Full wwPDB X-ray Structure Validation Report (i)

Oct 5, 2023 – 02:48 AM EDT

PDB ID	:	6V53
Title	:	The crystal structure of the 2009 H1N1 PA endonuclease mutant I38T in complex with SJ000985494
Authors	:	Cuypers, M.G.; Slavish, P.J.; Rankovic, Z.; White, S.W.
Deposited on	:	2019-12-03
Resolution	:	2.20 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 (i) symbol.

The types of validation reports are described at
http://www.wwpdb.org/validation/2017/FAQs#types.

The following versions of software and data (see references (1)) were used in the production of this report:

MolProbity	:	FAILED
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	FAILED
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.35.1

1 Overall quality at a glance (i)

The following experimental techniques were used to determine the structure:
X-RAY DIFFRACTION

The reported resolution of this entry is 2.20 Å.

There are no overall percentile quality scores available for this entry.

MolProbity and EDS failed to run properly - the sequence quality summary graphics cannot be shown.

2 Entry composition (i)

There are 6 unique types of molecules in this entry. The entry contains 1559 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 Polymerase acidic protein.

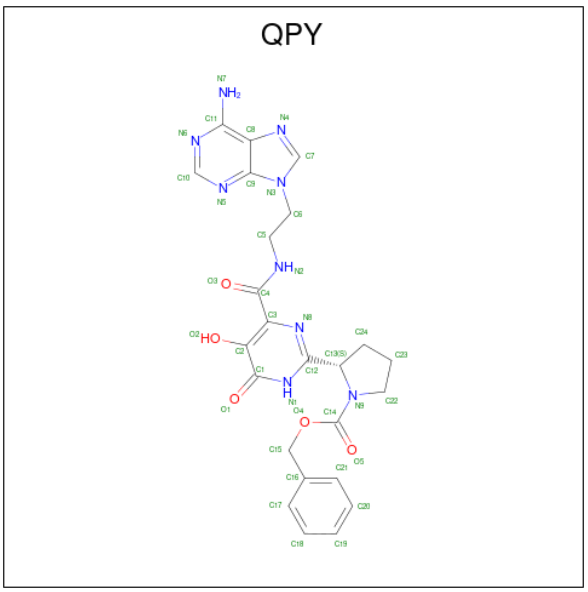
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	179	1408	891	241	266	10	0	0	0

There are 24 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-19	MET	-	expression tag	UNP C6H0Y9
A	-18	GLY	-	expression tag	UNP C6H0Y9
A	-17	SER	-	expression tag	UNP C6H0Y9
A	-16	SER	-	expression tag	UNP C6H0Y9
A	-15	HIS	-	expression tag	UNP C6H0Y9
A	-14	HIS	-	expression tag	UNP C6H0Y9
A	-13	HIS	-	expression tag	UNP C6H0Y9
A	-12	HIS	-	expression tag	UNP C6H0Y9
A	-11	HIS	-	expression tag	UNP C6H0Y9
A	-10	HIS	-	expression tag	UNP C6H0Y9
A	-9	SER	-	expression tag	UNP C6H0Y9
A	-8	SER	-	expression tag	UNP C6H0Y9
A	-7	GLY	-	expression tag	UNP C6H0Y9
A	-6	LEU	-	expression tag	UNP C6H0Y9
A	-5	VAL	-	expression tag	UNP C6H0Y9
A	-4	PRO	-	expression tag	UNP C6H0Y9
A	-3	ARG	-	expression tag	UNP C6H0Y9
A	-2	GLY	-	expression tag	UNP C6H0Y9
A	-1	SER	-	expression tag	UNP C6H0Y9
A	0	HIS	-	expression tag	UNP C6H0Y9
A	38	THR	ILE	engineered mutation	UNP C6H0Y9
A	51	GLY	-	linker	UNP C6H0Y9
A	52	GLY	-	linker	UNP C6H0Y9
A	53	SER	-	linker	UNP C6H0Y9

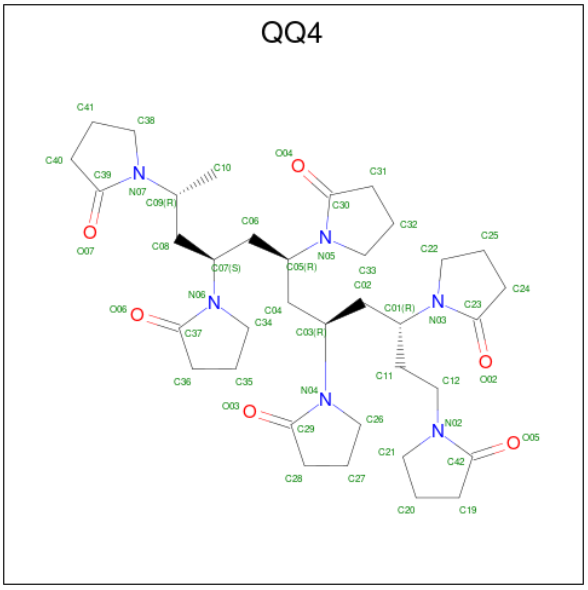
- Molecule 2 is benzyl (2S)-2-(4-{[2-(6-amino-9H-purin-9-yl)ethyl]carbamoyl}-5-hydroxy-6-oxo-1,6-dihydropyrimidin-2-yl)pyrrolidine-1-carboxylate (three-letter code: QPY) (formula:

$C_{24}H_{25}N_9O_5$) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
			Total	C	N	O		
2	A	1	38	24	9	5	0	0

- Molecule 3 is Hexa Vinylpyrrolidone K15 (three-letter code: QQ4) (formula: $C_{36}H_{56}N_6O_6$) (labeled as "Ligand of Interest" by depositor).

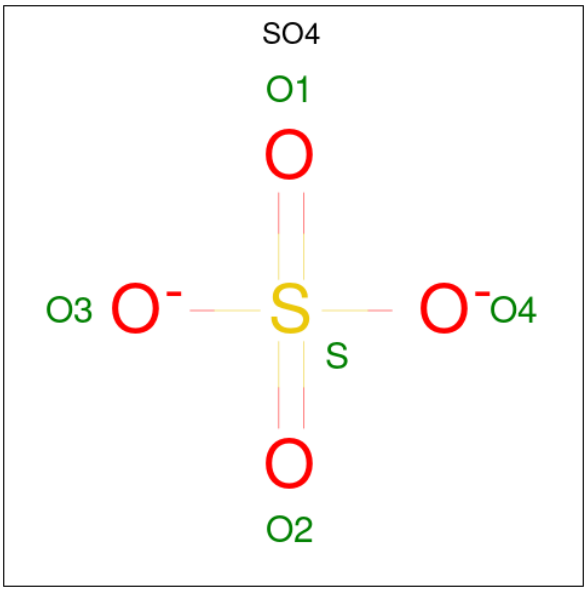


Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
			Total	C	N	O		
3	A	1	48	36	6	6	0	0

- Molecule 4 is MANGANESE (II) ION (three-letter code: MN) (formula: Mn).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	A	2	Total Mn 2 2	0	0

- Molecule 5 is SULFATE ION (three-letter code: SO4) (formula: O_4S).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
5	A	1	Total O S 5 4 1	0	0
5	A	1	Total O S 5 4 1	0	0

- Molecule 6 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
6	A	52	Total O 53 53	0	1

MolProbity and EDS failed to run properly - this section is therefore empty.

3 Data and refinement statistics (i)

EDS failed to run properly - this section is therefore incomplete.

Property	Value	Source
Space group	I 4 2 2	Depositor
Cell constants a, b, c, α, β, γ	89.73Å 89.73Å 132.13Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	31.72 – 2.20	Depositor
% Data completeness (in resolution range)	99.4 (31.72-2.20)	Depositor
R_{merge}	0.07	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	2.17 (at 2.20Å)	Xtriage
Refinement program	PHENIX 1.17rc1_3605	Depositor
R, R_{free}	0.232 , 0.291	Depositor
Wilson B-factor (Å^2)	52.0	Xtriage
Anisotropy	0.409	Xtriage
L-test for twinning[2]	$< \|L\| > = 0.51$, $< L^2 > = 0.34$	Xtriage
Estimated twinning fraction	0.033 for -1/2*h-1/2*k-1/2*l,-1/2*h-1/2*k+1/2*l,-h+k 0.015 for -1/2*h+1/2*k-1/2*l,1/2*h-1/2*k-1/2*l,-h-k	Xtriage
Total number of atoms	1559	wwPDB-VP
Average B, all atoms (Å^2)	67.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 6.32% of the height of the origin peak. No significant pseudotranslation is detected.*

[1]Intensities estimated from amplitudes.

[2]Theoretical values of $< |L| >$, $< L^2 >$ for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

4 Model quality (i)

4.1 Standard geometry (i)

MolProbity failed to run properly - this section is therefore empty.

4.2 Too-close contacts (i)

MolProbity failed to run properly - this section is therefore empty.

4.3 Torsion angles (i)

4.3.1 Protein backbone (i)

MolProbity failed to run properly - this section is therefore empty.

4.3.2 Protein sidechains (i)

MolProbity failed to run properly - this section is therefore empty.

4.3.3 RNA (i)

MolProbity failed to run properly - this section is therefore empty.

4.4 Non-standard residues in protein, DNA, RNA chains (i)

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

4.5 Carbohydrates (i)

There are no monosaccharides in this entry.

4.6 Ligand geometry (i)

Of 6 ligands modelled in this entry, 2 are monoatomic - leaving 4 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	$\#\|Z\| > 2$
2	QPY	A	201	4	36,42,42	3.46	20 (55%)	37,59,59	2.61	11 (29%)
5	SO4	A	205	-	4,4,4	0.14	0	6,6,6	0.06	0
5	SO4	A	206	-	4,4,4	0.13	0	6,6,6	0.09	0
3	QQ4	A	202	-	51,53,53	2.89	6 (11%)	58,75,75	2.63	9 (15%)

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

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	QPY	A	201	4	-	7/19/33/33	0/5/5/5
3	QQ4	A	202	-	-	24/41/101/101	0/6/6/6

All (26) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	A	202	QQ4	C30-N05	9.41	1.48	1.34
3	A	202	QQ4	C23-N03	9.05	1.47	1.34
3	A	202	QQ4	C37-N06	8.96	1.47	1.34
2	A	201	QPY	O1-C1	8.96	1.40	1.23
3	A	202	QQ4	C39-N07	8.20	1.46	1.34
2	A	201	QPY	C14-N9	7.23	1.45	1.35
3	A	202	QQ4	C29-N04	7.22	1.45	1.34
2	A	201	QPY	C4-N2	7.08	1.45	1.33
2	A	201	QPY	C20-C21	6.75	1.53	1.38
2	A	201	QPY	C17-C16	6.63	1.53	1.38
2	A	201	QPY	C19-C18	5.68	1.53	1.38
3	A	202	QQ4	C42-N02	5.25	1.47	1.34
2	A	201	QPY	C18-C17	-3.23	1.32	1.38
2	A	201	QPY	C11-N7	3.20	1.45	1.34
2	A	201	QPY	C21-C16	-3.17	1.32	1.38
2	A	201	QPY	C8-N4	3.08	1.50	1.39
2	A	201	QPY	O4-C14	3.07	1.40	1.34
2	A	201	QPY	C10-N5	3.04	1.37	1.32
2	A	201	QPY	C12-N1	2.73	1.44	1.36
2	A	201	QPY	C3-C4	2.67	1.53	1.48
2	A	201	QPY	O4-C15	-2.62	1.40	1.45

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	201	QPY	O3-C4	-2.46	1.18	1.23
2	A	201	QPY	C9-N5	-2.39	1.32	1.35
2	A	201	QPY	C7-N4	2.37	1.38	1.34
2	A	201	QPY	C20-C19	-2.23	1.32	1.38
2	A	201	QPY	C11-C8	-2.07	1.35	1.43

All (20) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
3	A	202	QQ4	C33-N05-C30	-8.69	107.87	113.42
3	A	202	QQ4	C34-N06-C37	-8.57	107.95	113.42
2	A	201	QPY	C1-N1-C12	-8.48	119.52	123.78
3	A	202	QQ4	C22-N03-C23	-8.36	108.08	113.42
2	A	201	QPY	O4-C14-N9	7.97	119.80	111.05
3	A	202	QQ4	C38-N07-C39	-7.27	108.78	113.42
3	A	202	QQ4	C26-N04-C29	-6.17	109.48	113.42
2	A	201	QPY	N5-C10-N6	-5.17	120.59	128.68
3	A	202	QQ4	C12-N02-C42	4.60	128.36	123.75
2	A	201	QPY	C24-C13-N9	4.56	109.80	103.03
3	A	202	QQ4	C21-N02-C42	-4.30	108.11	113.76
2	A	201	QPY	O5-C14-N9	-3.36	120.37	124.26
2	A	201	QPY	C3-C4-N2	3.12	119.53	115.54
2	A	201	QPY	O4-C14-O5	-2.90	119.83	124.78
3	A	202	QQ4	O05-C42-N02	2.52	127.92	124.57
2	A	201	QPY	C22-N9-C13	-2.48	108.06	112.00
2	A	201	QPY	O3-C4-N2	-2.38	118.94	123.30
3	A	202	QQ4	C27-C26-N04	2.20	107.11	103.25
2	A	201	QPY	N1-C12-N8	-2.09	120.34	123.39
2	A	201	QPY	C23-C22-N9	2.05	106.85	103.25

There are no chirality outliers.

All (31) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	201	QPY	O4-C14-N9-C22
2	A	201	QPY	N9-C14-O4-C15
2	A	201	QPY	O5-C14-O4-C15
2	A	201	QPY	C5-C6-N3-C7
3	A	202	QQ4	C01-C11-C12-N02
3	A	202	QQ4	C11-C12-N02-C21
3	A	202	QQ4	C11-C12-N02-C42
3	A	202	QQ4	N03-C01-C02-C03

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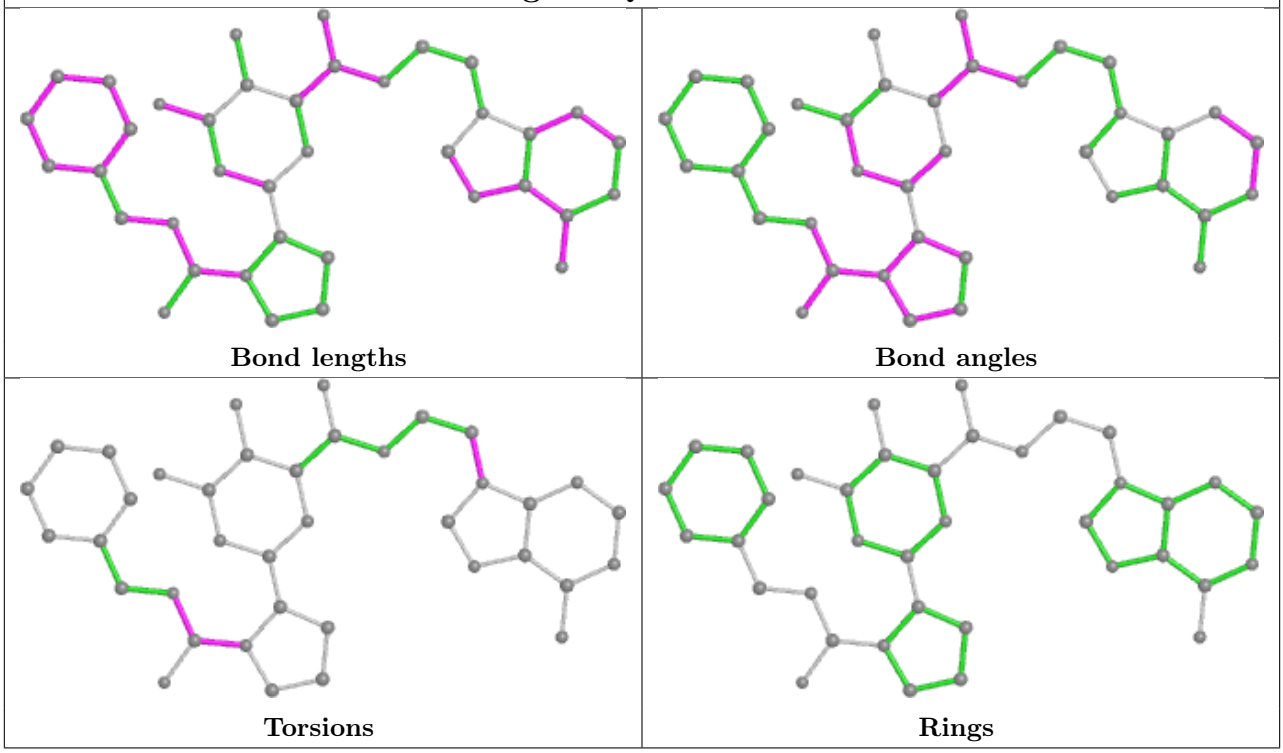
Mol	Chain	Res	Type	Atoms
3	A	202	QQ4	C11-C01-N03-C22
3	A	202	QQ4	C02-C01-N03-C22
3	A	202	QQ4	C01-C02-C03-N04
3	A	202	QQ4	N04-C03-C04-C05
3	A	202	QQ4	C02-C03-N04-C26
3	A	202	QQ4	C02-C03-N04-C29
3	A	202	QQ4	C04-C03-N04-C26
3	A	202	QQ4	C04-C05-N05-C33
3	A	202	QQ4	C06-C05-N05-C33
3	A	202	QQ4	C07-C08-C09-N07
3	A	202	QQ4	C10-C09-N07-C39
2	A	201	QPY	O5-C14-N9-C13
2	A	201	QPY	O5-C14-N9-C22
2	A	201	QPY	O4-C14-N9-C13
3	A	202	QQ4	C02-C01-C11-C12
3	A	202	QQ4	C01-C02-C03-C04
3	A	202	QQ4	C08-C09-N07-C38
3	A	202	QQ4	N03-C01-C11-C12
3	A	202	QQ4	C11-C01-C02-C03
3	A	202	QQ4	C07-C08-C09-C10
3	A	202	QQ4	C10-C09-N07-C38
3	A	202	QQ4	C02-C03-C04-C05
3	A	202	QQ4	C03-C04-C05-C06

There are no ring outliers.

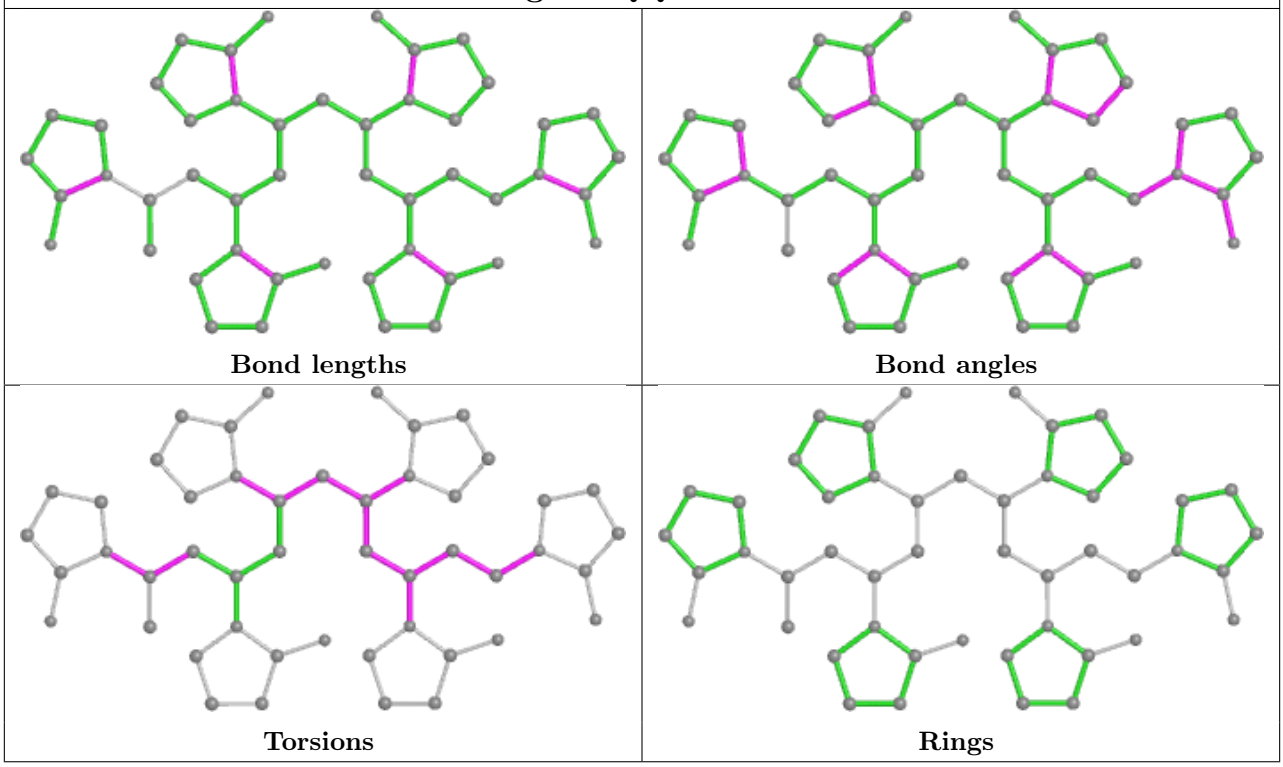
No monomer is involved in short contacts.

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 then 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 QPY A 201



Ligand QQ4 A 202



4.7 Other polymers (i)

There are no such residues in this entry.

4.8 Polymer linkage issues (i)

There are no chain breaks in this entry.

5 Fit of model and data (i)

5.1 Protein, DNA and RNA chains (i)

EDS failed to run properly - this section is therefore empty.

5.2 Non-standard residues in protein, DNA, RNA chains (i)

EDS failed to run properly - this section is therefore empty.

5.3 Carbohydrates (i)

EDS failed to run properly - this section is therefore empty.

5.4 Ligands (i)

EDS failed to run properly - this section is therefore empty.

5.5 Other polymers (i)

EDS failed to run properly - this section is therefore empty.