WORLDWIDE wwPDB
PROTEIN DATA BANK

wwPDB X-ray Structure Validation Summary Report (i)

Sep 15, 2024 – 06:04 PM EDT

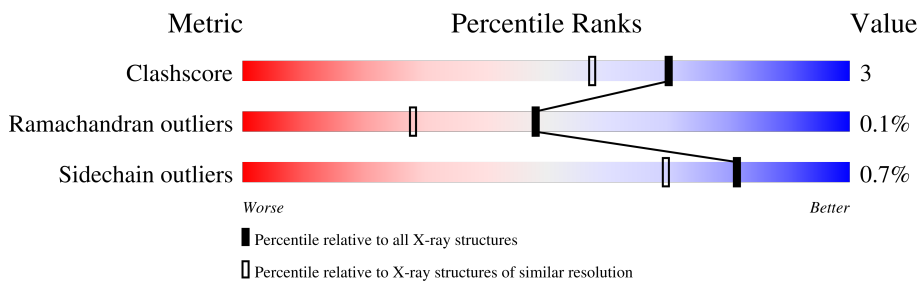|		
PDB ID	:	8V0C
Title	:	Structure of TDP1 catalytic domain complexed with compound IB06
Authors	:	Lountos, G.T.; Zhao, X.Z.; Barakat, I.; Wang, W.; Agama, K.; Al Mahmud, M.R.; Pommier, Y.; Burke Jr., T.R.
Deposited on	:	2023-11-17
Resolution	:	1.62 Å(reported)

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 1.62 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	Percentile Ranks	Value
Clashscore		3
Ramachandran outliers		0.1%
Sidechain outliers		0.7%

Worse   *Better*

▮ Percentile relative to all X-ray structures

▯ Percentile relative to X-ray structures of similar resolution

Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
Clashscore	180529	6617 (1.64-1.60)
Ramachandran outliers	177936	6498 (1.64-1.60)
Sidechain outliers	177891	6497 (1.64-1.60)

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 >=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 <=5%

Note EDS failed to run properly.

Mol	Chain	Length	Quality of chain
1	A	461	88% 8% •
1	B	461	87% 8% •

The following table lists non-polymeric compounds, carbohydrate monomers and non-standard residues in protein, DNA, RNA chains that are outliers for geometric or electron-density-fit criteria:

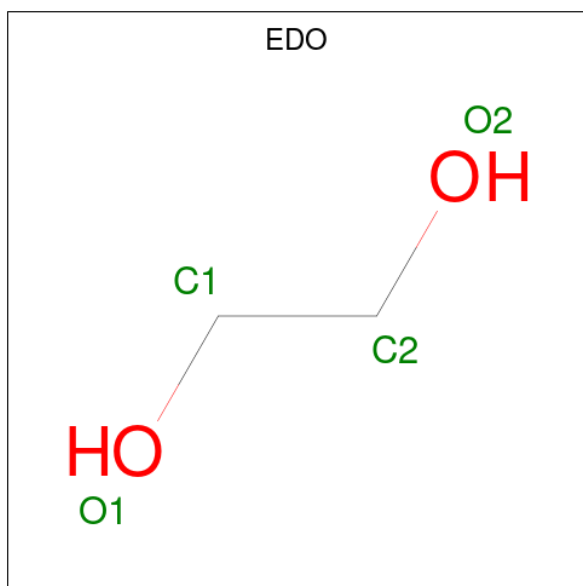| Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
4	PEG	A	707	-	-	X	-

2 Entry composition ⓘ

There are 6 unique types of molecules in this entry. The entry contains 8200 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 Tyrosyl-DNA phosphodiesterase 1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	441	Total	C	N	O	S	0	24	0
			3684	2381	619	669	15			
1	B	442	Total	C	N	O	S	0	19	0
			3639	2352	609	663	15			

- Molecule 2 is 1,2-ETHANEDIOL (three-letter code: EDO) (formula: $C_2H_6O_2$).

Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
2	A	1	Total	C	O	0	0
			4	2	2		
2	A	1	Total	C	O	0	0
			4	2	2		
2	A	1	Total	C	O	0	0
			4	2	2		
2	A	1	Total	C	O	0	0
			4	2	2		

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Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
2	A	1	Total 4	C 2	O 2	0	0
2	B	1	Total 4	C 2	O 2	0	0
2	B	1	Total 4	C 2	O 2	0	0
2	B	1	Total 4	C 2	O 2	0	0

- Molecule 3 is (8M)-8-(2-{[2-(fluorosulfonyl)ethyl]amino}phenyl)-4-oxo-1,4-dihydroquinolin e-3-carboxylic acid (three-letter code: YE3) (formula: $C_{18}H_{15}FN_2O_5S$) (labeled as "Ligand of Interest" by depositor).
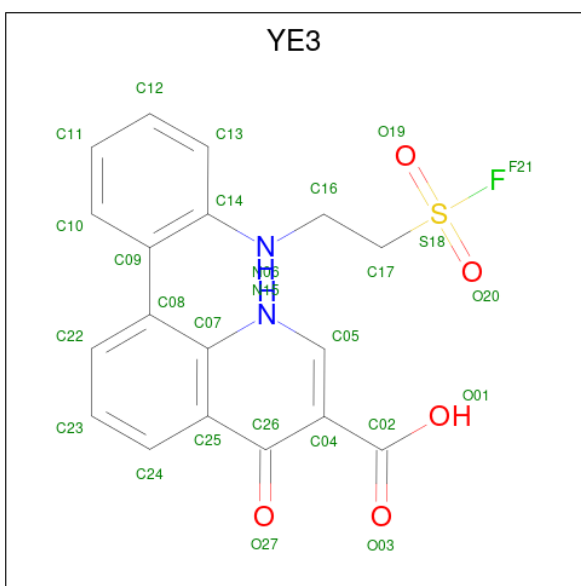
Mol	Chain	Residues	Atoms						ZeroOcc	AltConf
3	A	1	Total 53	C 36	F 1	N 4	O 10	S 2	0	1
3	B	1	Total 53	C 36	F 1	N 4	O 10	S 2	0	1

- Molecule 4 is DI(HYDROXYETHYL)ETHER (three-letter code: PEG) (formula: $C_4H_{10}O_3$).

PEG

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

- Molecule 5 is DIMETHYL SULFOXIDE (three-letter code: DMS) (formula: C_2H_6OS).

DMS

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
5	A	1	Total 4	C 2	O 1	S 1	0	0

- Molecule 6 is water.

| Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	A	430	Total 430	O 430	0	0
6	B	291	Total 291	O 291	0	0

3   Residue-property plots ⓘ

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 failed to run properly.

• Molecule 1: Tyrosyl-DNA phosphodiesterase 1

Chain A:

• Molecule 1: Tyrosyl-DNA phosphodiesterase 1

Chain B:
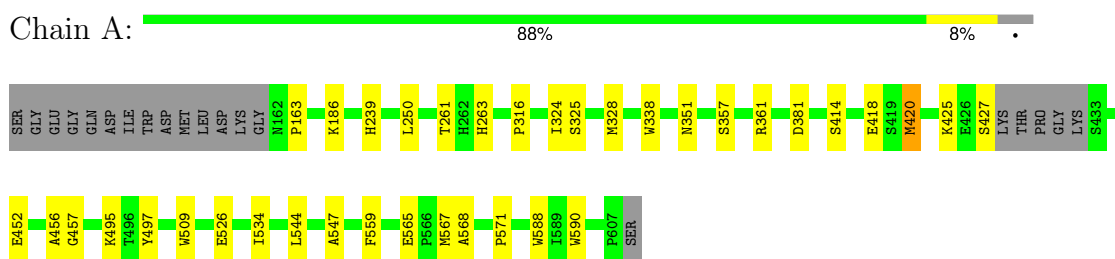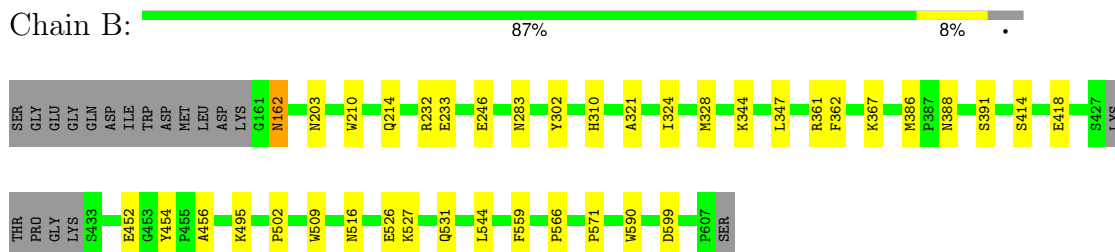
4 Data and refinement statistics ⓘ

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

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α, β, γ	50.02Å 105.18Å 193.62Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	45.17 – 1.62	Depositor
% Data completeness (in resolution range)	94.3 (45.17-1.62)	Depositor
R_{merge}	(Not available)	Depositor
R_{sym}	0.07	Depositor
$<I/\sigma(I)>$ [1]	2.86 (at 1.62Å)	Xtriage
Refinement program	PHENIX 1.16_3549	Depositor
R, R_{free}	0.172 , 0.203	Depositor
Wilson B-factor (Å^2)	14.1	Xtriage
Anisotropy	0.506	Xtriage
L-test for twinning[2]	$<|L|> = 0.49, <L^2> = 0.32$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
Total number of atoms	8200	wwPDB-VP
Average B, all atoms (Å^2)	24.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.79% of the height of the origin peak. No significant pseudotranslation is detected.*

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[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.

5 Model quality ⓘ

5.1 Standard geometry ⓘ

Bond lengths and bond angles in the following residue types are not validated in this section: PEG, DMS, EDO, YE3

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	0.35	0/3803	0.57	1/5169 (0.0%)
1	B	0.33	0/3758	0.54	1/5112 (0.0%)
All	All	0.34	0/7561	0.56	2/10281 (0.0%)

There are no bond length outliers.

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	B	344	LYS	CD-CE-NZ	6.16	125.87	111.70
1	A	420	MET	CG-SD-CE	5.95	109.71	100.20

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	3684	0	3577	26	0
1	B	3639	0	3513	22	0
2	A	20	0	30	1	0
2	B	12	0	18	0	0
3	A	53	0	0	1	0
3	B	53	0	0	0	0
4	A	7	0	10	7	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
4	B	7	0	10	2	0
5	A	4	0	6	0	0
6	A	430	0	0	2	0
6	B	291	0	0	0	0
All	All	8200	0	7164	48	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 3.

The worst 5 of 48 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:547:ALA:HA	4:A:707:PEG:H31	1.47	0.96
1:A:316:PRO:HG2	4:A:707:PEG:H11	1.51	0.91
1:A:351:ASN:HA	4:A:707:PEG:H12	1.70	0.73
1:A:316:PRO:HB2	4:A:707:PEG:H41	1.73	0.70
1:A:324:ILE:O	1:A:328[B]:MET:HG3	1.93	0.68

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	461/461 (100%)	449 (97%)	12 (3%)	0	100	100
1	B	457/461 (99%)	446 (98%)	10 (2%)	1 (0%)	44	25
All	All	918/922 (100%)	895 (98%)	22 (2%)	1 (0%)	48	28

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	162	ASN

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	402/400 (100%)	399 (99%)	3 (1%)	81	70
1	B	395/400 (99%)	393 (100%)	2 (0%)	86	78
All	All	797/800 (100%)	792 (99%)	5 (1%)	81	74

All (5) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	427	SER
1	A	495	LYS
1	A	590	TRP
1	B	386	MET
1	B	590	TRP

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. There are no such sidechains identified.

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 ⓘ

15 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	YE3	A	706[A]	1	25,28,29	1.80	4 (16%)	35,39,42	1.42	4 (11%)
3	YE3	A	706[B]	-	29,29,29	1.70	6 (20%)	40,42,42	1.38	6 (15%)
2	EDO	B	701	-	3,3,3	0.45	0	2,2,2	0.54	0
4	PEG	B	705	-	6,6,6	0.46	0	5,5,5	0.32	0
2	EDO	B	702	-	3,3,3	0.38	0	2,2,2	0.46	0
4	PEG	A	707	-	6,6,6	0.43	0	5,5,5	0.67	0
2	EDO	A	705	-	3,3,3	0.43	0	2,2,2	0.34	0
5	DMS	A	708	-	3,3,3	0.68	0	3,3,3	0.78	0
2	EDO	A	703	-	3,3,3	0.36	0	2,2,2	0.52	0
2	EDO	B	703	-	3,3,3	0.38	0	2,2,2	0.32	0
2	EDO	A	704	-	3,3,3	0.36	0	2,2,2	0.61	0
3	YE3	B	704[B]	-	29,29,29	1.70	5 (17%)	40,42,42	1.35	6 (15%)
3	YE3	B	704[A]	1	25,28,29	1.77	4 (16%)	35,39,42	1.51	4 (11%)
2	EDO	A	701	-	3,3,3	0.51	0	2,2,2	0.36	0
2	EDO	A	702	-	3,3,3	0.39	0	2,2,2	0.49	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	YE3	A	706[A]	1	-	6/14/14/15	0/3/3/3
3	YE3	A	706[B]	-	-	8/15/15/15	0/3/3/3
2	EDO	B	701	-	-	0/1/1/1	-
4	PEG	B	705	-	-	2/4/4/4	-
2	EDO	B	702	-	-	0/1/1/1	-
4	PEG	A	707	-	-	4/4/4/4	-
2	EDO	A	705	-	-	0/1/1/1	-
2	EDO	A	703	-	-	0/1/1/1	-

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	EDO	B	703	-	-	0/1/1/1	-
2	EDO	A	704	-	-	1/1/1/1	-
3	YE3	B	704[B]	-	-	7/15/15/15	0/3/3/3
3	YE3	B	704[A]	1	-	6/14/14/15	0/3/3/3
2	EDO	A	701	-	-	0/1/1/1	-
2	EDO	A	702	-	-	1/1/1/1	-

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

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	A	706[A]	YE3	C05-N06	5.35	1.40	1.33
3	B	704[A]	YE3	C05-N06	4.87	1.40	1.33
3	B	704[A]	YE3	C04-C02	4.86	1.56	1.48
3	A	706[A]	YE3	C04-C02	4.65	1.56	1.48
3	B	704[B]	YE3	C05-N06	4.65	1.40	1.33

The worst 5 of 20 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	A	706[A]	YE3	O20-S18-C17	4.41	113.62	105.54
3	B	704[A]	YE3	O20-S18-C17	4.40	113.59	105.54
3	B	704[A]	YE3	O19-S18-C17	4.04	112.94	105.54
3	A	706[B]	YE3	C16-C17-S18	3.90	122.76	113.16
3	A	706[A]	YE3	O19-S18-C17	3.50	111.95	105.54

There are no chirality outliers.

5 of 35 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	A	706[B]	YE3	C16-C17-S18-F21
3	A	706[B]	YE3	C16-C17-S18-O19
3	A	706[B]	YE3	C16-C17-S18-O20
3	B	704[B]	YE3	N15-C16-C17-S18
3	B	704[B]	YE3	C16-C17-S18-O20

There are no ring outliers.

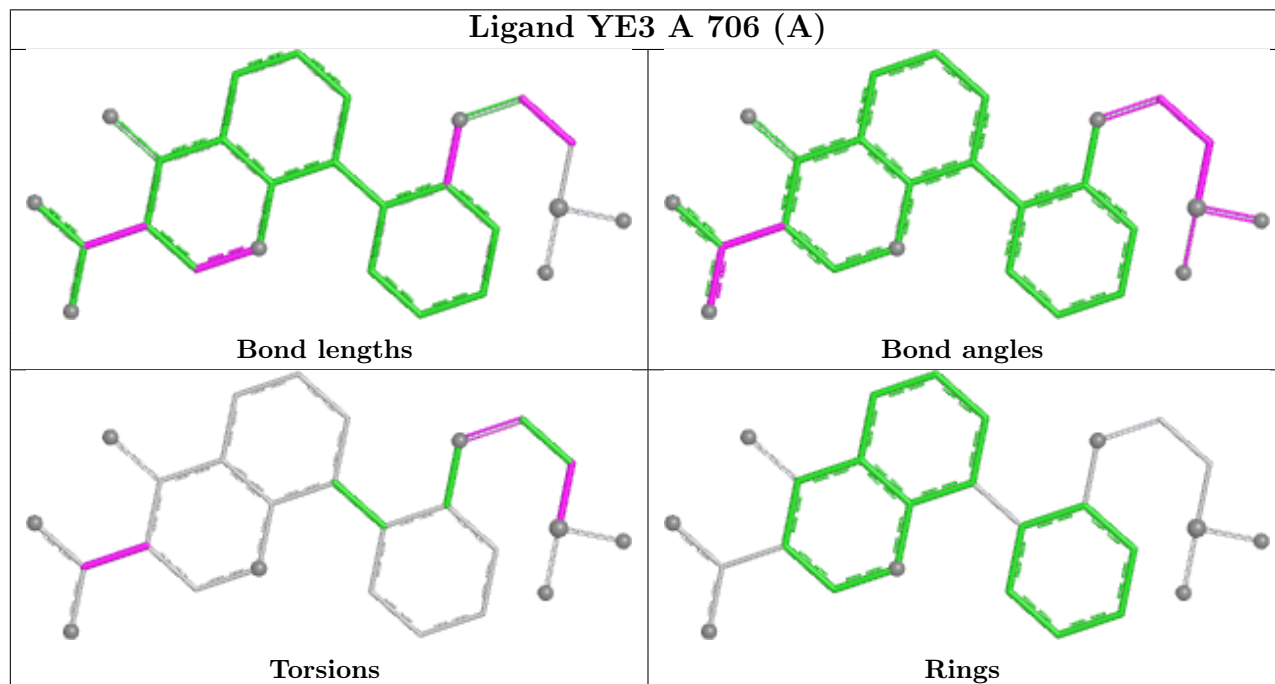4 monomers are involved in 11 short contacts:

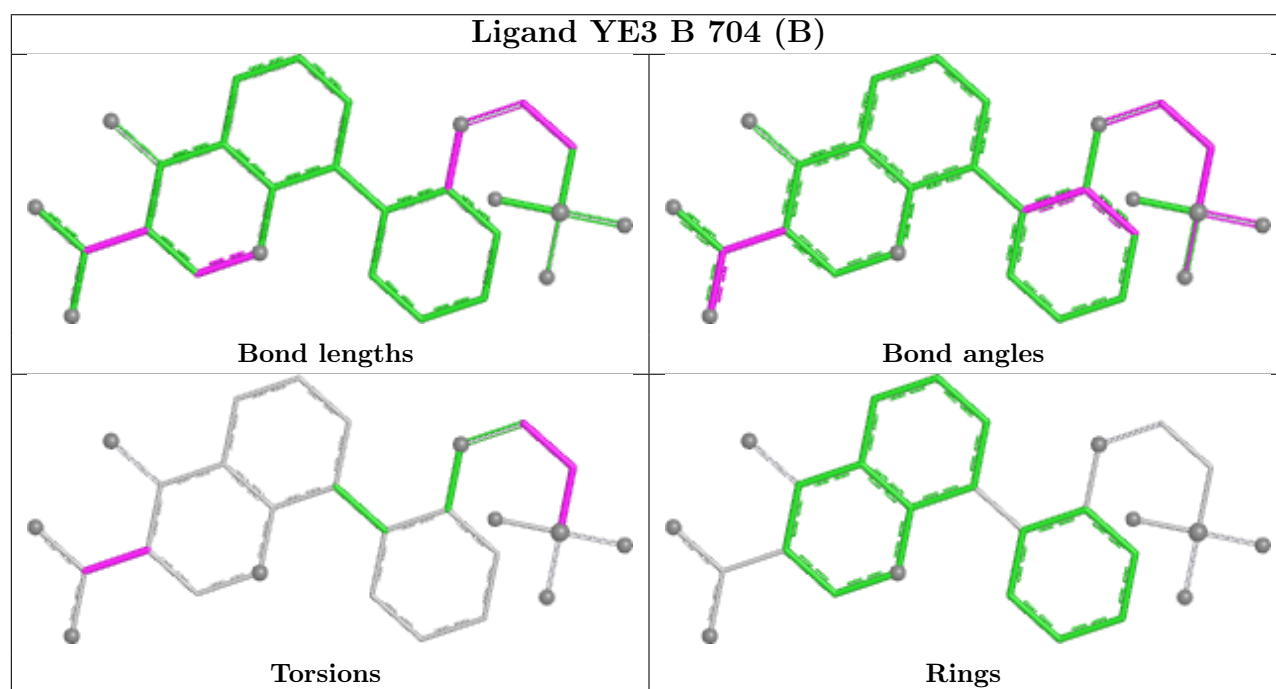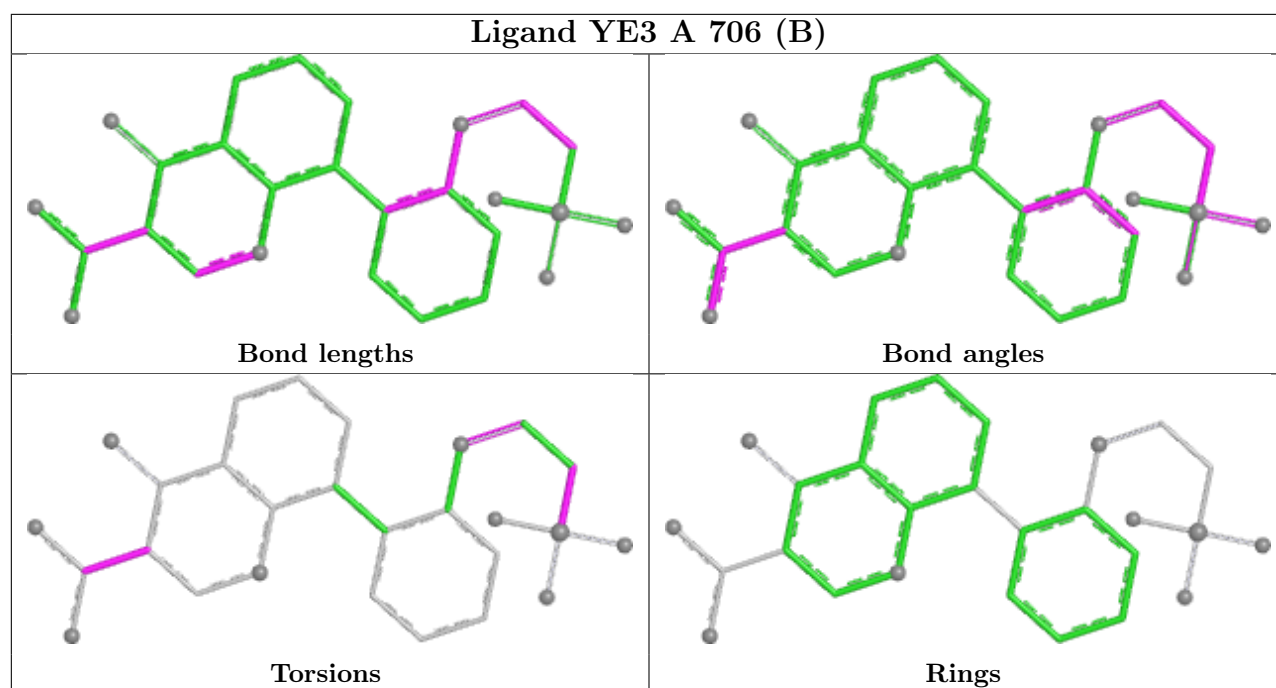| Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	A	706[A]	YE3	1	0

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Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	B	705	PEG	2	0
4	A	707	PEG	7	0
2	A	702	EDO	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 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 YE3 A 706 (A)

Bond lengths

Bond angles

Torsions

Rings

Ligand YE3 A 706 (B)

Bond lengths

Bond angles

Torsions

Rings

Ligand YE3 B 704 (B)

Bond lengths

Bond angles

Torsions

Rings

Ligand YE3 B 704 (A)

Bond lengths

Bond angles

Torsions

Rings
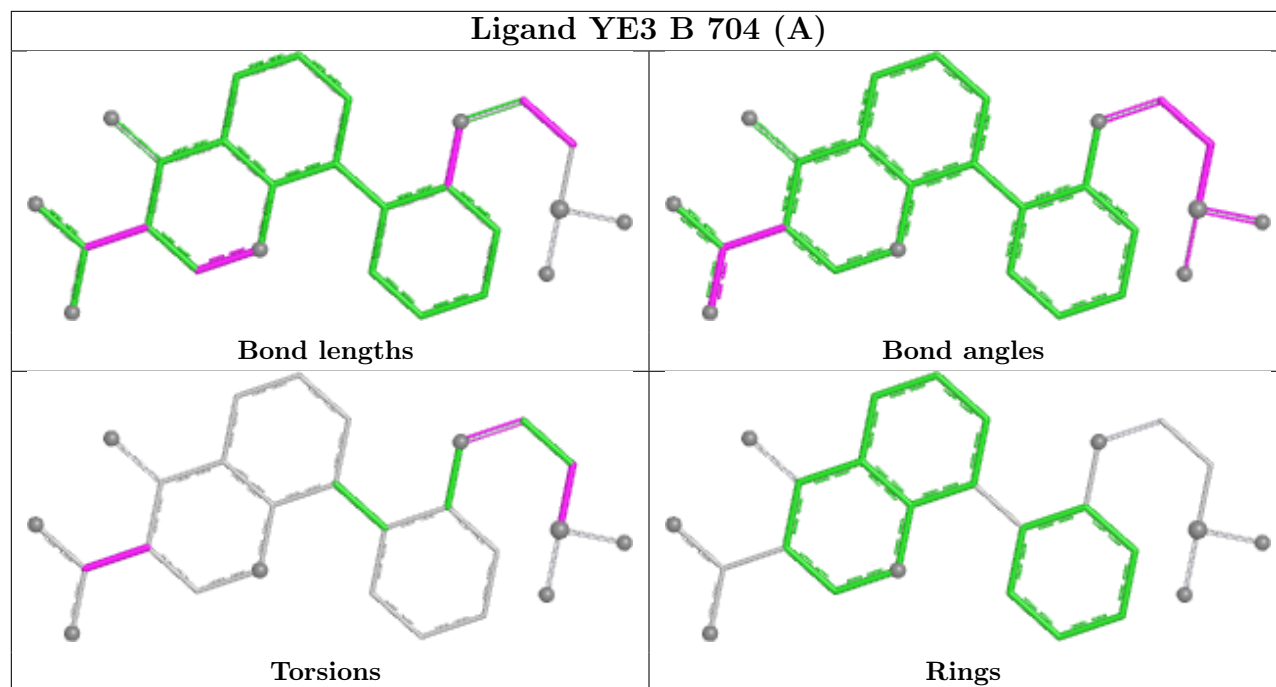
5.7 Other polymers ⓘ

There are no such residues in this entry.

5.8 Polymer linkage issues ⓘ

There are no chain breaks in this entry.

6 Fit of model and data ⓘ

6.1 Protein, DNA and RNA chains ⓘ

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

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

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

6.3 Carbohydrates ⓘ

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

6.4 Ligands ⓘ

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

6.5 Other polymers ⓘ

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