	0	GLY	-	cloning artifact	UNP Q8NCC3

- Molecule 2 is 2-acetamido-2-deoxy-beta-D-glucopyranose (three-letter code: NAG) (formula: C<sub>8</sub>H<sub>15</sub>NO<sub>6</sub>).



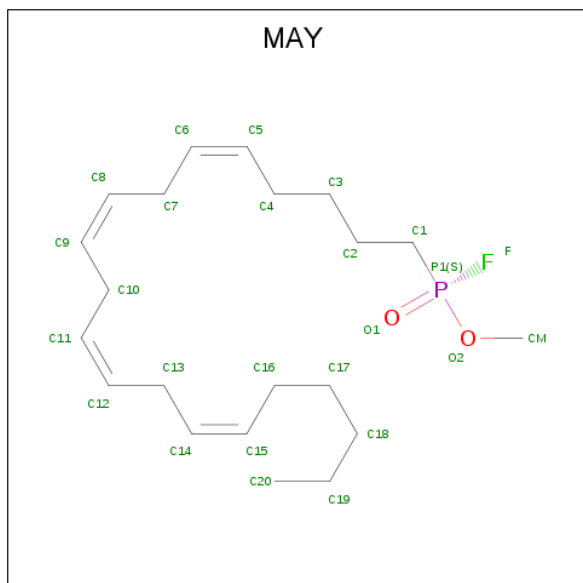
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
2	A	1	Total	C	N	O	0	0
			14	8	1	5		
2	A	1	Total	C	N	O	0	0
			14	8	1	5		
2	A	1	Total	C	N	O	0	0
			14	8	1	5		
2	B	1	Total	C	N	O	0	0
			14	8	1	5		
2	B	1	Total	C	N	O	0	0
			14	8	1	5		
2	B	1	Total	C	N	O	0	0
			14	8	1	5		
2	C	1	Total	C	N	O	0	0
			14	8	1	5		
2	C	1	Total	C	N	O	0	0
			14	8	1	5		
2	C	1	Total	C	N	O	0	0
			14	8	1	5		
2	D	1	Total	C	N	O	0	0
			14	8	1	5		
2	D	1	Total	C	N	O	0	0
			14	8	1	5		

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Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
2	D	1	Total	C	N	O	0	0
			14	8	1	5		
2	D	1	Total	C	N	O	0	0
			14	8	1	5		

- Molecule 3 is METHYL ARACHIDONYL FLUOROPHOSPHONATE (three-letter code: MAY) (formula:  $C_{21}H_{36}FO_2P$ ).



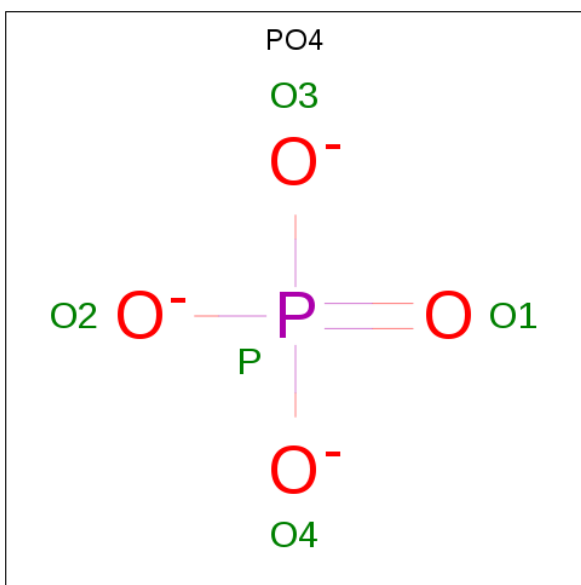
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
3	A	1	Total	C	O	P	0	0
			20	17	2	1		
3	B	1	Total	C	O	P	0	0
			18	15	2	1		
3	C	1	Total	C	O	P	0	0
			19	16	2	1		
3	D	1	Total	C	O	P	0	0
			10	7	2	1		

- Molecule 4 is 4-(2-HYDROXYETHYL)-1-PIPERAZINE ETHANESULFONIC ACID (three-letter code: EPE) (formula:  $C_8H_{18}N_2O_4S$ ).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
4	A	1	Total	C	N	O	S	0	0
			15	8	2	4	1		
4	B	1	Total	C	N	O	S	0	0
			15	8	2	4	1		
4	C	1	Total	C	N	O	S	0	0
			15	8	2	4	1		
4	D	1	Total	C	N	O	S	0	0
			15	8	2	4	1		

- Molecule 5 is PHOSPHATE ION (three-letter code: PO4) (formula: O<sub>4</sub>P).



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

- Molecule 6 is CHLORIDE ION (three-letter code: CL) (formula: Cl).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
6	B	1	Total Cl 1 1	0	0

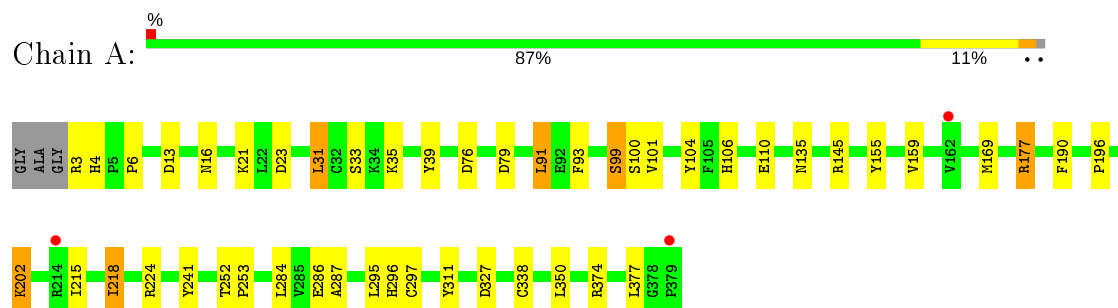
- Molecule 7 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
7	A	65	Total O 65 65	0	0
7	B	85	Total O 85 85	0	0
7	C	55	Total O 55 55	0	0
7	D	27	Total O 27 27	0	0

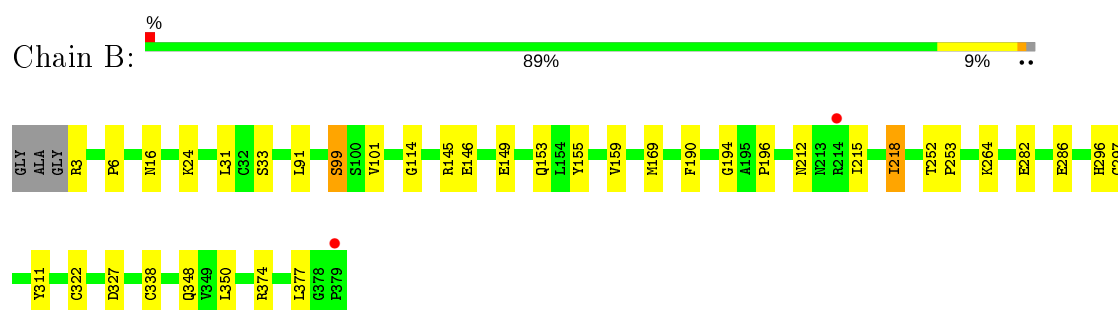
### 3 Residue-property plots [i](#)

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.

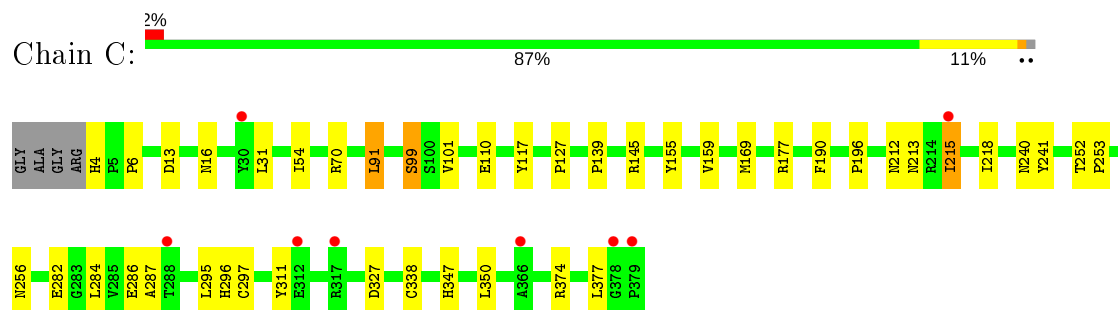
- Molecule 1: Group XV phospholipase A2



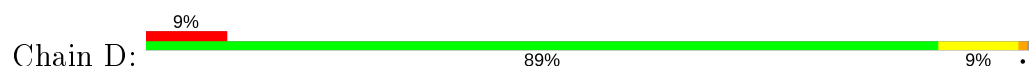
- Molecule 1: Group XV phospholipase A2



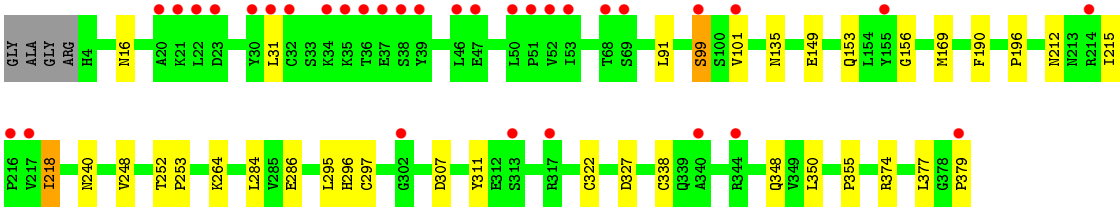
- Molecule 1: Group XV phospholipase A2



- Molecule 1: Group XV phospholipase A2







## 4 Data and refinement statistics

Property	Value	Source
Space group	P 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	69.15Å 85.50Å 88.85Å 88.85° 70.87° 79.74°	Depositor
Resolution (Å)	30.00 – 2.65 28.63 – 2.65	Depositor EDS
% Data completeness (in resolution range)	94.7 (30.00-2.65) 94.8 (28.63-2.65)	Depositor EDS
$R_{merge}$	0.09	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	2.20 (at 2.64Å)	Xtriage
Refinement program	REFMAC 5.8.0073	Depositor
R, $R_{free}$	0.179 , 0.219 0.185 , 0.219	Depositor DCC
$R_{free}$ test set	2558 reflections (4.90%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	34.6	Xtriage
Anisotropy	0.333	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.35 , 47.2	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.49$ , $\langle L^2 \rangle = 0.32$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
$F_o, F_c$ correlation	0.94	EDS
Total number of atoms	12763	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	39.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 6.94% of the height of the origin peak. No significant pseudotranslation is detected.*

<sup>1</sup>Intensities estimated from amplitudes.

<sup>2</sup>Theoretical values of  $\langle |L| \rangle$ ,  $\langle L^2 \rangle$  for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

## 5 Model quality

### 5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: MAY, PO4, EPE, NAG, CL

The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with  $|Z| > 5$  is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	# Z  >5	RMSZ	# Z  >5
1	A	0.83	0/3133	0.90	8/4268 (0.2%)
1	B	0.81	1/3142 (0.0%)	0.85	3/4280 (0.1%)
1	C	0.77	2/3133 (0.1%)	0.86	5/4269 (0.1%)
1	D	0.73	0/3133	0.81	3/4269 (0.1%)
All	All	0.79	3/12541 (0.0%)	0.86	19/17086 (0.1%)

All (3) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	C	110	GLU	CG-CD	6.04	1.61	1.51
1	B	282	GLU	CD-OE1	5.64	1.31	1.25
1	C	282	GLU	CD-OE1	5.50	1.31	1.25

The worst 5 of 19 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	23	ASP	CB-CG-OD2	9.62	126.95	118.30
1	B	145	ARG	NE-CZ-NH1	7.61	124.10	120.30
1	C	145	ARG	NE-CZ-NH1	7.27	123.94	120.30
1	A	145	ARG	NE-CZ-NH1	7.04	123.82	120.30
1	D	307	ASP	CB-CG-OD2	-6.93	112.06	118.30

There are no chirality outliers.

There are no planarity outliers.

### 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	3038	0	2980	29	1
1	B	3050	0	2986	34	1
1	C	3037	0	2973	32	0
1	D	3034	0	2974	28	0
2	A	56	0	52	0	0
2	B	56	0	52	0	0
2	C	56	0	52	3	0
2	D	56	0	52	3	0
3	A	20	0	25	5	0
3	B	18	0	23	0	0
3	C	19	0	24	5	0
3	D	10	0	12	0	0
4	A	15	0	18	0	0
4	B	15	0	17	0	0
4	C	15	0	17	0	0
4	D	15	0	18	0	0
5	A	5	0	0	0	0
5	B	5	0	0	0	0
5	C	5	0	0	1	0
5	D	5	0	0	0	0
6	B	1	0	0	0	0
7	A	65	0	0	1	0
7	B	85	0	0	3	0
7	C	55	0	0	1	0
7	D	27	0	0	2	0
All	All	12763	0	12275	124	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 5.

The worst 5 of 124 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:297[A]:CYS:SG	7:D:523:HOH:O	2.03	1.17
1:B:297[B]:CYS:CB	1:B:338:CYS:HG	1.86	0.88
3:A:405:MAY:H12	3:A:405:MAY:C16	2.06	0.85
1:B:297[B]:CYS:SG	1:B:338:CYS:SG	2.75	0.84
1:B:297[A]:CYS:SG	1:B:338:CYS:SG	2.75	0.83

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:33:SER:OG	1:B:33:SER:OG[1_655]	2.19	0.01

## 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	377/380 (99%)	369 (98%)	8 (2%)	0	100	100
1	B	378/380 (100%)	371 (98%)	7 (2%)	0	100	100
1	C	377/380 (99%)	369 (98%)	8 (2%)	0	100	100
1	D	377/380 (99%)	369 (98%)	8 (2%)	0	100	100
All	All	1509/1520 (99%)	1478 (98%)	31 (2%)	0	100	100

There are no Ramachandran outliers to report.

### 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	331/329 (101%)	320 (97%)	11 (3%)	38	54
1	B	332/329 (101%)	321 (97%)	11 (3%)	38	54
1	C	331/329 (101%)	321 (97%)	10 (3%)	41	59
1	D	331/329 (101%)	322 (97%)	9 (3%)	44	63

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles
All	All	1325/1316 (101%)	1284 (97%)	41 (3%)	40 57

5 of 41 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	B	286	GLU
1	C	16	ASN
1	D	252	THR
1	B	322	CYS
1	B	374	ARG

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 8 such sidechains are listed below:

Mol	Chain	Res	Type
1	B	348	GLN
1	D	348	GLN
1	D	153	GLN
1	B	153	GLN
1	C	226	GLN

### 5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

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

There are no non-standard protein/DNA/RNA residues in this entry.

## 5.5 Carbohydrates ⓘ

There are no monosaccharides in this entry.

## 5.6 Ligand geometry ⓘ

Of 29 ligands modelled in this entry, 1 is monoatomic - leaving 28 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
4	EPE	B	406	-	15,15,15	1.51	2 (13%)	18,20,20	1.44	4 (22%)
5	PO4	C	407	-	4,4,4	1.13	0	6,6,6	0.60	0
2	NAG	D	402	1	14,14,15	1.13	2 (14%)	17,19,21	3.08	7 (41%)
2	NAG	A	401	1	14,14,15	0.66	1 (7%)	17,19,21	2.28	6 (35%)
5	PO4	A	407	-	4,4,4	0.94	0	6,6,6	0.73	0
3	MAY	C	405	1	15,18,24	0.48	0	13,18,26	0.90	1 (7%)
2	NAG	C	404	1	14,14,15	1.06	1 (7%)	17,19,21	2.56	8 (47%)
4	EPE	A	406	-	15,15,15	1.66	1 (6%)	18,20,20	2.44	5 (27%)
2	NAG	A	403	1	14,14,15	0.89	0	17,19,21	1.80	5 (29%)
3	MAY	D	405	1	6,9,24	0.92	0	4,9,26	0.34	0
2	NAG	B	401	1	14,14,15	0.94	0	17,19,21	2.32	7 (41%)
3	MAY	B	405	1	14,17,24	0.66	0	11,17,26	0.63	0
2	NAG	C	401	1	14,14,15	1.05	1 (7%)	17,19,21	1.58	4 (23%)
2	NAG	B	404	1	14,14,15	0.89	0	17,19,21	2.19	5 (29%)
2	NAG	D	403	1	14,14,15	0.95	1 (7%)	17,19,21	2.14	8 (47%)
4	EPE	D	406	-	15,15,15	1.57	1 (6%)	18,20,20	1.48	2 (11%)
4	EPE	C	406	-	15,15,15	2.04	1 (6%)	18,20,20	2.96	4 (22%)
2	NAG	B	403	1	14,14,15	1.14	2 (14%)	17,19,21	2.11	8 (47%)
3	MAY	A	405	1	16,19,24	0.51	0	14,19,26	1.02	2 (14%)
2	NAG	B	402	1	14,14,15	0.82	1 (7%)	17,19,21	2.72	7 (41%)
2	NAG	A	404	1	14,14,15	1.08	2 (14%)	17,19,21	1.92	6 (35%)
2	NAG	D	401	1	14,14,15	0.89	0	17,19,21	2.81	7 (41%)
5	PO4	D	407	-	4,4,4	1.20	0	6,6,6	1.03	0
2	NAG	D	404	1	14,14,15	0.64	0	17,19,21	1.48	4 (23%)
2	NAG	A	402	1	14,14,15	0.58	0	17,19,21	3.02	9 (52%)
2	NAG	C	402	1	14,14,15	0.91	0	17,19,21	2.32	8 (47%)
5	PO4	B	408	-	4,4,4	1.10	0	6,6,6	0.81	0
2	NAG	C	403	1	14,14,15	1.26	2 (14%)	17,19,21	2.65	7 (41%)

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
4	EPE	B	406	-	-	5/9/19/19	0/1/1/1
2	NAG	D	402	1	-	4/6/23/26	0/1/1/1
2	NAG	A	401	1	-	0/6/23/26	0/1/1/1
3	MAY	C	405	1	-	7/13/17/24	-
2	NAG	C	404	1	-	0/6/23/26	0/1/1/1
4	EPE	A	406	-	-	5/9/19/19	0/1/1/1
2	NAG	A	403	1	-	0/6/23/26	0/1/1/1
3	MAY	D	405	1	-	1/4/8/24	-
2	NAG	B	401	1	-	0/6/23/26	0/1/1/1
3	MAY	B	405	1	-	3/12/16/24	-
2	NAG	C	401	1	-	0/6/23/26	0/1/1/1
2	NAG	B	404	1	-	1/6/23/26	0/1/1/1
2	NAG	D	403	1	-	2/6/23/26	0/1/1/1
4	EPE	D	406	-	-	1/9/19/19	0/1/1/1
4	EPE	C	406	-	-	7/9/19/19	0/1/1/1
2	NAG	B	403	1	-	2/6/23/26	0/1/1/1
3	MAY	A	405	1	-	6/14/18/24	-
2	NAG	B	402	1	-	3/6/23/26	0/1/1/1
2	NAG	A	404	1	-	0/6/23/26	0/1/1/1
2	NAG	D	401	1	-	0/6/23/26	0/1/1/1
2	NAG	D	404	1	-	2/6/23/26	0/1/1/1
2	NAG	A	402	1	-	2/6/23/26	0/1/1/1
2	NAG	C	402	1	-	2/6/23/26	0/1/1/1
2	NAG	C	403	1	-	2/6/23/26	0/1/1/1

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

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	C	406	EPE	C10-S	-7.29	1.67	1.77
4	A	406	EPE	C10-S	-5.90	1.69	1.77
4	D	406	EPE	C10-S	-5.16	1.70	1.77
4	B	406	EPE	C10-S	-4.48	1.71	1.77
2	C	403	NAG	C1-C2	3.03	1.56	1.52

The worst 5 of 124 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	C	406	EPE	O2S-S-C10	11.40	120.64	106.92
2	D	402	NAG	C1-C2-N2	8.67	125.29	110.49
2	A	402	NAG	C1-O5-C5	7.79	122.75	112.19

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	402	NAG	C1-O5-C5	6.88	121.52	112.19
4	A	406	EPE	O2S-S-C10	-6.76	98.77	106.92

There are no chirality outliers.

5 of 55 torsion outliers are listed below:

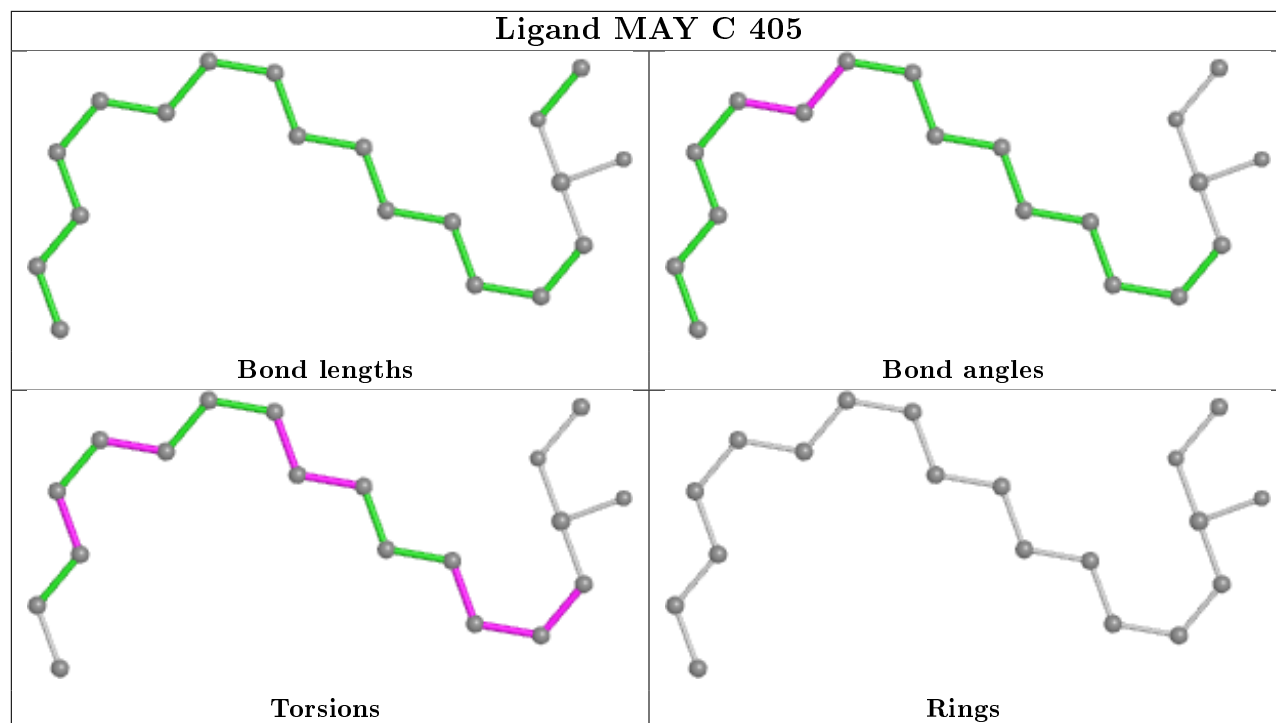
Mol	Chain	Res	Type	Atoms
4	B	406	EPE	C10-C9-N1-C6
3	C	405	MAY	C5-C6-C7-C8
4	A	406	EPE	C10-C9-N1-C2
4	A	406	EPE	C9-C10-S-O1S
4	A	406	EPE	C9-C10-S-O2S

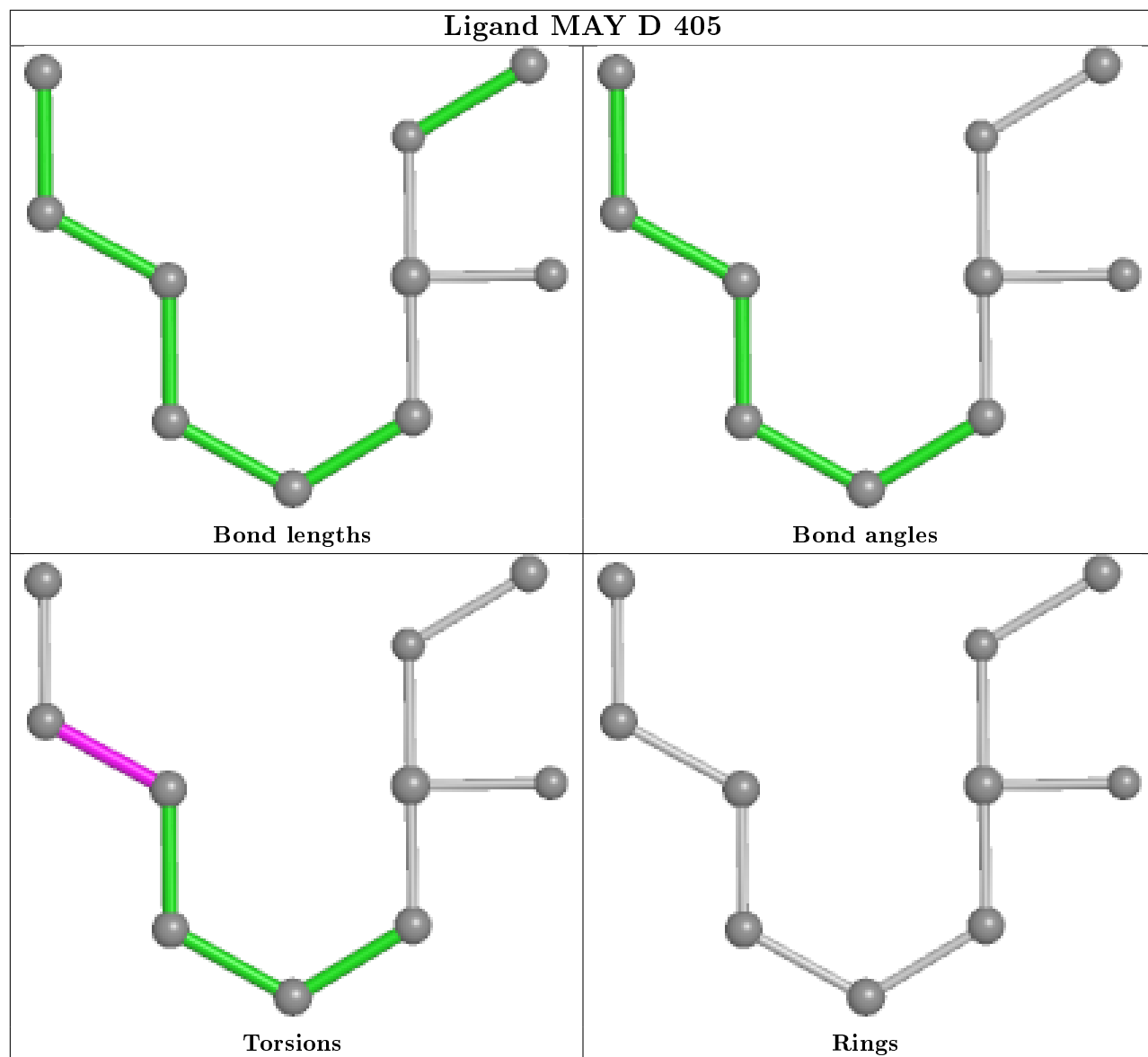
There are no ring outliers.

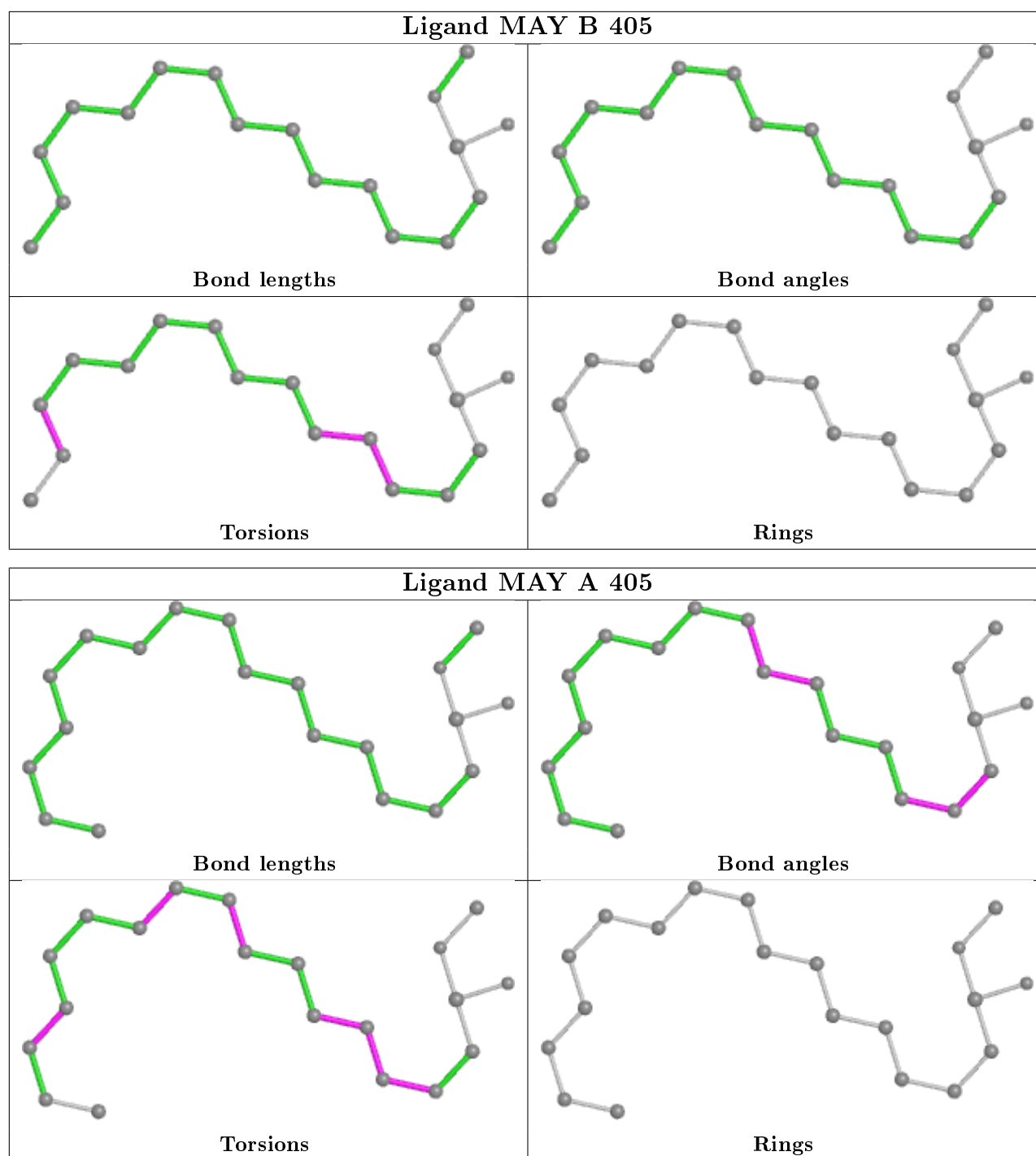
8 monomers are involved in 17 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
5	C	407	PO4	1	0
2	D	402	NAG	1	0
3	C	405	MAY	5	0
2	D	403	NAG	1	0
3	A	405	MAY	5	0
2	D	404	NAG	1	0
2	C	402	NAG	1	0
2	C	403	NAG	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 [i](#)

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

In the following table, the column labelled ‘#RSRZ> 2’ contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 95<sup>th</sup> percentile and maximum values of the occupancy-weighted average B-factor per residue. The column labelled ‘Q< 0.9’ lists the number of (and percentage) of residues with an average occupancy less than 0.9.

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å <sup>2</sup> )	Q<0.9
1	A	377/380 (99%)	-0.38	3 (0%) 86 85	18, 31, 57, 91	0
1	B	377/380 (99%)	-0.43	2 (0%) 91 91	15, 28, 53, 96	0
1	C	376/380 (98%)	-0.14	8 (2%) 63 59	22, 39, 65, 101	0
1	D	376/380 (98%)	0.14	33 (8%) 10 8	24, 45, 102, 139	0
All	All	1506/1520 (99%)	-0.20	46 (3%) 49 45	15, 35, 76, 139	0

The worst 5 of 46 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	D	30	TYR	7.5
1	D	38	SER	4.4
1	D	50	LEU	4.4
1	C	379	PRO	4.1
1	A	379	PRO	4.0

### 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](#)

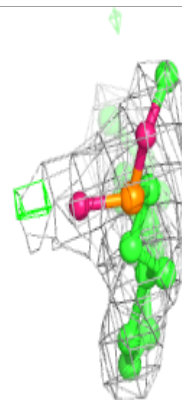
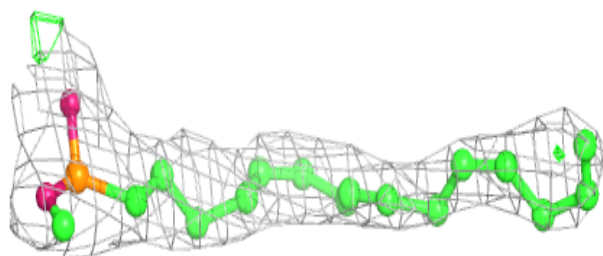
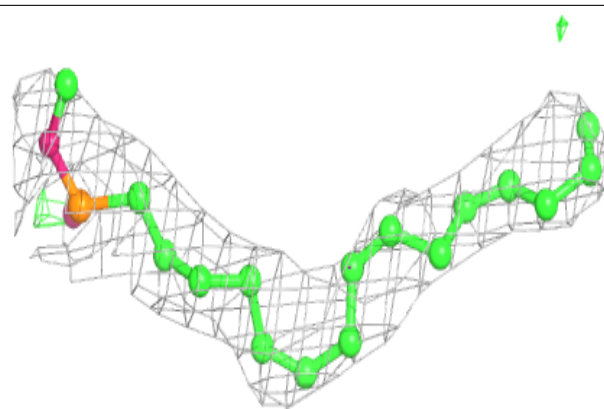
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95<sup>th</sup> percentile and maximum values of B factors of atoms in the group. The column labelled ‘Q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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors( $\text{\AA}^2$ )	Q<0.9
4	EPE	D	406	15/15	0.81	0.39	106,112,120,123	0
2	NAG	B	402	14/15	0.83	0.29	58,71,84,88	0
2	NAG	D	402	14/15	0.85	0.24	55,69,76,77	0
2	NAG	C	403	14/15	0.86	0.20	48,52,59,64	0
2	NAG	C	402	14/15	0.87	0.23	55,61,64,65	0
2	NAG	A	402	14/15	0.88	0.23	56,63,67,69	0
2	NAG	D	404	14/15	0.90	0.24	61,63,66,68	0
2	NAG	D	401	14/15	0.90	0.36	74,79,83,84	0
4	EPE	C	406	15/15	0.93	0.28	59,73,86,86	0
2	NAG	B	403	14/15	0.93	0.15	33,38,42,42	0
2	NAG	B	401	14/15	0.93	0.25	46,51,56,56	0
2	NAG	A	401	14/15	0.93	0.20	51,62,68,69	0
2	NAG	C	404	14/15	0.94	0.24	49,55,57,57	0
2	NAG	A	403	14/15	0.94	0.14	38,40,45,48	0
4	EPE	B	406	15/15	0.94	0.16	43,47,59,59	0
3	MAY	C	405	19/25	0.94	0.22	30,48,67,68	0
2	NAG	A	404	14/15	0.95	0.18	34,37,38,39	0
5	PO4	C	407	5/5	0.95	0.20	28,29,30,30	5
3	MAY	B	405	18/25	0.95	0.23	19,40,58,59	0
2	NAG	B	404	14/15	0.95	0.17	38,39,42,44	0
3	MAY	A	405	20/25	0.95	0.18	25,36,46,47	0
2	NAG	D	403	14/15	0.95	0.11	36,39,43,45	0
2	NAG	C	401	14/15	0.97	0.17	31,32,34,35	0
5	PO4	D	407	5/5	0.97	0.13	22,23,24,24	5
4	EPE	A	406	15/15	0.98	0.15	32,38,46,55	0
6	CL	B	407	1/1	0.98	0.03	41,41,41,41	0
3	MAY	D	405	10/25	0.98	0.25	39,44,49,51	0
5	PO4	A	407	5/5	0.98	0.22	49,50,53,53	0
5	PO4	B	408	5/5	0.99	0.11	39,41,42,44	0

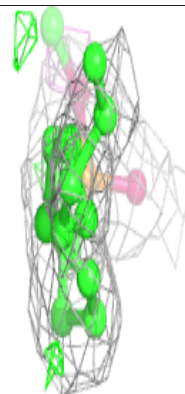
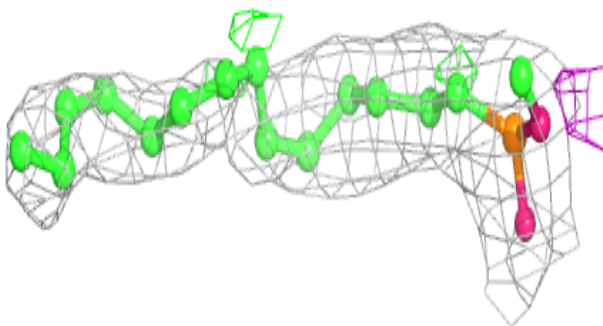
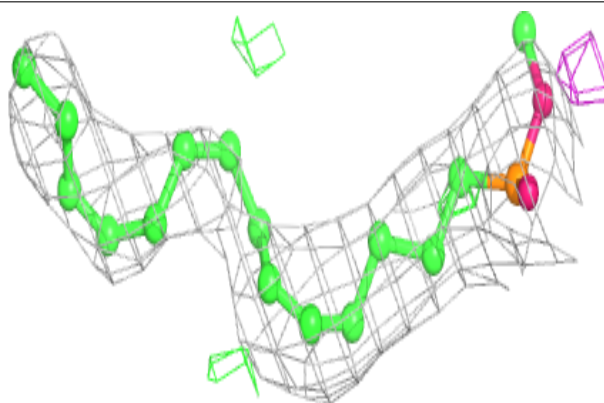
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation to approximate a three-dimensional view.

**Electron density around MAY C 405:**

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

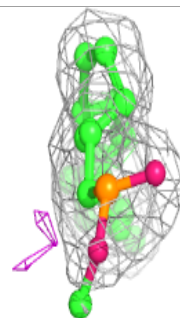
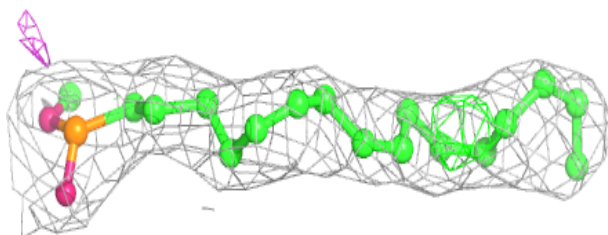
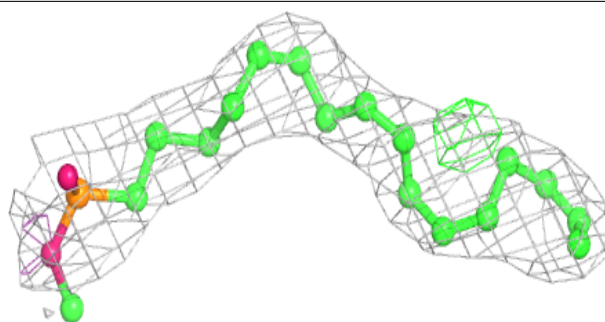
**Electron density around MAY B 405:**

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

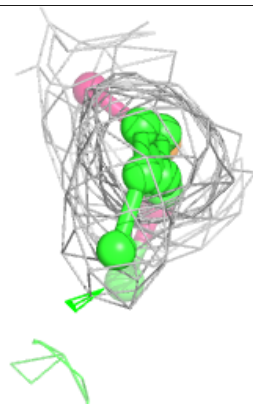
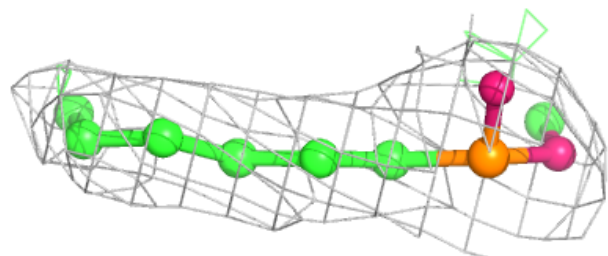
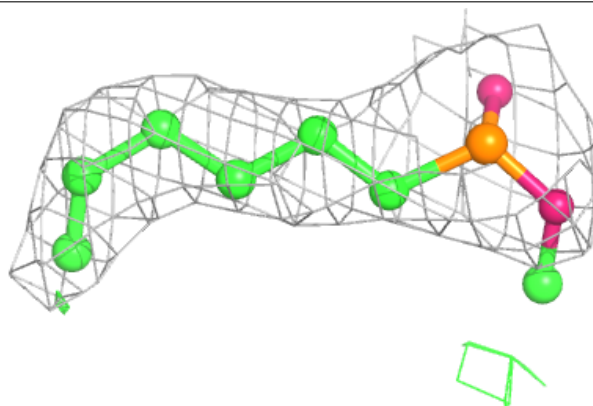


**Electron density around MAY A 405:**

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

**Electron density around MAY D 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.