



# Full wwPDB X-ray Structure Validation Report ⓘ

Jun 24, 2024 – 10:28 AM EDT

PDB ID : 6XUI  
Title : Crystal structure of human phosphoglucose isomerase in complex with inhibitor  
Authors : Li de la Sierra-Gallay, I.; Ahmad, L.; Plancqueel, S.; van Tilbeurgh, H.; Salmon, L.  
Deposited on : 2020-01-20  
Resolution : 1.95 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](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.

The types of validation reports are described at

<http://www.wwpdb.org/validation/2017/FAQs#types>.

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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 : 2022.3.0, CSD as543be (2022)  
Xtriage (Phenix) : 1.20.1  
EDS : 2.37.1  
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) : 2.37.1

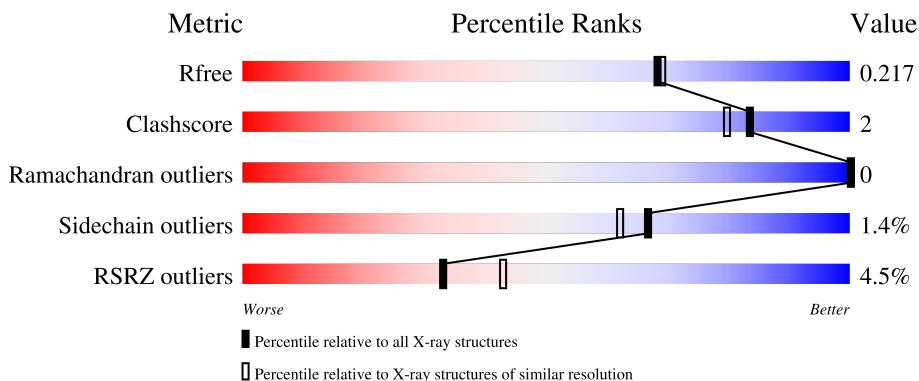
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 1.95 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	2580 (1.96-1.96)
Clashscore	141614	2705 (1.96-1.96)
Ramachandran outliers	138981	2678 (1.96-1.96)
Sidechain outliers	138945	2678 (1.96-1.96)
RSRZ outliers	127900	2539 (1.96-1.96)

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  $\geq 3$ , 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	556	 4% 94% 6%
1	B	556	 4% 93% 7%
1	C	556	 4% 94% 6%
1	D	556	 6% 92% 7%

## 2 Entry composition [i](#)

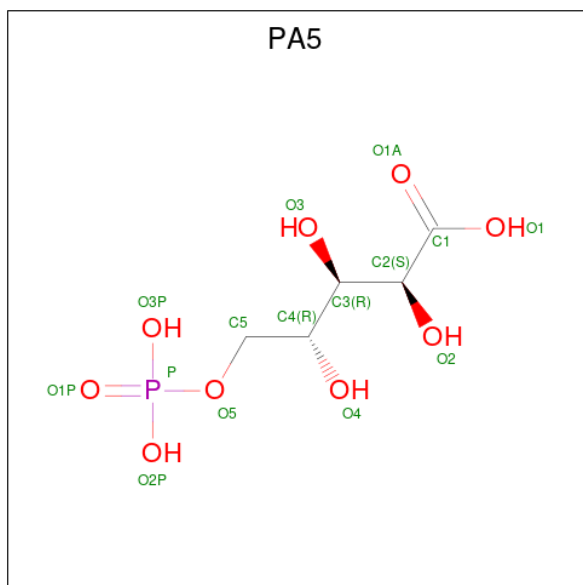
There are 5 unique types of molecules in this entry. The entry contains 19294 atoms, of which 0 are hydrogens and 0 are deuteriums.

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 Glucose-6-phosphate isomerase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	556	Total 4437	C 2827	N 782	O 810	S 18	0	0	0
1	B	556	Total 4437	C 2827	N 782	O 810	S 18	0	0	0
1	C	556	Total 4437	C 2827	N 782	O 810	S 18	0	0	0
1	D	556	Total 4437	C 2827	N 782	O 810	S 18	0	0	0

- Molecule 2 is 5-PHOSPHOARABINONIC ACID (three-letter code: PA5) (formula: C<sub>5</sub>H<sub>11</sub>O<sub>9</sub>P) (labeled as "Ligand of Interest" by depositor).



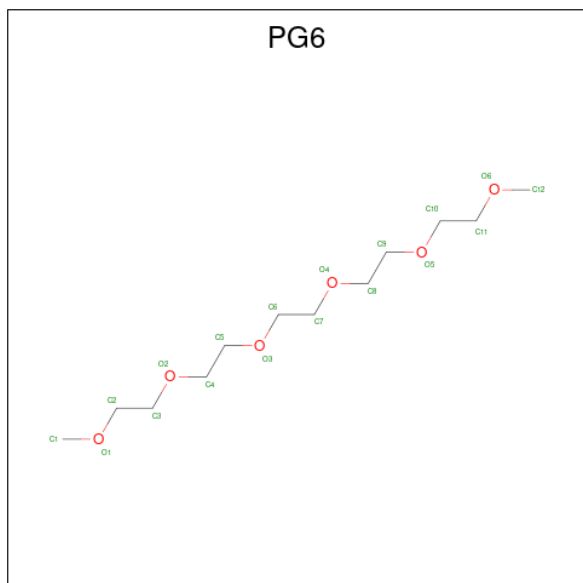
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
			Total	C	O	P		
2	A	1	Total 15	C 5	O 9	P 1	0	0
2	B	1	Total 15	C 5	O 9	P 1	0	0

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Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
2	C	1	Total	C	O	P	0	0
			15	5	9	1		
2	D	1	Total	C	O	P	0	0
			15	5	9	1		

- Molecule 3 is 1-(2-METHOXY-ETHOXY)-2-{2-[2-(2-METHOXY-ETHOXY)-ETHOXY]-ETHOXY}-ETHANE (three-letter code: PG6) (formula: C<sub>12</sub>H<sub>26</sub>O<sub>6</sub>).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	A	1	Total	C	O	0	0
			18	12	6		
3	B	1	Total	C	O	0	0
			18	12	6		
3	C	1	Total	C	O	0	0
			18	12	6		
3	D	1	Total	C	O	0	0
			18	12	6		

- Molecule 4 is GLYCEROL (three-letter code: GOL) (formula: C<sub>3</sub>H<sub>8</sub>O<sub>3</sub>).



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

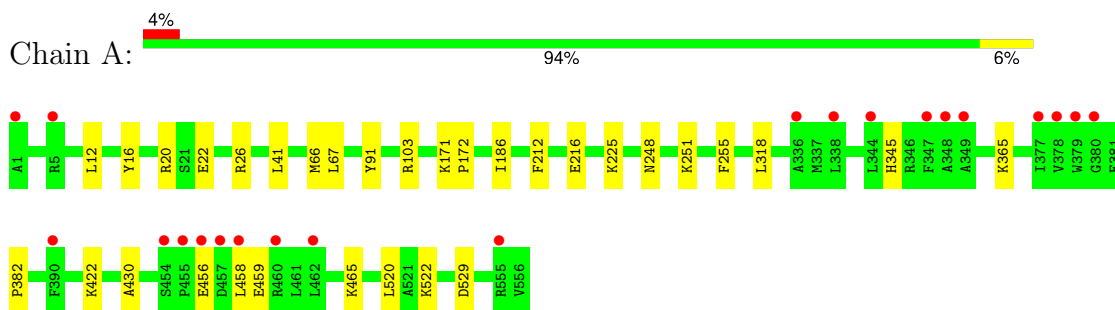
- Molecule 5 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
5	A	356	Total O 356 356	0	0
5	B	357	Total O 357 357	0	0
5	C	362	Total O 362 362	0	0
5	D	327	Total O 327 327	0	0

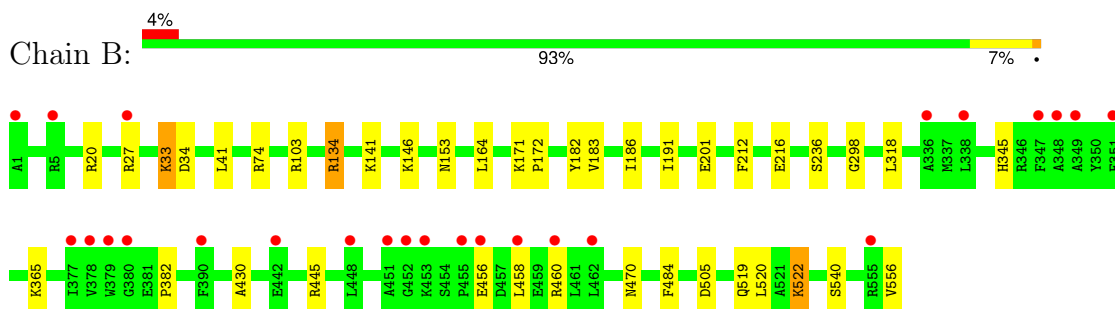
### 3 Residue-property plots [i](#)

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.

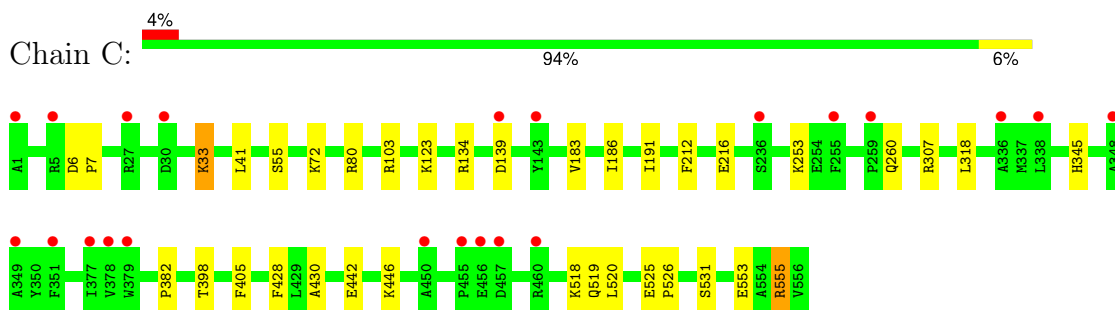
- Molecule 1: Glucose-6-phosphate isomerase



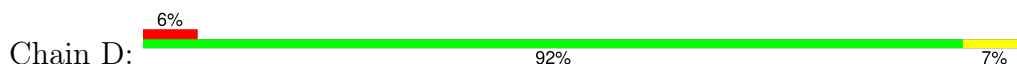
- Molecule 1: Glucose-6-phosphate isomerase

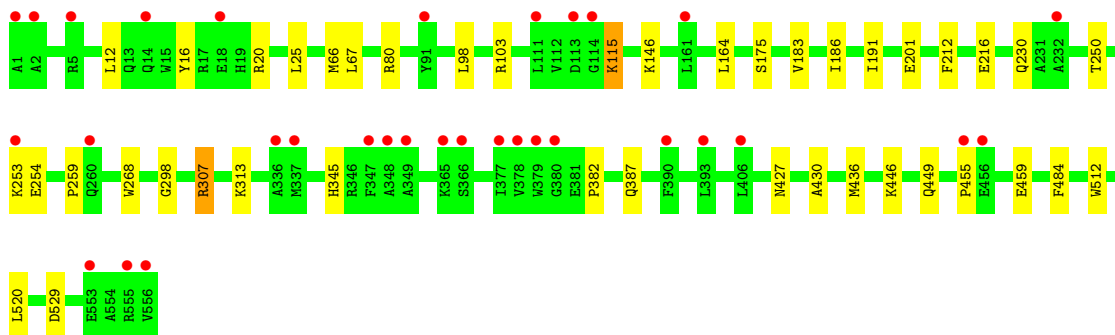


- Molecule 1: Glucose-6-phosphate isomerase



- Molecule 1: Glucose-6-phosphate isomerase





## 4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	80.55Å 106.95Å 270.40Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	48.26 – 1.95 48.26 – 1.95	Depositor EDS
% Data completeness (in resolution range)	99.3 (48.26-1.95) 99.3 (48.26-1.95)	Depositor EDS
$R_{merge}$	(Not available)	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	1.58 (at 1.95Å)	Xtrriage
Refinement program	REFMAC 5.8.0258	Depositor
R, $R_{free}$	0.171 , 0.212 0.178 , 0.217	Depositor DCC
$R_{free}$ test set	8505 reflections (5.00%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	28.3	Xtrriage
Anisotropy	0.541	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.35 , 44.7	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.51$ , $\langle L^2 \rangle = 0.35$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
$F_o, F_c$ correlation	0.97	EDS
Total number of atoms	19294	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	32.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The analyses of the Patterson function reveals a significant off-origin peak that is 40.78 % 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 2.6012e-04. The detected translational NCS is most likely also responsible for the elevated intensity ratio.*

<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 [i](#)

### 5.1 Standard geometry [i](#)

Bond lengths and bond angles in the following residue types are not validated in this section: PG6, GOL, PA5

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	0.69	0/4545	0.74	0/6154
1	B	0.67	0/4545	0.72	0/6154
1	C	0.69	0/4545	0.74	0/6154
1	D	0.68	0/4545	0.74	0/6154
All	All	0.68	0/18180	0.74	0/24616

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

### 5.2 Too-close contacts [i](#)

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	4437	0	4395	17	0
1	B	4437	0	4395	26	0
1	C	4437	0	4395	22	0
1	D	4437	0	4395	26	0
2	A	15	0	8	0	0
2	B	15	0	8	0	0
2	C	15	0	8	1	0
2	D	15	0	8	0	0
3	A	18	0	26	1	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
3	B	18	0	26	2	0
3	C	18	0	26	1	0
3	D	18	0	26	0	0
4	C	12	0	16	2	0
5	A	356	0	0	0	0
5	B	357	0	0	1	0
5	C	362	0	0	4	0
5	D	327	0	0	4	0
All	All	19294	0	17732	84	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 2.

All (84) close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:456:GLU:HG2	1:B:460:ARG:NH1	1.82	0.94
1:B:134:ARG:HG2	1:B:134:ARG:HH21	1.53	0.72
1:D:12:LEU:HD21	1:D:67:LEU:HD23	1.74	0.69
1:C:398:THR:HA	3:C:602:PG6:H52	1.74	0.68
1:B:164:LEU:HD23	1:B:182:TYR:CD2	2.29	0.67
1:A:12:LEU:HD21	1:A:67:LEU:HD23	1.80	0.64
1:A:345:HIS:HA	1:A:382:PRO:HG3	1.80	0.62
1:C:345:HIS:HA	1:C:382:PRO:HG3	1.83	0.60
1:C:134:ARG:NH1	4:C:604:GOL:H11	2.19	0.58
1:A:422:LYS:HE3	1:D:529:ASP:OD1	2.04	0.58
1:C:260:GLN:NE2	5:C:704:HOH:O	2.37	0.57
1:D:12:LEU:HD13	1:D:66:MET:HB3	1.85	0.57
1:B:41:LEU:HD11	1:B:318:LEU:HD12	1.88	0.56
1:C:134:ARG:HH11	4:C:604:GOL:H11	1.70	0.55
1:D:250:THR:O	1:D:254:GLU:HG3	2.07	0.55
1:C:72:LYS:NZ	5:C:701:HOH:O	2.31	0.54
1:D:345:HIS:HA	1:D:382:PRO:HG3	1.90	0.53
1:D:146:LYS:HE2	1:D:201:GLU:OE2	2.09	0.53
1:A:16:TYR:O	1:A:20:ARG:HB2	2.08	0.53
1:A:12:LEU:HD13	1:A:66:MET:HB3	1.90	0.53
1:C:41:LEU:HD11	1:C:318:LEU:HD12	1.90	0.53
1:B:134:ARG:HG2	1:B:134:ARG:NH2	2.22	0.52
1:C:186:ILE:HB	1:C:216:GLU:HG3	1.90	0.52
1:B:33:LYS:NZ	1:B:34:ASP:OD1	2.40	0.52
1:A:186:ILE:HB	1:A:216:GLU:HG3	1.92	0.51

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:186:ILE:HB	1:B:216:GLU:HG3	1.94	0.50
1:D:186:ILE:HB	1:D:216:GLU:HG3	1.94	0.50
1:B:470:ASN:ND2	3:B:602:PG6:H111	2.26	0.50
1:B:345:HIS:HA	1:B:382:PRO:HG3	1.94	0.49
1:C:555:ARG:NH2	1:C:555:ARG:HG3	2.27	0.49
1:A:465:LYS:HE2	1:D:512:TRP:CE3	2.47	0.49
1:B:430:ALA:HB1	1:C:520:LEU:HB3	1.94	0.49
1:D:446:LYS:HA	1:D:449:GLN:HE21	1.77	0.48
1:A:520:LEU:HB3	1:D:430:ALA:HB1	1.94	0.48
1:B:445:ARG:HG3	1:B:458:LEU:HD21	1.95	0.48
1:C:555:ARG:HG3	1:C:555:ARG:HH21	1.79	0.48
1:A:430:ALA:HB1	1:D:520:LEU:HB3	1.96	0.48
1:C:33:LYS:HB3	1:C:33:LYS:HE3	1.68	0.48
1:D:387:GLN:HE22	1:D:427:ASN:HB3	1.79	0.48
1:D:115:LYS:HE2	1:D:115:LYS:HB3	1.59	0.48
1:C:405:PHE:HB3	1:C:428:PHE:CE1	2.49	0.47
1:D:455:PRO:O	1:D:459:GLU:HG2	2.15	0.47
1:B:556:VAL:HG12	5:C:711:HOH:O	2.14	0.47
1:D:80:ARG:HD2	1:D:307:ARG:HA	1.96	0.46
1:B:520:LEU:HB3	1:C:430:ALA:HB1	1.97	0.46
1:B:146:LYS:HE3	1:B:201:GLU:OE2	2.16	0.46
1:D:98:LEU:HB2	1:D:268:TRP:CE3	2.51	0.46
1:C:519:GLN:NE2	5:C:708:HOH:O	2.43	0.46
1:B:183:VAL:HG11	1:B:191:ILE:HD13	1.97	0.45
1:A:41:LEU:HD11	1:A:318:LEU:HD12	1.98	0.45
1:B:519:GLN:O	1:B:522:LYS:HG2	2.16	0.45
1:D:16:TYR:O	1:D:20:ARG:HB2	2.16	0.45
1:B:470:ASN:HD22	3:B:602:PG6:H111	1.82	0.45
1:C:518:LYS:HE3	2:C:601:PA5:O4	2.17	0.45
1:B:456:GLU:HG2	1:B:460:ARG:CZ	2.43	0.45
1:B:20:ARG:HG2	1:B:20:ARG:HH11	1.82	0.45
1:C:80:ARG:HD2	1:C:307:ARG:HA	2.00	0.44
1:D:230:GLN:HG3	5:D:814:HOH:O	2.17	0.44
1:D:313:LYS:NZ	5:D:703:HOH:O	2.38	0.44
1:C:442:GLU:OE1	1:C:446:LYS:NZ	2.43	0.43
1:A:458:LEU:C	1:A:458:LEU:HD23	2.38	0.43
1:D:298:GLY:HA3	1:D:484:PHE:O	2.19	0.43
1:D:313:LYS:CE	5:D:703:HOH:O	2.66	0.42
1:D:183:VAL:HG11	1:D:191:ILE:HD13	2.01	0.42
1:A:225:LYS:NZ	1:A:255:PHE:O	2.52	0.42
1:C:525:GLU:N	1:C:526:PRO:HD2	2.35	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:248:ASN:CG	1:A:251:LYS:HG2	2.40	0.42
1:B:74:ARG:NH1	1:B:505:ASP:HB2	2.34	0.42
1:B:365:LYS:HB3	1:B:365:LYS:HE2	1.84	0.42
1:B:141:LYS:NZ	5:B:715:HOH:O	2.52	0.42
1:B:171:LYS:N	1:B:172:PRO:CD	2.83	0.41
1:A:20:ARG:NH1	3:A:602:PG6:H22	2.35	0.41
1:B:153:ASN:HB3	1:B:182:TYR:CD1	2.55	0.41
1:B:298:GLY:HA3	1:B:484:PHE:O	2.21	0.41
1:D:164:LEU:HD23	1:D:164:LEU:C	2.41	0.41
1:D:175:SER:HB3	5:D:762:HOH:O	2.20	0.41
1:A:91:TYR:CE1	1:A:365:LYS:HA	2.55	0.41
1:A:171:LYS:N	1:A:172:PRO:CD	2.84	0.41
1:B:540:SER:HB2	1:C:55:SER:OG	2.20	0.41
1:D:25:LEU:HB3	1:D:436:MET:HG3	2.03	0.41
1:A:456:GLU:O	1:A:459:GLU:N	2.54	0.40
1:C:183:VAL:HG11	1:C:191:ILE:HD13	2.04	0.40
1:C:6:ASP:HA	1:C:7:PRO:HD3	1.96	0.40
1:D:253:LYS:HE2	1:D:259:PRO:HG3	2.04	0.40

There are no symmetry-related clashes.

## 5.3 Torsion angles

### 5.3.1 Protein backbone

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	554/556 (100%)	538 (97%)	16 (3%)	0	100	100
1	B	554/556 (100%)	542 (98%)	12 (2%)	0	100	100
1	C	554/556 (100%)	540 (98%)	14 (2%)	0	100	100
1	D	554/556 (100%)	540 (98%)	14 (2%)	0	100	100
All	All	2216/2224 (100%)	2160 (98%)	56 (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	475/475 (100%)	469 (99%)	6 (1%)	69	65
1	B	475/475 (100%)	468 (98%)	7 (2%)	65	60
1	C	475/475 (100%)	466 (98%)	9 (2%)	57	50
1	D	475/475 (100%)	471 (99%)	4 (1%)	81	80
All	All	1900/1900 (100%)	1874 (99%)	26 (1%)	67	62

All (26) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	22	GLU
1	A	26	ARG
1	A	103	ARG
1	A	212	PHE
1	A	522	LYS
1	A	529	ASP
1	B	27	ARG
1	B	33	LYS
1	B	103	ARG
1	B	134	ARG
1	B	212	PHE
1	B	236	SER
1	B	522	LYS
1	C	33	LYS
1	C	103	ARG
1	C	123	LYS
1	C	139	ASP
1	C	212	PHE
1	C	253	LYS
1	C	531	SER
1	C	553	GLU
1	C	555	ARG
1	D	103	ARG
1	D	115	LYS

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Mol	Chain	Res	Type
1	D	212	PHE
1	D	307	ARG

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (8) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	14	GLN
1	A	19	HIS
1	A	230	GLN
1	A	335	HIS
1	B	260	GLN
1	D	304	GLN
1	D	387	GLN
1	D	449	GLN

### 5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

## 5.4 Non-standard residues in protein, DNA, RNA chains [i](#)

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

## 5.5 Carbohydrates [i](#)

There are no 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
3	PG6	C	602	-	17,17,17	0.30	0	16,16,16	0.20	0
2	PA5	C	601	-	14,14,14	0.64	0	18,20,20	1.39	3 (16%)
2	PA5	D	602	-	14,14,14	0.96	1 (7%)	18,20,20	1.58	4 (22%)
4	GOL	C	604	-	5,5,5	0.17	0	5,5,5	0.49	0
3	PG6	B	602	-	17,17,17	0.35	0	16,16,16	0.42	0
2	PA5	B	601	-	14,14,14	1.23	2 (14%)	18,20,20	1.47	4 (22%)
3	PG6	D	601	-	17,17,17	0.44	0	16,16,16	0.23	0
3	PG6	A	602	-	17,17,17	0.42	0	16,16,16	0.35	0
2	PA5	A	601	-	14,14,14	1.02	0	18,20,20	1.10	1 (5%)
4	GOL	C	603	-	5,5,5	0.15	0	5,5,5	0.54	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
3	PG6	C	602	-	-	10/15/15/15	-
2	PA5	C	601	-	-	0/18/18/18	-
2	PA5	D	602	-	-	0/18/18/18	-
4	GOL	C	604	-	-	2/4/4/4	-
3	PG6	B	602	-	-	6/15/15/15	-
2	PA5	B	601	-	-	0/18/18/18	-
3	PG6	D	601	-	-	7/15/15/15	-
3	PG6	A	602	-	-	7/15/15/15	-
2	PA5	A	601	-	-	0/18/18/18	-
4	GOL	C	603	-	-	4/4/4/4	-

All (3) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	601	PA5	C5-C4	2.49	1.55	1.51
2	D	602	PA5	C2-C1	-2.25	1.49	1.52
2	B	601	PA5	O2-C2	2.24	1.46	1.42

All (12) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	D	602	PA5	O2P-P-O5	-3.92	96.44	106.67
2	C	601	PA5	O3P-P-O5	-3.07	98.65	106.67

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	C	601	PA5	O3P-P-O2P	2.79	118.25	107.80
2	D	602	PA5	O3P-P-O2P	2.61	117.59	107.80
2	B	601	PA5	C4-C3-C2	-2.57	107.84	112.05
2	C	601	PA5	C4-C3-C2	-2.48	107.98	112.05
2	B	601	PA5	O3P-P-O2P	2.41	116.83	107.80
2	A	601	PA5	O1-C1-C2	2.32	119.75	113.31
2	D	602	PA5	O2P-P-O1P	2.29	119.77	110.83
2	B	601	PA5	O2P-P-O5	-2.24	100.83	106.67
2	D	602	PA5	C4-C3-C2	-2.12	108.58	112.05
2	B	601	PA5	O3P-P-O5	-2.11	101.17	106.67

There are no chirality outliers.

All (36) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
4	C	603	GOL	O1-C1-C2-C3
4	C	603	GOL	C1-C2-C3-O3
4	C	604	GOL	O2-C2-C3-O3
3	A	602	PG6	O2-C4-C5-O3
3	C	602	PG6	O3-C6-C7-O4
3	C	602	PG6	O2-C4-C5-O3
3	D	601	PG6	O3-C6-C7-O4
3	C	602	PG6	O4-C8-C9-O5
4	C	603	GOL	O2-C2-C3-O3
3	B	602	PG6	O2-C4-C5-O3
3	B	602	PG6	O3-C6-C7-O4
3	D	601	PG6	O4-C8-C9-O5
4	C	604	GOL	C1-C2-C3-O3
3	A	602	PG6	O4-C8-C9-O5
4	C	603	GOL	O1-C1-C2-O2
3	A	602	PG6	O1-C2-C3-O2
3	D	601	PG6	O2-C4-C5-O3
3	B	602	PG6	C10-C11-O6-C12
3	C	602	PG6	O5-C10-C11-O6
3	B	602	PG6	C11-C10-O5-C9
3	C	602	PG6	C9-C8-O4-C7
3	C	602	PG6	C8-C9-O5-C10
3	A	602	PG6	C8-C9-O5-C10
3	D	601	PG6	C6-C7-O4-C8
3	A	602	PG6	C7-C6-O3-C5
3	D	601	PG6	O5-C10-C11-O6
3	A	602	PG6	C6-C7-O4-C8

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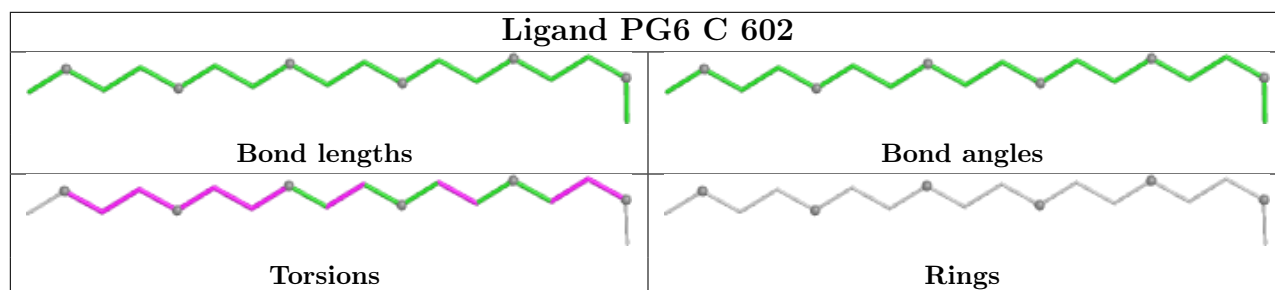
Mol	Chain	Res	Type	Atoms
3	D	601	PG6	C7-C6-O3-C5
3	D	601	PG6	C11-C10-O5-C9
3	B	602	PG6	C9-C8-O4-C7
3	C	602	PG6	C11-C10-O5-C9
3	B	602	PG6	C7-C6-O3-C5
3	C	602	PG6	C10-C11-O6-C12
3	C	602	PG6	O1-C2-C3-O2
3	A	602	PG6	O3-C6-C7-O4
3	C	602	PG6	C3-C2-O1-C1

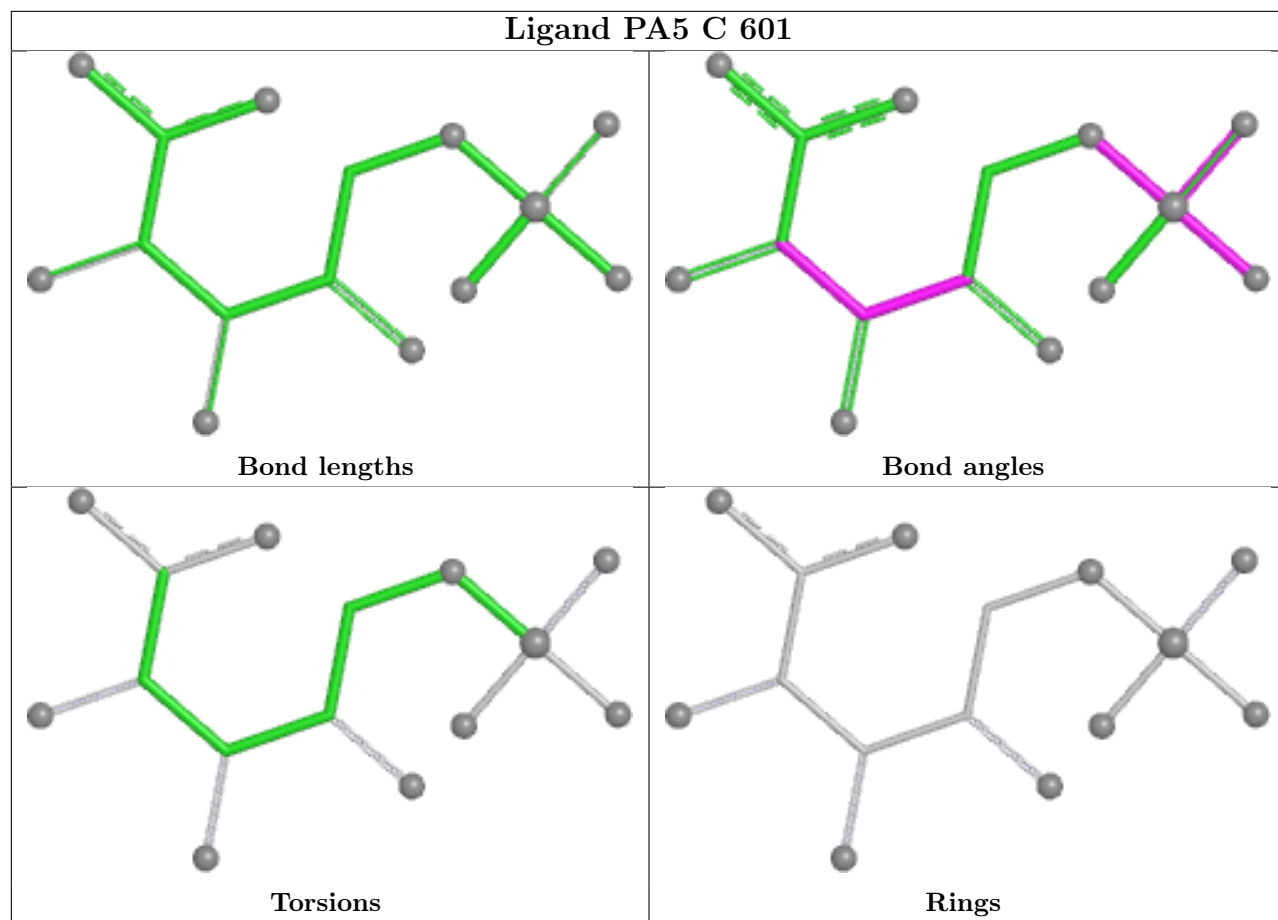
There are no ring outliers.

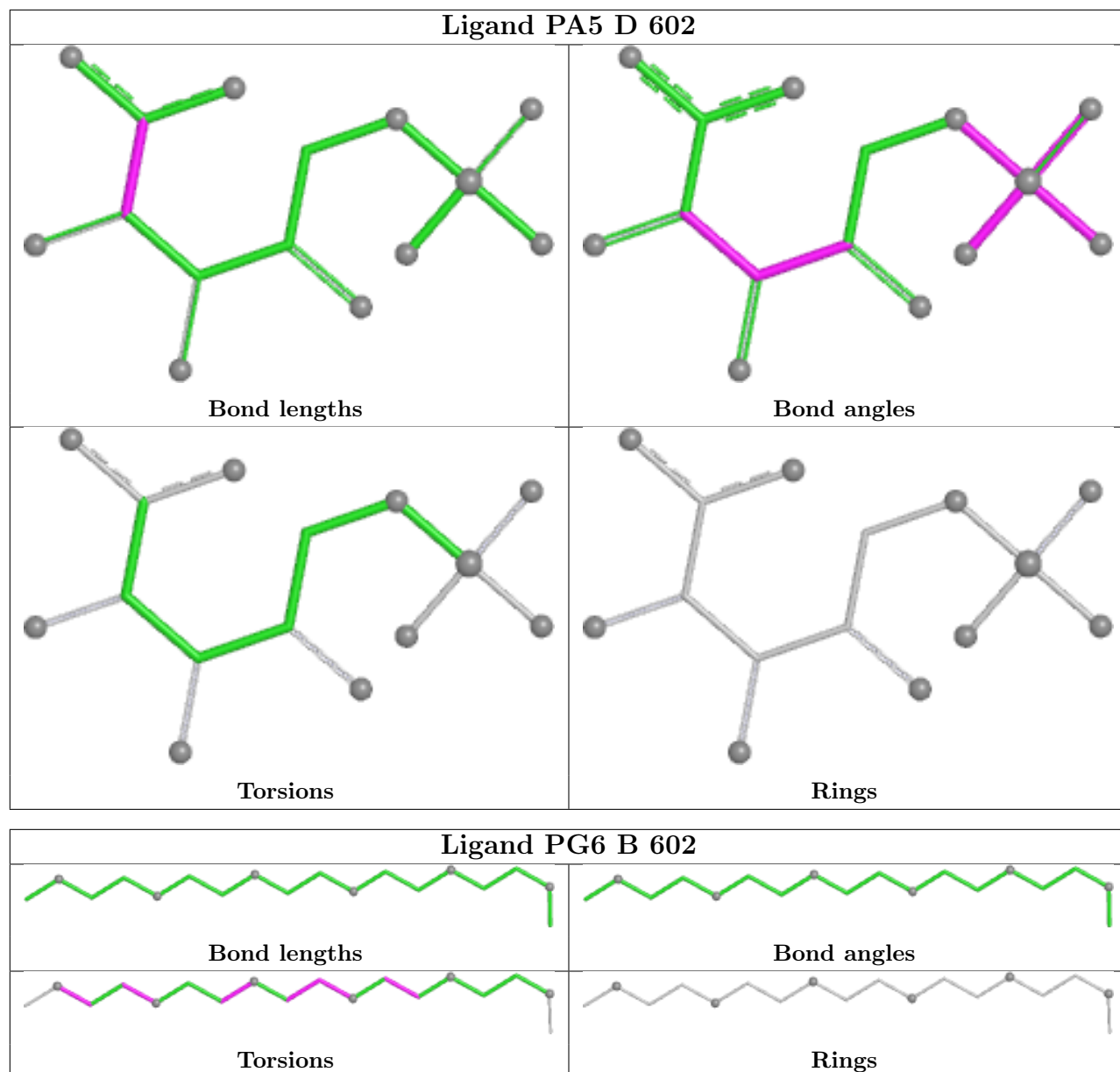
5 monomers are involved in 7 short contacts:

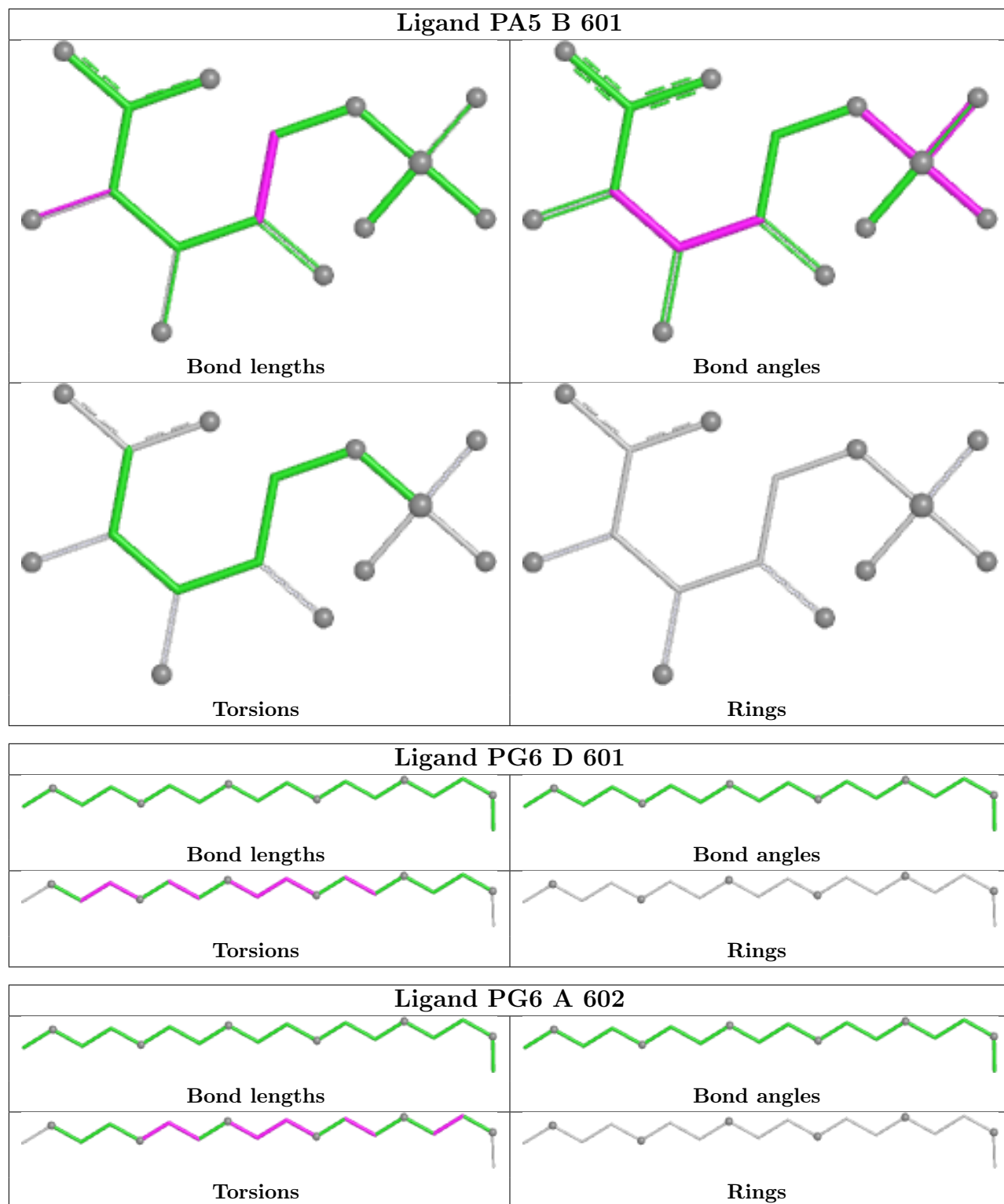
Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	C	602	PG6	1	0
2	C	601	PA5	1	0
4	C	604	GOL	2	0
3	B	602	PG6	2	0
3	A	602	PG6	1	0

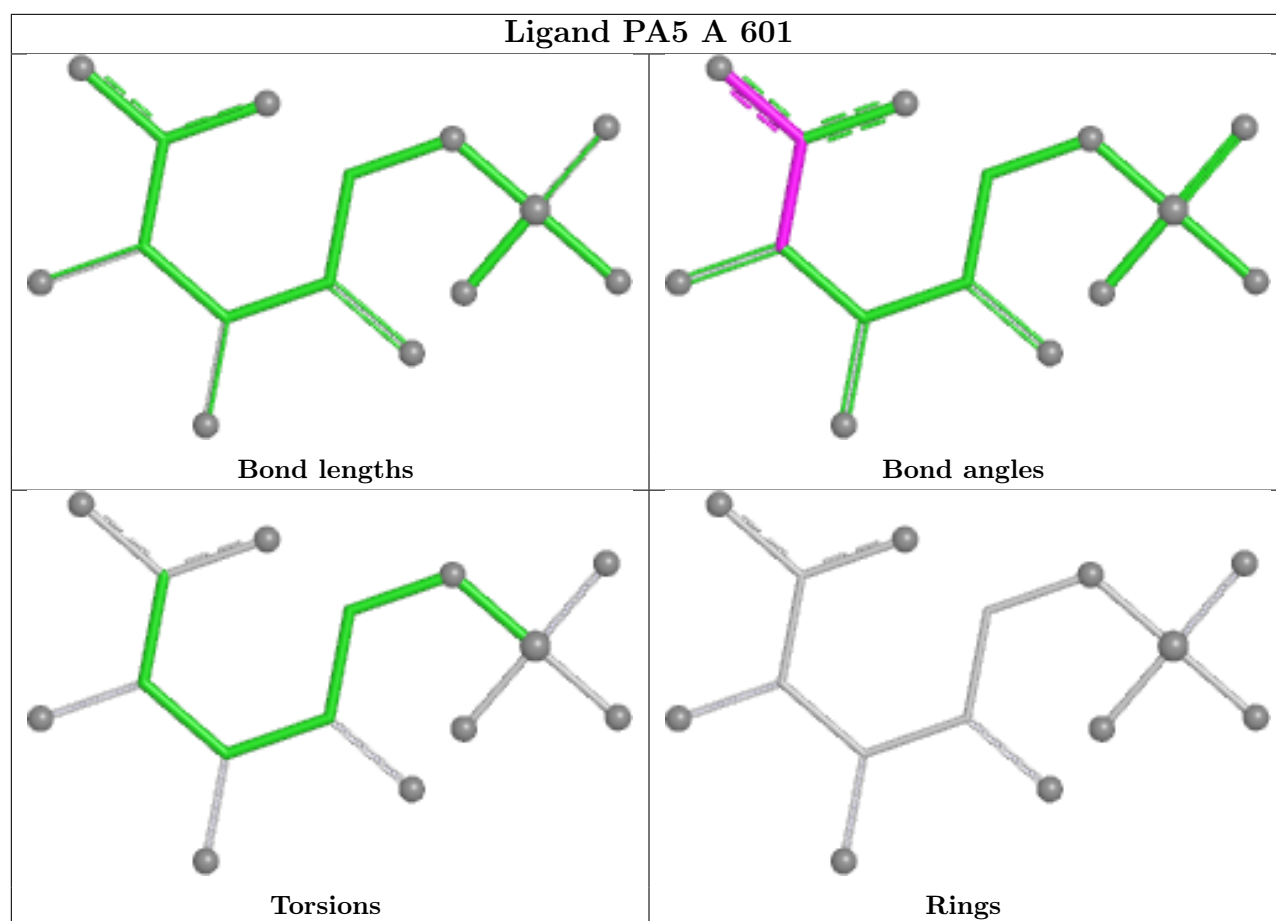
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. 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

### 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, 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	556/556 (100%)	0.12	21 (3%)	40	50	19, 27, 51, 97	0
1	B	556/556 (100%)	0.19	25 (4%)	33	43	19, 28, 54, 76	0
1	C	556/556 (100%)	0.18	22 (3%)	38	48	19, 29, 53, 76	0
1	D	556/556 (100%)	0.28	32 (5%)	23	31	20, 30, 53, 76	0
All	All	2224/2224 (100%)	0.19	100 (4%)	33	43	19, 29, 53, 97	0

All (100) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	460	ARG	4.2
1	A	456	GLU	4.2
1	A	455	PRO	4.1
1	B	455	PRO	3.9
1	B	456	GLU	3.9
1	C	378	VAL	3.9
1	D	379	TRP	3.9
1	B	379	TRP	3.9
1	C	455	PRO	3.8
1	B	348	ALA	3.7
1	A	457	ASP	3.7
1	B	1	ALA	3.6
1	D	365	LYS	3.6
1	D	114	GLY	3.6
1	D	366	SER	3.6
1	B	451	ALA	3.5
1	D	553	GLU	3.5
1	B	555	ARG	3.4
1	D	1	ALA	3.4
1	C	379	TRP	3.3
1	C	5	ARG	3.3

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>	<b>RSRZ</b>
1	C	456	GLU	3.3
1	A	458	LEU	3.3
1	A	379	TRP	3.2
1	D	377	ILE	3.1
1	C	348	ALA	3.1
1	B	377	ILE	3.0
1	A	378	VAL	3.0
1	B	458	LEU	3.0
1	B	453	LYS	2.9
1	A	348	ALA	2.9
1	D	2	ALA	2.9
1	A	377	ILE	2.9
1	B	390	PHE	2.9
1	D	406	LEU	2.8
1	C	1	ALA	2.8
1	D	348	ALA	2.8
1	A	338	LEU	2.7
1	D	555	ARG	2.7
1	B	336	ALA	2.7
1	B	349	ALA	2.7
1	D	14	GLN	2.7
1	B	27	ARG	2.7
1	B	378	VAL	2.6
1	A	380	GLY	2.6
1	D	378	VAL	2.5
1	C	338	LEU	2.5
1	C	336	ALA	2.5
1	B	442	GLU	2.5
1	D	456	GLU	2.5
1	B	338	LEU	2.4
1	D	556	VAL	2.4
1	B	448	LEU	2.4
1	D	347	PHE	2.4
1	B	452	GLY	2.4
1	C	349	ALA	2.3
1	C	255	PHE	2.3
1	D	253	LYS	2.3
1	D	113	ASP	2.3
1	A	336	ALA	2.3
1	A	349	ALA	2.3
1	D	111	LEU	2.3
1	D	232	ALA	2.3

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Mol	Chain	Res	Type	RSRZ
1	D	260	GLN	2.3
1	C	139	ASP	2.3
1	B	462	LEU	2.3
1	D	337	MET	2.3
1	D	390	PHE	2.2
1	D	455	PRO	2.2
1	D	393	LEU	2.2
1	B	347	PHE	2.2
1	C	351	PHE	2.2
1	A	462	LEU	2.2
1	D	161	LEU	2.2
1	D	91	TYR	2.2
1	C	236	SER	2.2
1	A	460	ARG	2.2
1	A	1	ALA	2.2
1	A	390	PHE	2.2
1	D	18	GLU	2.2
1	B	5	ARG	2.2
1	C	450	ALA	2.2
1	C	27	ARG	2.1
1	D	380	GLY	2.1
1	B	351	PHE	2.1
1	A	5	ARG	2.1
1	D	5	ARG	2.1
1	C	377	ILE	2.1
1	D	349	ALA	2.1
1	C	460	ARG	2.1
1	C	259	PRO	2.1
1	B	380	GLY	2.1
1	A	454	SER	2.1
1	C	143	TYR	2.1
1	C	30	ASP	2.1
1	D	336	ALA	2.0
1	A	347	PHE	2.0
1	C	457	ASP	2.0
1	A	344	LEU	2.0
1	A	555	ARG	2.0

## 6.2 Non-standard residues in protein, DNA, RNA chains

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](#)

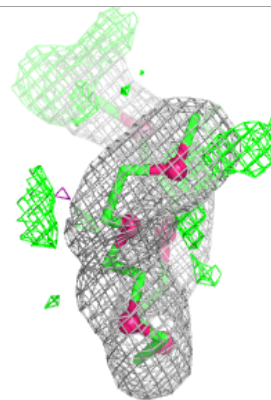
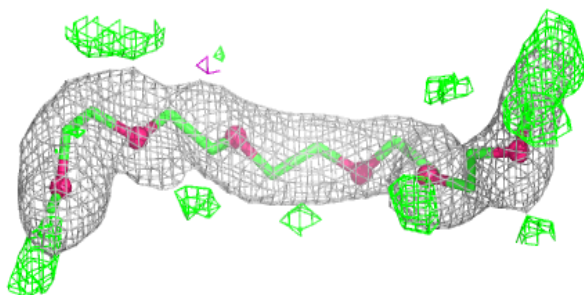
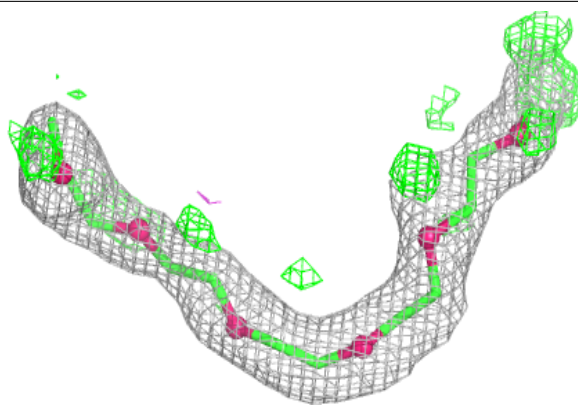
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95<sup>th</sup> percentile and maximum values of B factors of atoms in the group. The column labelled 'Q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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å <sup>2</sup> )	Q<0.9
3	PG6	D	601	18/18	0.83	0.15	48,57,63,63	0
4	GOL	C	604	6/6	0.83	0.25	58,60,60,61	0
3	PG6	A	602	18/18	0.84	0.14	43,51,58,62	0
3	PG6	B	602	18/18	0.86	0.14	43,50,60,61	0
3	PG6	C	602	18/18	0.86	0.14	47,52,59,59	0
4	GOL	C	603	6/6	0.88	0.25	50,53,56,60	0
2	PA5	C	601	15/15	0.98	0.10	25,30,36,36	0
2	PA5	D	602	15/15	0.98	0.08	23,30,37,39	0
2	PA5	A	601	15/15	0.98	0.09	22,26,35,36	0
2	PA5	B	601	15/15	0.98	0.08	21,28,35,37	0

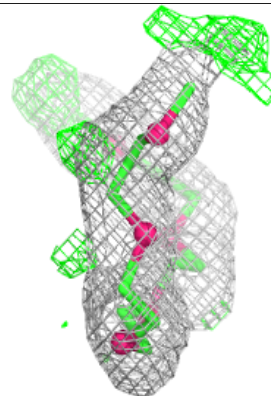
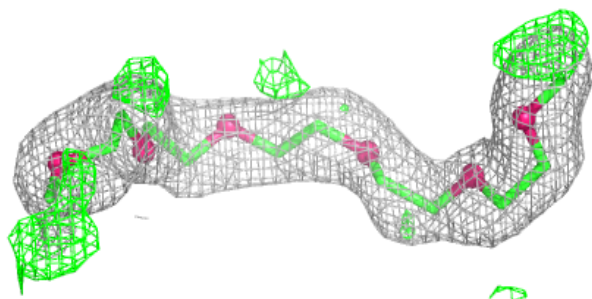
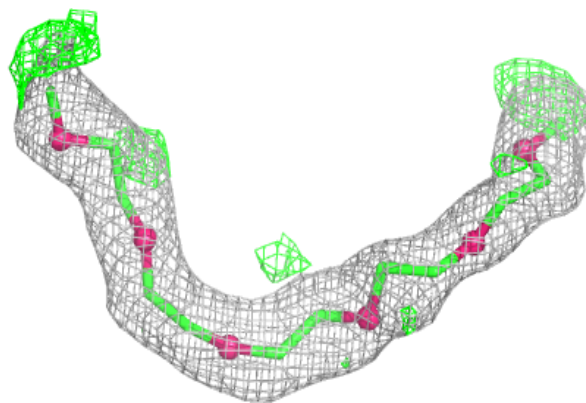
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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

**Electron density around PG6 D 601:**

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

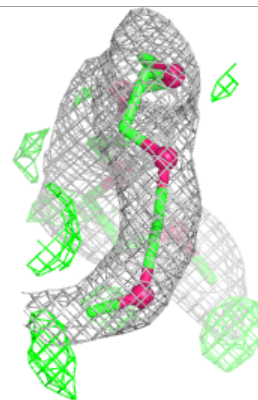
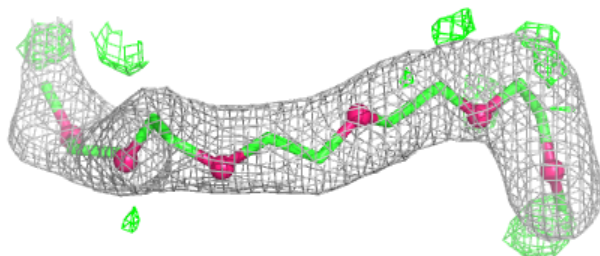
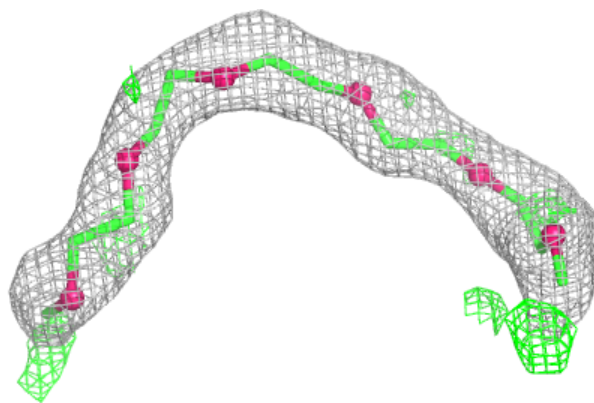
**Electron density around PG6 A 602:**

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and green (positive)

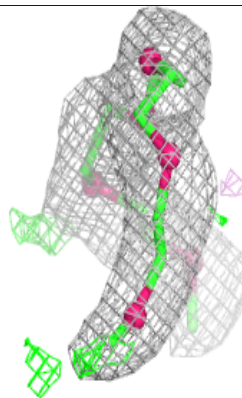
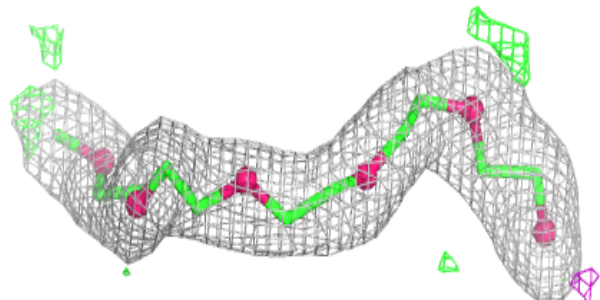
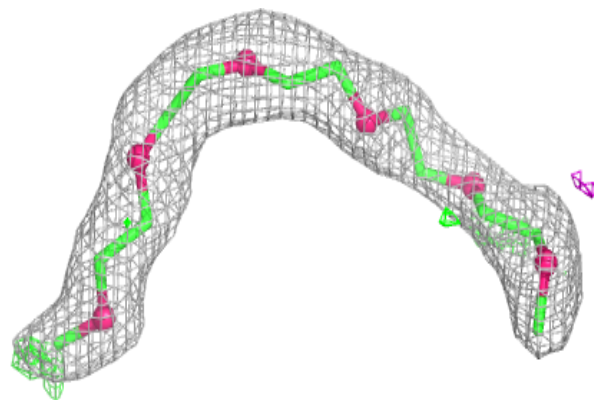


**Electron density around PG6 B 602:**

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

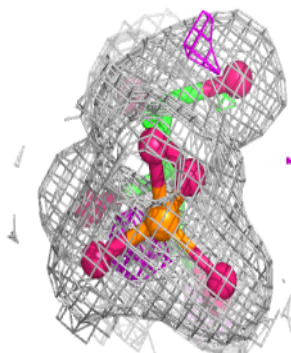
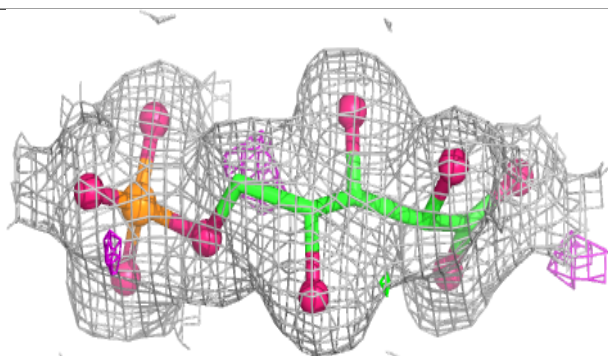
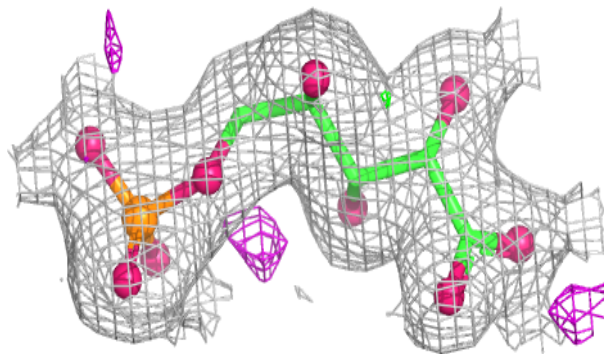
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and green (positive)

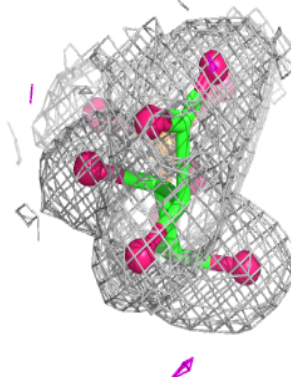
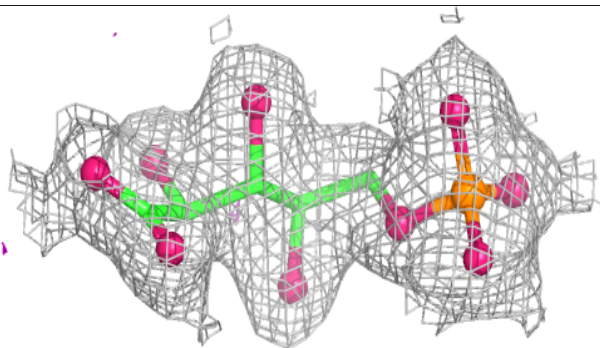
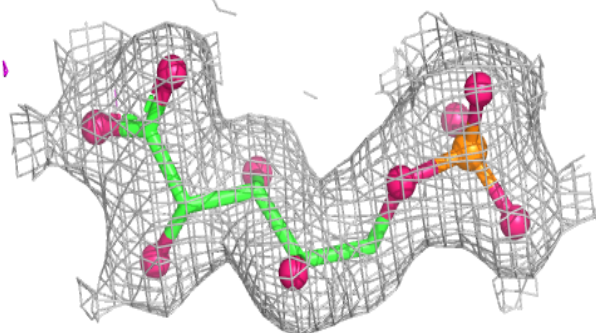


**Electron density around PA5 C 601:**

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

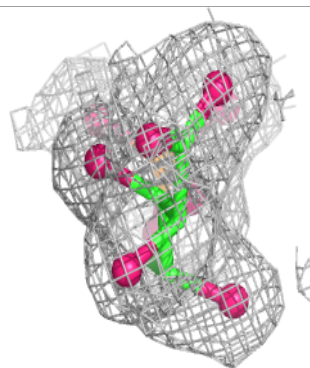
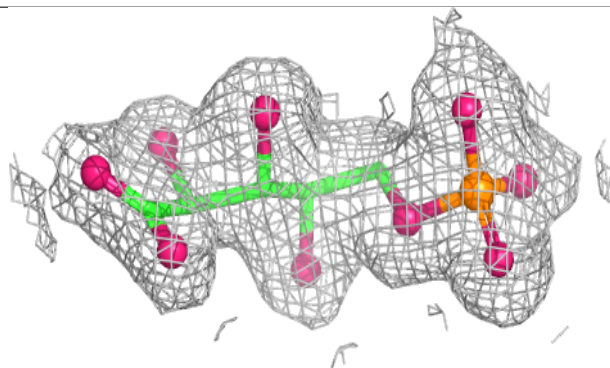
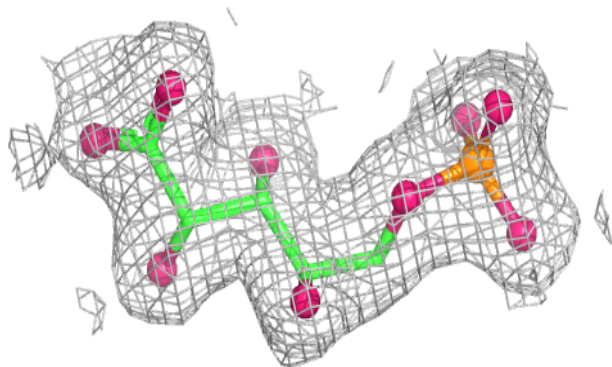
**Electron density around PA5 D 602:**

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

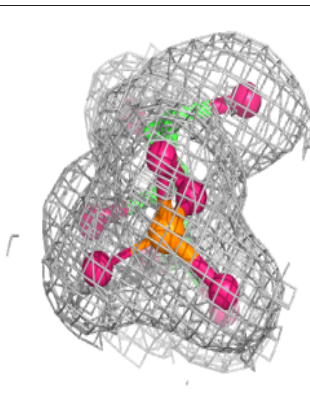
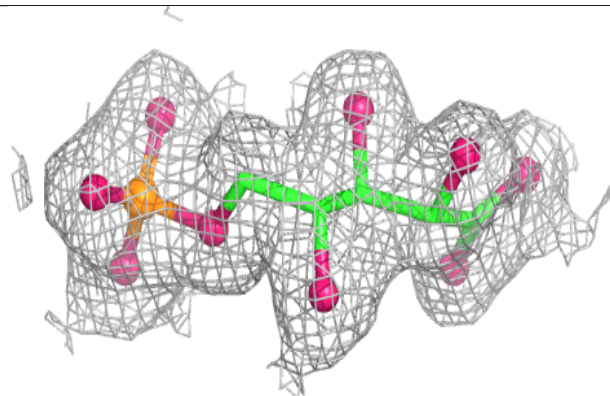
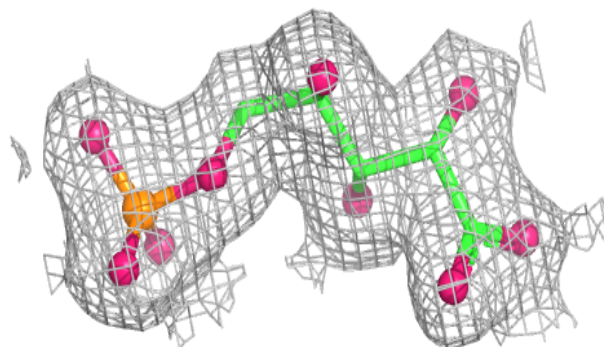


**Electron density around PA5 A 601:**

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

**Electron density around PA5 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.