



# Full wwPDB X-ray Structure Validation Report ⓘ

Oct 29, 2024 – 02:59 PM JST

PDB ID : 9INR  
Title : Crystal structure of PIN1 in complex with inhibitor C3  
Authors : Zhang, L.J.; Zhang, L.Y.  
Deposited on : 2024-07-08  
Resolution : 1.93 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	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	NOT EXECUTED
EDS	:	NOT EXECUTED
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20231227.v01 (using entries in the PDB archive December 27th 2023)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.39

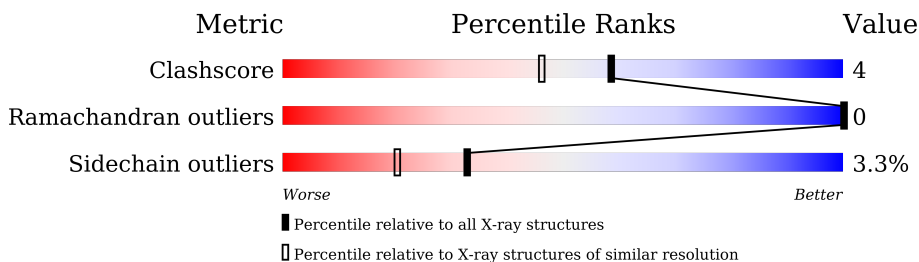
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 1.93 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))
Clashscore	180529	1400 (1.94-1.94)
Ramachandran outliers	177936	1387 (1.94-1.94)
Sidechain outliers	177891	1387 (1.94-1.94)

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  $\leq 5\%$ .

Note EDS was not executed.

Mol	Chain	Length	Quality of chain
1	A	163	
1	B	163	

## 2 Entry composition [i](#)

There are 5 unique types of molecules in this entry. The entry contains 4903 atoms, of which 2332 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.

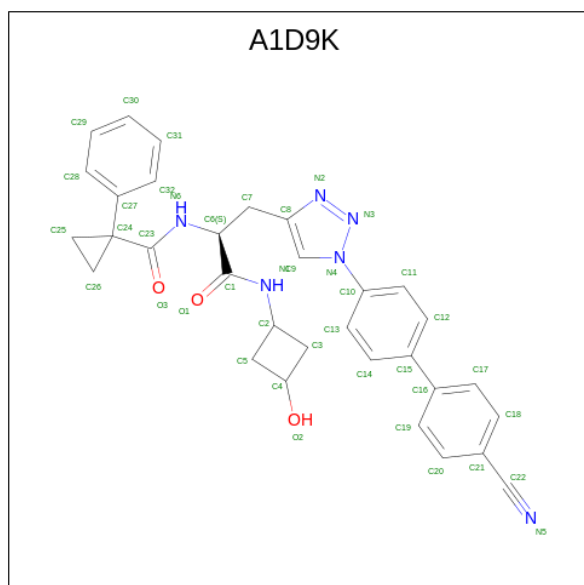
- Molecule 1 is a protein called Peptidyl-prolyl cis-trans isomerase NIMA-interacting 1.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
1	A	145	Total	C	H	N	O	S	40	0	0
			2269	714	1119	210	221	5			
1	B	145	Total	C	H	N	O	S	43	0	0
			2237	706	1099	208	219	5			

There are 2 discrepancies between the modelled and reference sequences:

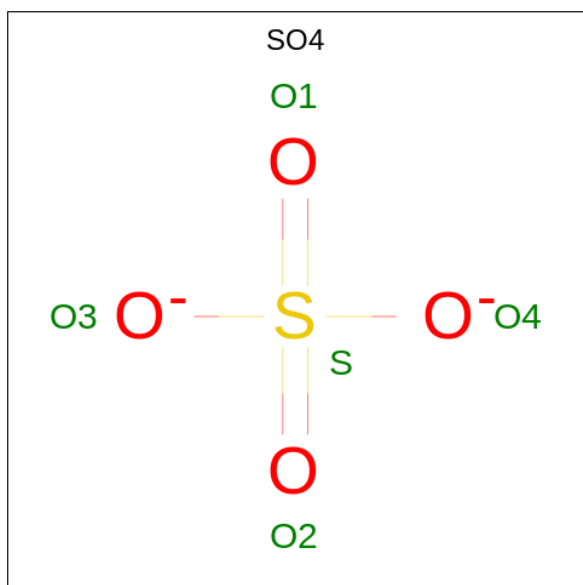
Chain	Residue	Modelled	Actual	Comment	Reference
A	14	ALA	ARG	conflict	UNP Q13526
B	14	ALA	ARG	conflict	UNP Q13526

- Molecule 2 is {N}-[(2 {S})-3-[1-[4-(4-cyanophenyl)phenyl]-1,2,3-triazol-4-yl]-1-[(3-oxidanylcyclobutyl)amino]-1-oxidanylidene-propan-2-yl]-1-phenyl-cyclopropane-1-carboxamide (three-letter code: A1D9K) (formula: C<sub>32</sub>H<sub>30</sub>N<sub>6</sub>O<sub>3</sub>) (labeled as "Ligand of Interest" by depositor).



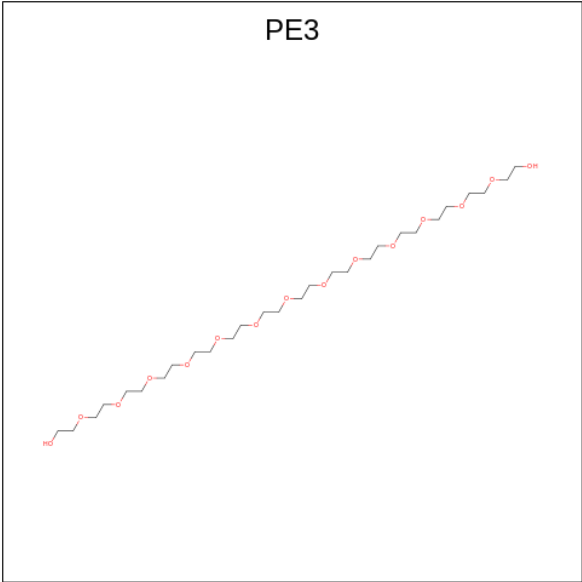
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
2	A	1	Total	C	H	N	O	0	0
			70	32	29	6	3		
2	B	1	Total	C	H	N	O	0	0
			70	32	29	6	3		

- Molecule 3 is SULFATE ION (three-letter code: SO4) (formula: O<sub>4</sub>S) (labeled as "Ligand of Interest" by depositor).



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

- Molecule 4 is 3,6,9,12,15,18,21,24,27,30,33,36,39-TRIDECAOXAHENTETRACONTANE-1,41-DIOL (three-letter code: PE3) (formula: C<sub>28</sub>H<sub>58</sub>O<sub>15</sub>) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
4	B	1	Total	C	H	O	0	0
			97	28	56	13		

- Molecule 5 is water.


Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	82	Total	O	0	0
			82	82		
5	B	63	Total	O	0	0
			63	63		

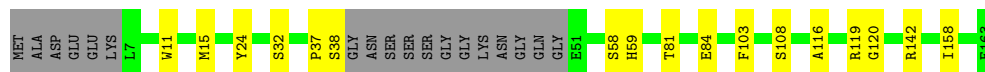
### 3 Residue-property plots [i](#)

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. 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. 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.


Note EDS was not executed.

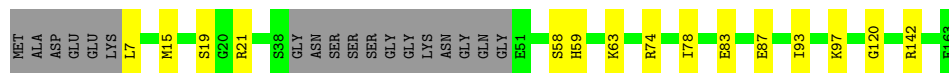
- Molecule 1: Peptidyl-prolyl cis-trans isomerase NIMA-interacting 1

Chain A:  79% 10% 11%



- Molecule 1: Peptidyl-prolyl cis-trans isomerase NIMA-interacting 1

Chain B:  80% 9% 11%



## 4 Data and refinement statistics

Xtriage (Phenix) and EDS were not executed - this section is therefore incomplete.

Property	Value	Source
Space group	P 21 21 2	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	54.59Å 176.64Å 42.63Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	34.55 – 1.93	Depositor
% Data completeness (in resolution range)	100.0 (34.55-1.93)	Depositor
$R_{merge}$	0.19	Depositor
$R_{sym}$	(Not available)	Depositor
Refinement program	REFMAC 5.8.0267	Depositor
R, $R_{free}$	0.193 , 0.230	Depositor
Estimated twinning fraction	No twinning to report.	Xtriage
Total number of atoms	4903	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	42.0	wwPDB-VP

## 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: PE3, A1D9K, SO4

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	0.75	0/1175	0.92	1/1577 (0.1%)
1	B	0.70	0/1163	0.88	1/1564 (0.1%)
All	All	0.73	0/2338	0.90	2/3141 (0.1%)

There are no bond length outliers.

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	74	ARG	NE-CZ-NH2	-5.25	117.68	120.30
1	A	119	ARG	NE-CZ-NH2	-5.21	117.69	120.30

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	1150	1119	1111	8	0
1	B	1138	1099	1085	12	0
2	A	41	29	0	0	0
2	B	41	29	0	0	0
3	A	10	0	0	0	0
3	B	5	0	0	0	0
4	B	41	56	52	8	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
5	A	82	0	0	0	0
5	B	63	0	0	1	0
All	All	2571	2332	2248	20	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 4.

All (20) 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:103:PHE:HE2	1:A:158:ILE:HG22	1.66	0.60
1:B:97:LYS:HZ1	4:B:202:PE3:H171	1.67	0.60
1:B:97:LYS:HE3	4:B:202:PE3:H142	1.87	0.56
1:B:7:LEU:HB2	5:B:332:HOH:O	2.09	0.51
1:A:24:TYR:O	1:A:32:SER:HA	2.13	0.49
1:B:63:LYS:HB2	1:B:78:ILE:HD13	1.95	0.48
1:B:58:SER:HA	1:B:120:GLY:O	2.14	0.47
1:A:108:SER:HA	1:A:116:ALA:O	2.15	0.46
1:B:97:LYS:CE	4:B:202:PE3:H172	2.46	0.46
1:B:97:LYS:NZ	4:B:202:PE3:H171	2.30	0.45
1:A:142:ARG:HD2	1:A:142:ARG:HA	1.85	0.45
1:B:97:LYS:HZ2	4:B:202:PE3:H141	1.82	0.44
1:B:83:GLU:O	1:B:87:GLU:HG2	2.17	0.44
1:A:81:THR:OG1	1:A:84:GLU:HG3	2.18	0.43
1:B:93:ILE:HG21	4:B:202:PE3:H142	2.01	0.43
1:B:97:LYS:NZ	4:B:202:PE3:H141	2.34	0.43
1:A:58:SER:HA	1:A:120:GLY:O	2.19	0.43
1:A:103:PHE:HE2	1:A:158:ILE:CG2	2.31	0.41
1:B:97:LYS:HE3	4:B:202:PE3:C14	2.49	0.40
1:A:11:TRP:CD2	1:A:37:PRO:HG3	2.57	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	141/163 (86%)	140 (99%)	1 (1%)	0	100	100
1	B	141/163 (86%)	139 (99%)	2 (1%)	0	100	100
All	All	282/326 (86%)	279 (99%)	3 (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	124/137 (90%)	121 (98%)	3 (2%)	44	32
1	B	121/137 (88%)	116 (96%)	5 (4%)	26	12
All	All	245/274 (89%)	237 (97%)	8 (3%)	33	20

All (8) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	15	MET
1	A	38	SER
1	A	59	HIS
1	B	15	MET
1	B	19	SER
1	B	21	ARG
1	B	59	HIS
1	B	142	ARG

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (2) such sidechains are listed below:

Mol	Chain	Res	Type
1	B	27	HIS
1	B	94	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 oligosaccharides in this entry.

## 5.6 Ligand geometry ⓘ

6 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	$\# Z  > 2$
4	PE3	B	202	-	40,40,42	0.95	0	39,39,41	1.40	7 (17%)
3	SO4	B	203	-	4,4,4	0.49	0	6,6,6	0.46	0
3	SO4	A	203	-	4,4,4	0.36	0	6,6,6	0.11	0
2	A1D9K	B	201	-	44,46,46	0.91	1 (2%)	50,66,66	1.16	2 (4%)
2	A1D9K	A	201	-	44,46,46	1.16	2 (4%)	50,66,66	1.86	11 (22%)
3	SO4	A	202	-	4,4,4	0.69	0	6,6,6	0.20	0

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

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	A1D9K	B	201	-	-	6/37/50/50	0/6/6/6
2	A1D9K	A	201	-	-	9/37/50/50	0/6/6/6
4	PE3	B	202	-	-	15/38/38/40	-

All (3) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	201	A1D9K	O3-C23	3.06	1.28	1.22
2	A	201	A1D9K	C17-C16	2.24	1.44	1.39
2	B	201	A1D9K	N2-N3	-2.10	1.30	1.34

All (20) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	201	A1D9K	C6-N6-C23	-6.87	108.37	121.50
2	A	201	A1D9K	C7-C6-C1	4.62	122.24	110.25
2	A	201	A1D9K	C20-C21-C18	3.16	124.66	118.96
2	A	201	A1D9K	C6-C1-N1	-2.98	110.17	116.70
2	A	201	A1D9K	C7-C6-N6	2.82	116.73	110.79
2	A	201	A1D9K	C19-C20-C21	-2.71	116.84	120.35
4	B	202	PE3	C18-O19-C20	2.67	124.87	113.29
2	A	201	A1D9K	C17-C16-C15	-2.62	116.81	121.36
2	A	201	A1D9K	C24-C23-N6	2.59	120.73	116.44
2	A	201	A1D9K	C1-C6-N6	2.56	118.13	111.16
2	B	201	A1D9K	C12-C15-C16	2.51	125.71	121.36
4	B	202	PE3	C30-O31-C32	2.49	124.07	113.29
4	B	202	PE3	C27-O28-C29	2.48	124.04	113.29
4	B	202	PE3	C33-O34-C35	2.47	123.98	113.29
2	B	201	A1D9K	C11-C10-N4	2.43	121.28	119.15
4	B	202	PE3	O28-C29-C30	2.37	121.09	110.39
2	A	201	A1D9K	C14-C15-C16	-2.32	117.34	121.36
4	B	202	PE3	O16-C17-C18	2.22	120.42	110.39
4	B	202	PE3	C3-O4-C5	2.19	120.75	112.90
2	A	201	A1D9K	C32-C27-C24	-2.03	117.21	121.05

There are no chirality outliers.

All (30) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	201	A1D9K	N6-C6-C7-C8
2	B	201	A1D9K	C13-C10-N4-N3
4	B	202	PE3	C14-C15-O16-C17
4	B	202	PE3	O19-C20-C21-O22
4	B	202	PE3	O7-C8-C9-O10
4	B	202	PE3	O10-C11-C12-O13
4	B	202	PE3	O22-C23-C24-O25
2	A	201	A1D9K	O1-C1-C6-C7
4	B	202	PE3	O25-C26-C27-O28

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Mol	Chain	Res	Type	Atoms
4	B	202	PE3	O16-C17-C18-O19
2	A	201	A1D9K	C13-C10-N4-N3
2	A	201	A1D9K	N1-C1-C6-C7
2	A	201	A1D9K	C23-C24-C27-C32
2	B	201	A1D9K	C11-C10-N4-N3
4	B	202	PE3	C26-C27-O28-C29
4	B	202	PE3	C30-C29-O28-C27
4	B	202	PE3	C24-C23-O22-C21
2	A	201	A1D9K	C11-C10-N4-N3
4	B	202	PE3	C42-C41-O40-C39
4	B	202	PE3	C8-C9-O10-C11
2	A	201	A1D9K	C11-C10-N4-C9
2	B	201	A1D9K	C11-C10-N4-C9
2	A	201	A1D9K	C23-C24-C27-C28
2	B	201	A1D9K	C23-C24-C27-C28
2	B	201	A1D9K	C23-C24-C27-C32
4	B	202	PE3	C18-C17-O16-C15
4	B	202	PE3	C23-C24-O25-C26
4	B	202	PE3	O13-C14-C15-O16
2	A	201	A1D9K	C13-C10-N4-C9
2	B	201	A1D9K	C13-C10-N4-C9

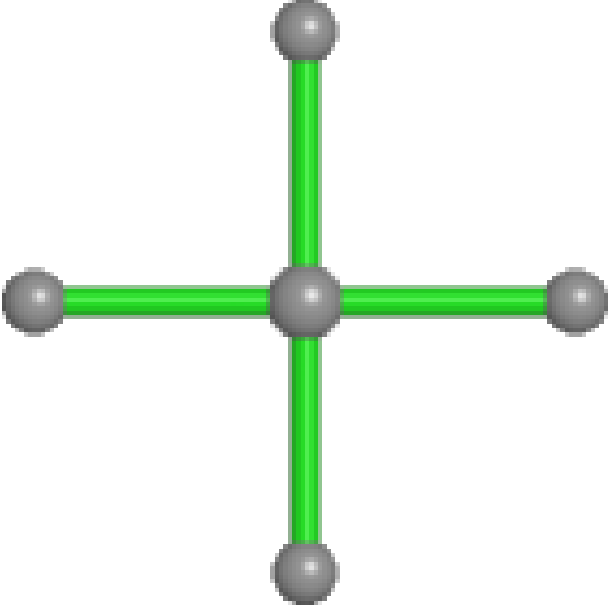
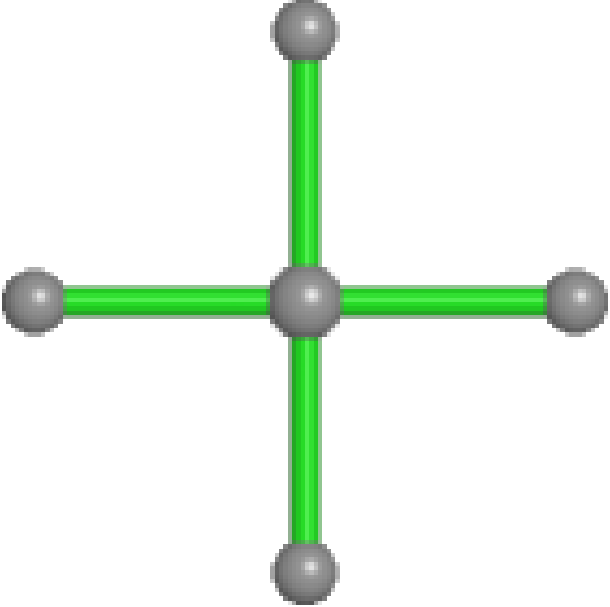
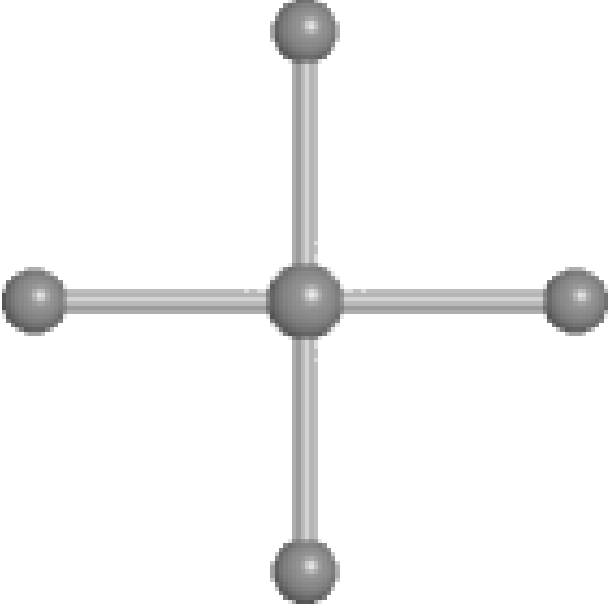
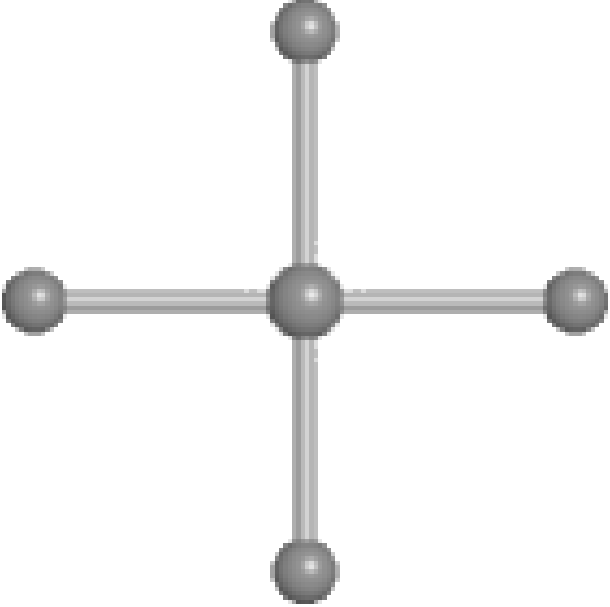
There are no ring outliers.

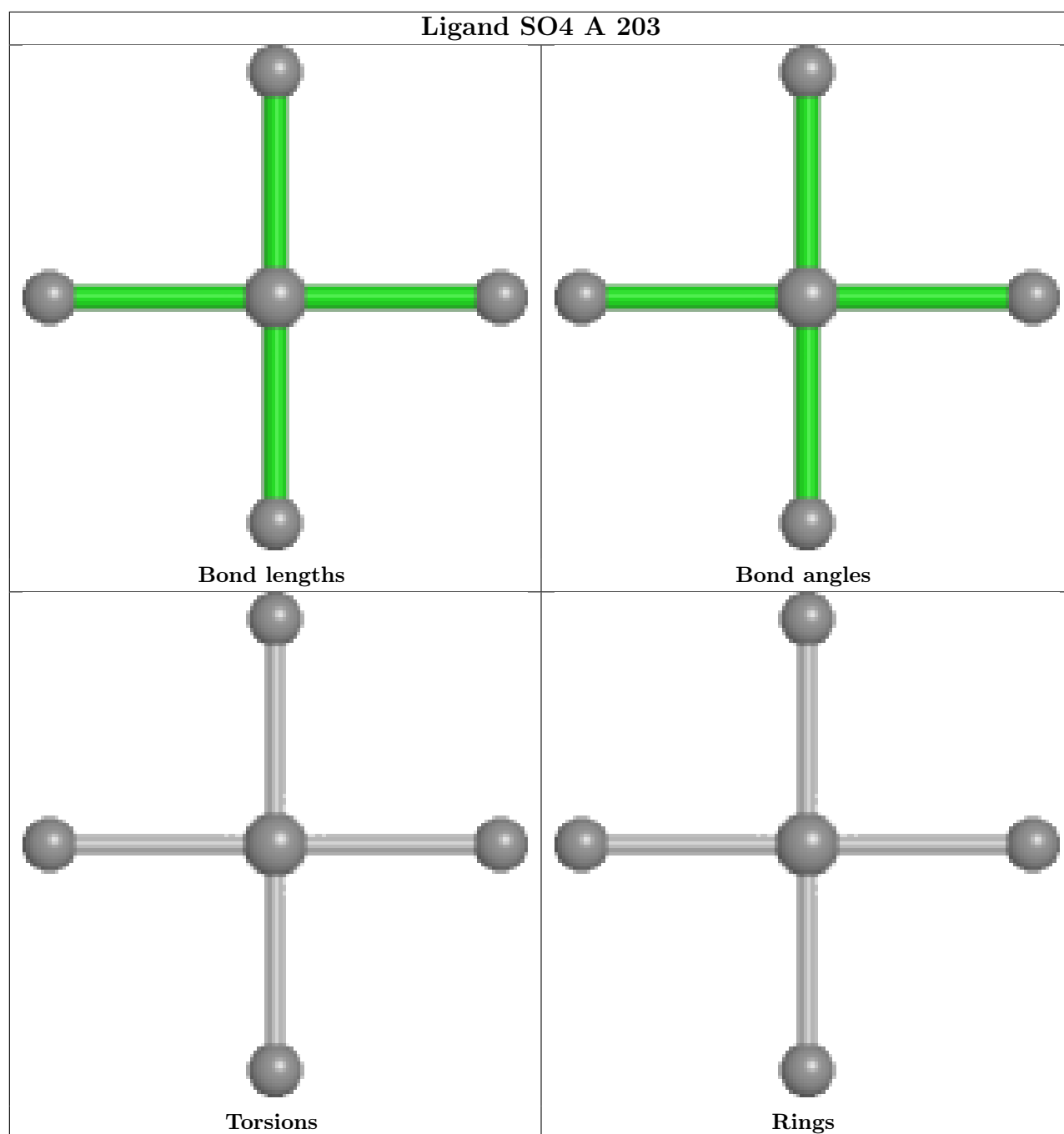
1 monomer is involved in 8 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	B	202	PE3	8	0

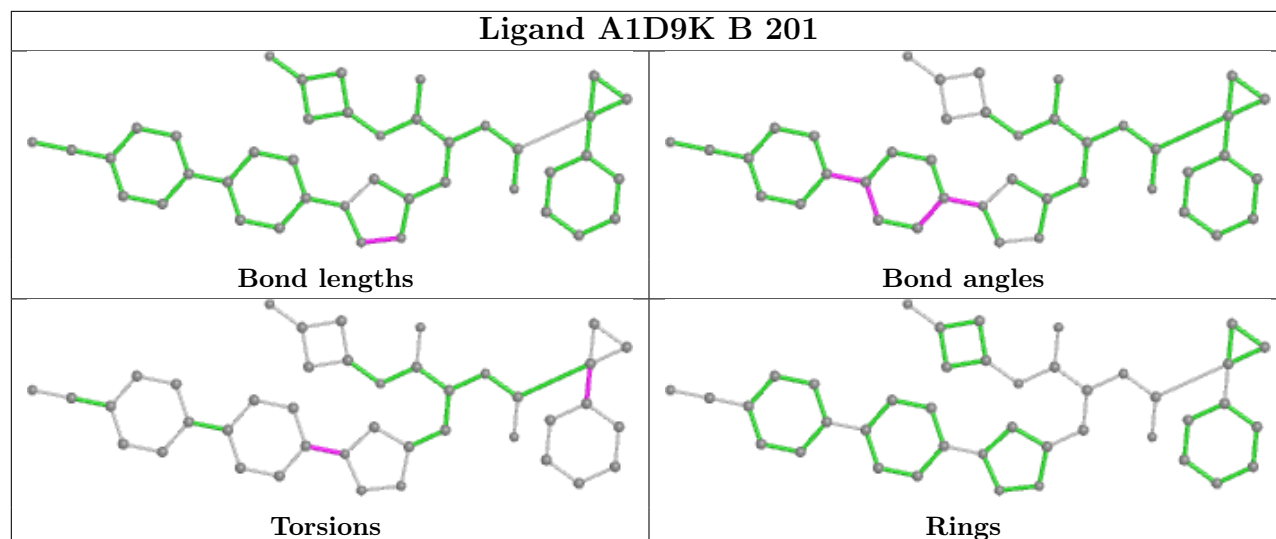
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. 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 PE3 B 202	
 Bond lengths	 Bond angles
 Torsions	 Rings

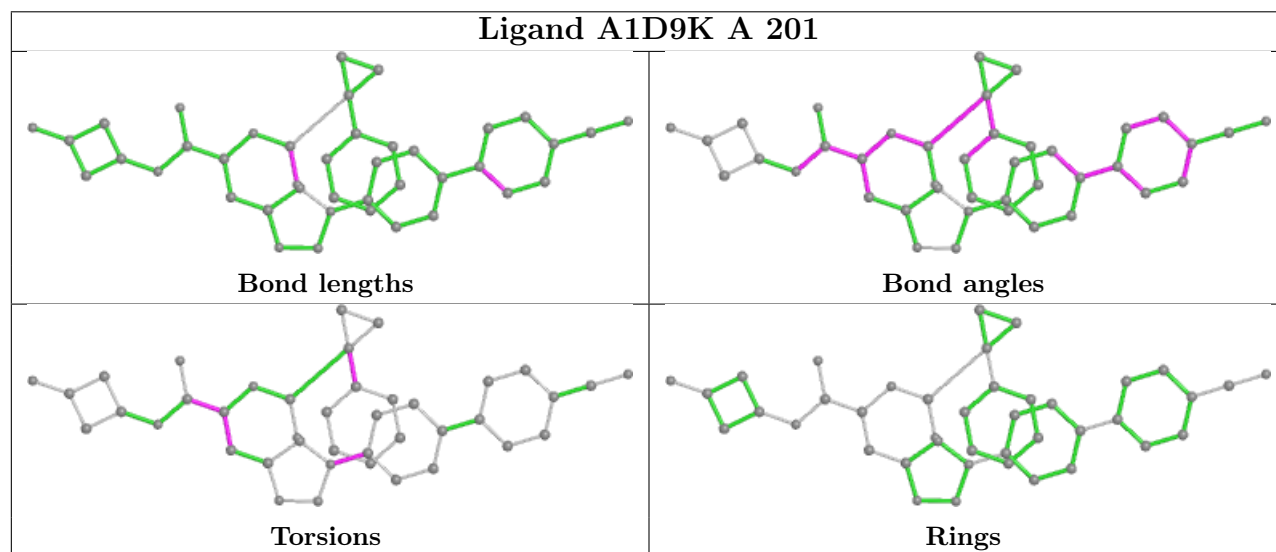
Ligand SO4 B 203	
 Bond lengths	 Bond angles
 Torsions	 Rings



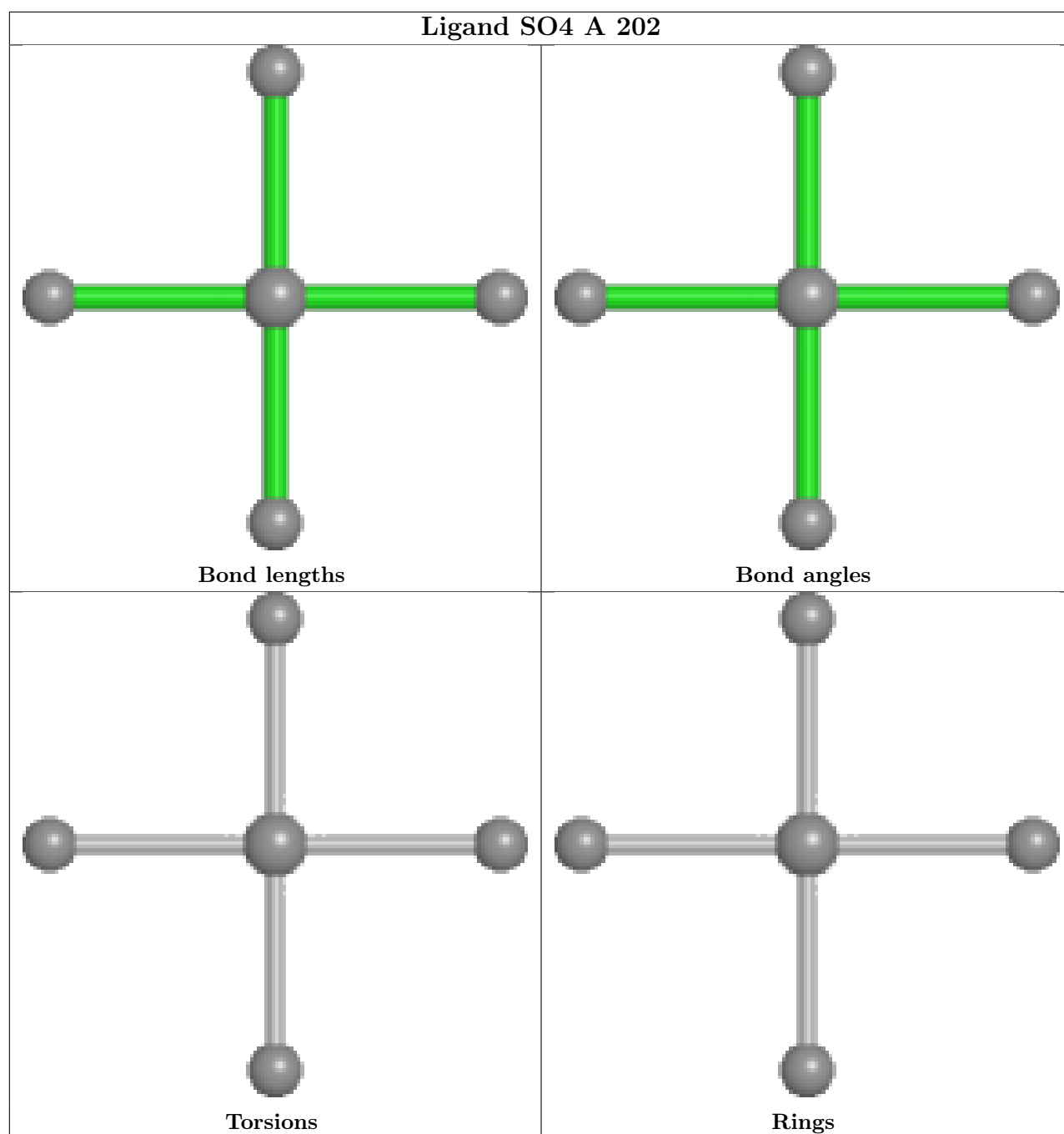
## Ligand A1D9K B 201



## Ligand A1D9K A 201







## 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

EDS was not executed - this section is therefore empty.

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

EDS was not executed - this section is therefore empty.

### 6.3 Carbohydrates

EDS was not executed - this section is therefore empty.

### 6.4 Ligands

EDS was not executed - this section is therefore empty.

### 6.5 Other polymers

EDS was not executed - this section is therefore empty.