



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 5, 2026 – 11:05 AM UTC

PDB ID : 3D57 / pdb_00003d57
Title : TR Variant D355R
Authors : Jouravel, N.
Deposited on : 2008-05-15
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 ⓘ 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 ⓘ](#)) were used in the production of this report:

MolProbity : 4-5-2 with Phenix2.0
Mogul : 2022.3.0, CSD as543be (2022)
Xtriage (Phenix) : 2.0
EDS : 3.0
Buster-report : wwPDB partial adaption of 1.1.7 (2018)
Percentile statistics : 20250101.v01 (using entries in the PDB archive January 1st 2025)
CCP4 : 9.0.010 (Gargrove)
Density-Fitness : 1.0.12
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.49

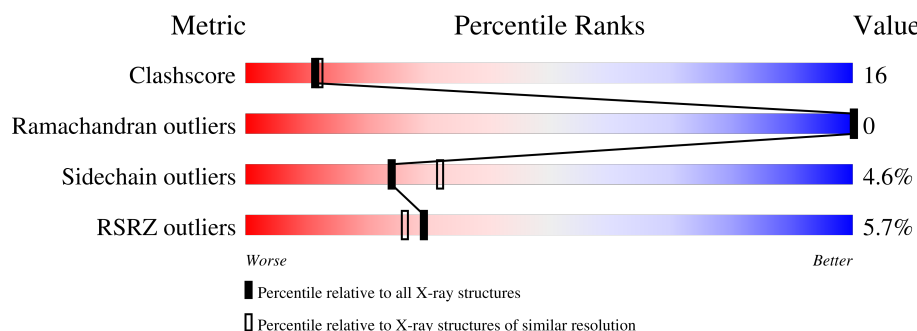
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.20 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	190562	6851 (2.20-2.20)
Ramachandran outliers	187476	6768 (2.20-2.20)
Sidechain outliers	187428	6769 (2.20-2.20)
RSRZ outliers	180081	6166 (2.20-2.20)

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 $\leq 5\%$. 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	266	4% 62% 27% • 8%
1	B	266	6% 61% 30% • 7%

2 Entry composition [i](#)

There are 4 unique types of molecules in this entry. The entry contains 4069 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 Thyroid hormone receptor beta.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	245	Total	C	N	O	S	0	0	0
			1949	1251	329	353	16			
1	B	248	Total	C	N	O	S	0	0	0
			1968	1264	330	358	16			

There are 30 discrepancies between the modelled and reference sequences:

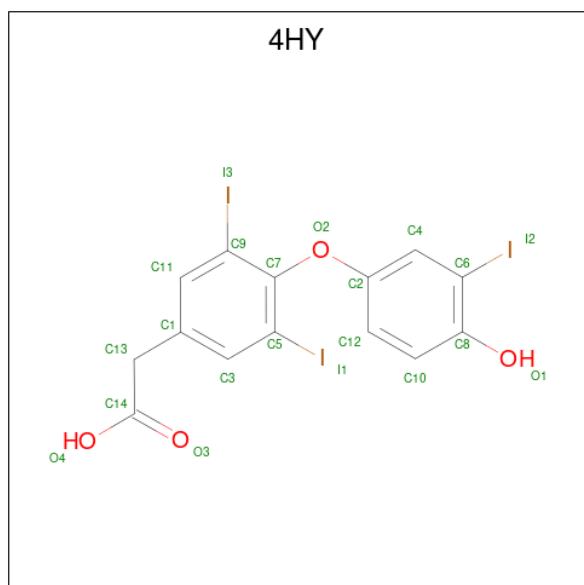
Chain	Residue	Modelled	Actual	Comment	Reference
A	195	MET	-	expression tag	UNP P10828
A	196	GLY	-	expression tag	UNP P10828
A	197	SER	-	expression tag	UNP P10828
A	198	SER	-	expression tag	UNP P10828
A	199	HIS	-	expression tag	UNP P10828
A	200	HIS	-	expression tag	UNP P10828
A	201	HIS	-	expression tag	UNP P10828
A	202	HIS	-	expression tag	UNP P10828
A	203	HIS	-	expression tag	UNP P10828
A	204	HIS	-	expression tag	UNP P10828
A	205	SER	-	expression tag	UNP P10828
A	206	GLN	-	expression tag	UNP P10828
A	207	ASP	-	expression tag	UNP P10828
A	208	PRO	-	expression tag	UNP P10828
A	355	ARG	ASP	engineered mutation	UNP P10828
B	195	MET	-	expression tag	UNP P10828
B	196	GLY	-	expression tag	UNP P10828
B	197	SER	-	expression tag	UNP P10828
B	198	SER	-	expression tag	UNP P10828
B	199	HIS	-	expression tag	UNP P10828
B	200	HIS	-	expression tag	UNP P10828
B	201	HIS	-	expression tag	UNP P10828
B	202	HIS	-	expression tag	UNP P10828
B	203	HIS	-	expression tag	UNP P10828
B	204	HIS	-	expression tag	UNP P10828

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Chain	Residue	Modelled	Actual	Comment	Reference
B	205	SER	-	expression tag	UNP P10828
B	206	GLN	-	expression tag	UNP P10828
B	207	ASP	-	expression tag	UNP P10828
B	208	PRO	-	expression tag	UNP P10828
B	355	ARG	ASP	engineered mutation	UNP P10828

- Molecule 2 is [4-(4-HYDROXY-3-iodo-PHENOXY)-3,5-DIIODO-PHENYL]-ACETIC ACID (CCD ID: 4HY) (formula: C₁₄H₉I₃O₄).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
2	A	1	Total	C	I	O	0	0
			21	14	3	4		
2	B	1	Total	C	I	O	0	0
			21	14	3	4		

- Molecule 3 is SULFATE ION (CCD ID: SO4) (formula: O₄S).



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

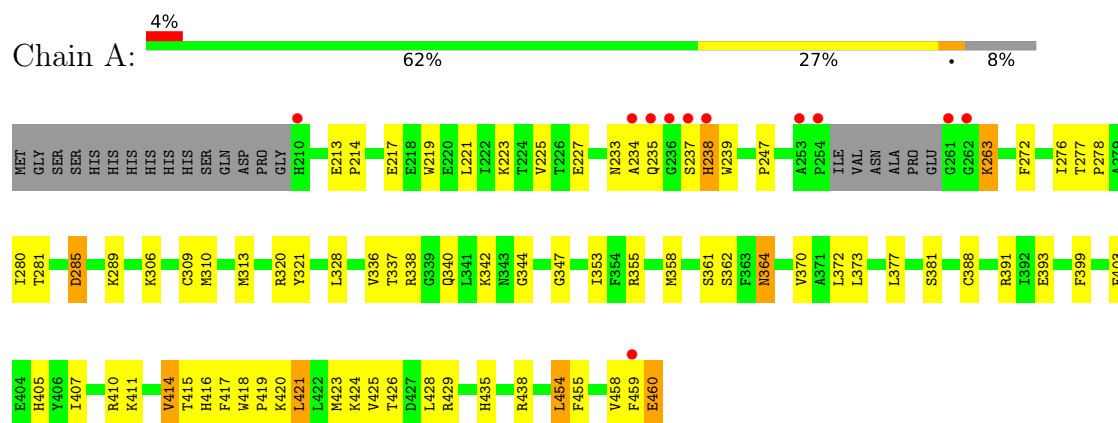
- Molecule 4 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	55	Total	O	0	0
			55	55		
4	B	50	Total	O	0	0
			50	50		

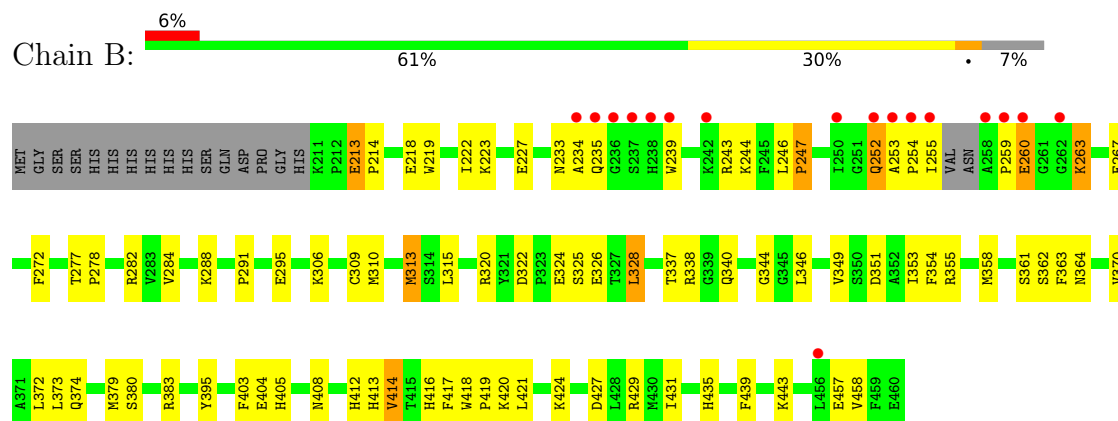
3 Residue-property plots

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 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: Thyroid hormone receptor beta



• Molecule 1: Thyroid hormone receptor beta



4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	55.56Å 92.96Å 58.81Å 90.00° 110.02° 90.00°	Depositor
Resolution (Å)	25.00 – 2.20 25.00 – 2.20	Depositor EDS
% Data completeness (in resolution range)	(Not available) (25.00-2.20) 90.2 (25.00-2.20)	Depositor EDS
R_{merge}	0.08	Depositor
R_{sym}	0.07	Depositor
$\langle I/\sigma(I) \rangle$ ¹	3.05 (at 2.19Å)	Xtriage
Refinement program	CNS	Depositor
R, R_{free}	0.210 , 0.240 0.212 , (Not available)	Depositor DCC
R_{free} test set	No test flags present.	wwPDB-VP
Wilson B-factor (Å ²)	19.5	Xtriage
Anisotropy	0.587	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.35 , 37.5	EDS
L-test for twinning ²	$\langle L \rangle = 0.48$, $\langle L^2 \rangle = 0.31$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.92	EDS
Total number of atoms	4069	wwPDB-VP
Average B, all atoms (Å ²)	25.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 7.56% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

²Theoretical 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: 4HY, 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	0.52	2/1994 (0.1%)	0.93	6/2695 (0.2%)
1	B	0.43	1/2013 (0.0%)	0.94	6/2722 (0.2%)
All	All	0.48	3/4007 (0.1%)	0.94	12/5417 (0.2%)

All (3) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	411	LYS	C-O	-6.97	1.15	1.24
1	B	313	MET	SD-CE	-5.21	1.66	1.79
1	A	410	ARG	C-N	-5.19	1.26	1.33

All (12) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	247	PRO	CB-CA-C	-8.29	97.88	111.56
1	B	322	ASP	CA-C-N	6.51	126.01	119.24
1	B	322	ASP	C-N-CA	6.51	126.01	119.24
1	B	247	PRO	CB-CA-C	-6.40	103.51	111.64
1	A	364	ASN	N-CA-C	6.32	120.23	111.90
1	A	238	HIS	CB-CA-C	-5.91	99.19	109.64
1	A	425	VAL	N-CA-C	-5.71	104.80	110.62
1	B	413	HIS	N-CA-C	-5.67	96.56	107.57
1	B	412	HIS	N-CA-C	5.40	117.26	110.24
1	A	370	VAL	N-CA-C	-5.36	105.31	110.72
1	A	411	LYS	N-CA-C	5.35	122.19	110.80
1	B	328	LEU	N-CA-C	-5.21	100.41	108.90

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	1949	0	1955	57	0
1	B	1968	0	1977	73	0
2	A	21	0	8	1	0
2	B	21	0	8	1	0
3	B	5	0	0	0	0
4	A	55	0	0	4	0
4	B	50	0	0	1	0
All	All	4069	0	3948	127	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 16.

All (127) 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:259:PRO:C	1:B:260:GLU:HG3	1.48	1.25
1:B:259:PRO:O	1:B:260:GLU:CG	1.86	1.24
1:B:259:PRO:O	1:B:260:GLU:HG3	1.05	1.19
1:B:263:LYS:HE3	1:B:263:LYS:H	1.20	1.04
1:B:235:GLN:HB3	1:B:320:ARG:NH2	1.77	1.00
1:A:415:THR:HB	4:A:539:HOH:O	1.61	0.96
1:B:235:GLN:HB3	1:B:320:ARG:HH21	1.29	0.95
1:B:235:GLN:NE2	1:B:320:ARG:HD3	1.85	0.92
1:B:235:GLN:HE21	1:B:320:ARG:HD3	1.35	0.89
1:B:259:PRO:C	1:B:260:GLU:CG	2.37	0.88
1:B:263:LYS:H	1:B:263:LYS:CE	1.88	0.86
1:B:418:TRP:HB3	1:B:419:PRO:HD3	1.61	0.82
1:A:418:TRP:HB3	1:A:419:PRO:HD3	1.66	0.77
1:B:309:CYS:SG	1:B:313:MET:HE2	2.26	0.76
1:A:310:MET:HE2	1:A:435:HIS:CD2	2.20	0.76
1:B:338:ARG:NH1	1:B:358:MET:HE1	2.02	0.75
1:B:246:LEU:HD12	1:B:247:PRO:HD2	1.68	0.75
1:B:263:LYS:HE3	1:B:263:LYS:N	1.98	0.73
1:B:235:GLN:CB	1:B:320:ARG:HH21	2.03	0.70
1:B:351:ASP:O	1:B:355:ARG:HG3	1.92	0.69

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:263:LYS:N	1:A:263:LYS:HD3	2.07	0.69
1:A:309:CYS:O	1:A:313:MET:HG3	1.94	0.67
1:A:225:VAL:HG11	1:A:399:PHE:HE2	1.62	0.65
1:B:218:GLU:O	1:B:222:ILE:HG13	1.98	0.64
1:A:416:HIS:HB2	1:A:420:LYS:HE3	1.79	0.64
1:B:214:PRO:HG2	1:B:219:TRP:CE2	2.32	0.64
1:A:223:LYS:O	1:A:227:GLU:HG3	1.99	0.63
1:A:381:SER:OG	1:A:393:GLU:HG2	1.99	0.61
1:A:338:ARG:NH2	1:A:358:MET:HE1	2.16	0.61
1:A:272:PHE:HE2	1:A:336:VAL:HG11	1.66	0.61
1:A:235:GLN:C	1:A:237:SER:H	2.09	0.60
1:B:272:PHE:HE1	1:B:344:GLY:HA3	1.66	0.60
1:A:306:LYS:HZ2	1:A:460:GLU:HG2	1.66	0.60
1:A:280:ILE:HG21	1:A:458:VAL:HG21	1.83	0.60
1:B:338:ARG:HH11	1:B:358:MET:HE1	1.64	0.59
1:B:315:LEU:HD22	1:B:373:LEU:HD22	1.85	0.59
1:A:235:GLN:O	1:A:235:GLN:HG2	2.04	0.58
1:B:259:PRO:O	1:B:260:GLU:CD	2.44	0.58
1:B:337:THR:OG1	1:B:340:GLN:HG3	2.04	0.58
1:A:239:TRP:H	1:A:239:TRP:CD1	2.19	0.58
1:B:429:ARG:HG2	1:B:429:ARG:HH11	1.68	0.58
1:A:429:ARG:HD3	4:A:513:HOH:O	2.03	0.57
1:B:416:HIS:O	1:B:420:LYS:HG3	2.06	0.56
1:B:346:LEU:HB3	1:B:349:VAL:HB	1.87	0.56
1:B:252:GLN:O	1:B:253:ALA:C	2.48	0.55
1:A:414:VAL:CG1	1:A:417:PHE:HD1	2.19	0.55
1:A:214:PRO:HG2	1:A:219:TRP:CE2	2.41	0.55
1:A:285:ASP:O	1:A:289:LYS:HG3	2.07	0.55
1:A:280:ILE:CG2	1:A:458:VAL:HG21	2.37	0.55
1:A:306:LYS:NZ	1:A:460:GLU:HG2	2.22	0.54
1:A:217:GLU:H	1:A:217:GLU:CD	2.16	0.54
1:A:362:SER:HB2	1:B:364:ASN:HD21	1.71	0.54
1:A:225:VAL:HG11	1:A:399:PHE:CE2	2.42	0.54
1:B:235:GLN:CB	1:B:320:ARG:NH2	2.61	0.54
1:A:221:LEU:O	1:A:225:VAL:HG13	2.06	0.53
1:B:214:PRO:HG2	1:B:219:TRP:CZ2	2.44	0.53
1:A:310:MET:HE2	1:A:435:HIS:CG	2.44	0.53
1:A:213:GLU:HB3	1:A:214:PRO:HD2	1.91	0.52
1:B:372:LEU:HD13	1:B:403:PHE:HA	1.90	0.52
1:A:403:PHE:O	1:A:407:ILE:HG12	2.09	0.52
1:A:423:MET:O	1:A:426:THR:HB	2.08	0.52

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:429:ARG:HH11	1:A:429:ARG:HG2	1.74	0.52
1:A:239:TRP:CG	1:A:320:ARG:HD3	2.44	0.51
1:B:272:PHE:CE1	1:B:344:GLY:HA3	2.45	0.51
1:A:454:LEU:HB2	4:A:510:HOH:O	2.09	0.51
1:B:427:ASP:O	1:B:431:ILE:HG13	2.10	0.51
1:B:310:MET:SD	1:B:313:MET:HE3	2.50	0.51
1:A:337:THR:OG1	1:A:340:GLN:HG3	2.11	0.50
1:A:342:LYS:HG3	1:A:347:GLY:O	2.10	0.50
1:A:417:PHE:CE2	1:A:421:LEU:HD12	2.46	0.50
1:B:277:THR:HB	1:B:278:PRO:HD3	1.94	0.49
1:B:284:VAL:O	1:B:288:LYS:HG2	2.12	0.49
1:B:439:PHE:CE2	1:B:443:LYS:HD2	2.48	0.49
1:A:355:ARG:NH2	1:B:324:GLU:O	2.46	0.49
1:A:364:ASN:HD21	1:B:362:SER:HB2	1.78	0.49
1:B:235:GLN:NE2	1:B:320:ARG:CD	2.66	0.48
1:B:243:ARG:O	1:B:244:LYS:HD2	2.13	0.48
1:B:429:ARG:HG2	1:B:429:ARG:NH1	2.28	0.48
1:B:414:VAL:CG1	1:B:417:PHE:HD1	2.26	0.47
1:B:353:ILE:HD13	2:B:500:4HY:I3	2.84	0.47
1:B:380:SER:O	1:B:383:ARG:HG2	2.14	0.47
1:A:225:VAL:CG1	1:A:399:PHE:HE2	2.27	0.46
1:B:223:LYS:O	1:B:227:GLU:HG3	2.15	0.46
1:A:321:TYR:HA	1:A:328:LEU:HD23	1.96	0.46
1:B:254:PRO:O	1:B:255:ILE:CG2	2.64	0.46
1:A:414:VAL:HG13	1:A:417:PHE:HB2	1.96	0.45
1:A:429:ARG:HG2	1:A:429:ARG:NH1	2.31	0.45
1:B:325:SER:O	1:B:326:GLU:HB2	2.16	0.45
1:A:277:THR:HB	1:A:278:PRO:HD3	1.98	0.45
1:B:370:VAL:O	1:B:374:GLN:HG3	2.17	0.45
1:B:424:LYS:NZ	4:B:534:HOH:O	2.49	0.45
1:B:379:MET:HE3	1:B:395:TYR:HB3	1.98	0.45
1:B:235:GLN:HB2	1:B:239:TRP:CD1	2.52	0.45
1:B:255:ILE:HG13	1:B:255:ILE:O	2.17	0.45
1:A:235:GLN:OE1	1:A:239:TRP:CD1	2.68	0.45
1:B:380:SER:HB2	1:B:383:ARG:HE	1.82	0.44
1:A:388:CYS:HB3	1:A:391:ARG:HD3	1.99	0.44
1:B:310:MET:HE2	1:B:458:VAL:HG11	2.00	0.44
1:B:233:ASN:CG	1:B:235:GLN:HG2	2.43	0.44
1:A:372:LEU:HD13	1:A:403:PHE:HA	2.00	0.44
1:B:328:LEU:HG	1:B:354:PHE:CZ	2.52	0.43
1:B:254:PRO:C	1:B:255:ILE:HG22	2.43	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:405:HIS:HA	1:B:408:ASN:HD22	1.84	0.43
1:B:263:LYS:H	1:B:263:LYS:CD	2.26	0.43
1:B:306:LYS:NZ	1:B:457:GLU:O	2.52	0.43
1:A:263:LYS:HD3	1:A:263:LYS:H	1.82	0.43
1:A:347:GLY:HA3	1:A:438:ARG:HE	1.83	0.43
1:A:272:PHE:HE1	1:A:344:GLY:HA3	1.85	0.42
1:A:353:ILE:HD13	2:A:500:4HY:I3	2.88	0.42
1:A:424:LYS:HA	1:A:424:LYS:HD3	1.83	0.42
1:B:234:ALA:HB2	1:B:282:ARG:NH1	2.35	0.42
1:B:309:CYS:SG	1:B:313:MET:CE	3.04	0.42
1:B:326:GLU:HA	1:B:326:GLU:OE1	2.19	0.42
1:A:213:GLU:C	1:A:405:HIS:HB3	2.44	0.42
1:A:435:HIS:HE1	1:A:459:PHE:CD1	2.38	0.41
1:A:276:ILE:HD13	1:A:455:PHE:CE1	2.56	0.41
1:A:435:HIS:HE1	1:A:459:PHE:CE1	2.39	0.41
1:B:363:PHE:HD2	1:B:417:PHE:CE1	2.38	0.41
1:A:234:ALA:HB2	4:A:519:HOH:O	2.20	0.41
1:B:310:MET:SD	1:B:313:MET:CE	3.09	0.41
1:A:377:LEU:HD11	1:A:428:LEU:HD13	2.02	0.40
1:B:404:GLU:OE1	1:B:418:TRP:CD1	2.74	0.40
1:B:418:TRP:HB3	1:B:419:PRO:CD	2.41	0.40
1:B:213:GLU:HB3	1:B:214:PRO:HD2	2.04	0.40
1:B:235:GLN:NE2	1:B:320:ARG:HH21	2.19	0.40
1:B:291:PRO:O	1:B:295:GLU:HG3	2.22	0.40
1:B:363:PHE:O	1:B:364:ASN:C	2.65	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	241/266 (91%)	233 (97%)	8 (3%)	0	100 100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	B	244/266 (92%)	231 (95%)	13 (5%)	0	100	100
All	All	485/532 (91%)	464 (96%)	21 (4%)	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	215/233 (92%)	204 (95%)	11 (5%)	21	27
1	B	217/233 (93%)	208 (96%)	9 (4%)	27	37
All	All	432/466 (93%)	412 (95%)	20 (5%)	24	32

All (20) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	233	ASN
1	A	238	HIS
1	A	263	LYS
1	A	281	THR
1	A	285	ASP
1	A	361	SER
1	A	373	LEU
1	A	414	VAL
1	A	421	LEU
1	A	454	LEU
1	A	460	GLU
1	B	213	GLU
1	B	252	GLN
1	B	260	GLU
1	B	263	LYS
1	B	267	GLU
1	B	361	SER
1	B	414	VAL

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Mol	Chain	Res	Type
1	B	421	LEU
1	B	435	HIS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (13) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	210	HIS
1	A	233	ASN
1	A	241	GLN
1	A	252	GLN
1	A	271	HIS
1	A	364	ASN
1	A	396	GLN
1	A	416	HIS
1	B	235	GLN
1	B	364	ASN
1	B	396	GLN
1	B	408	ASN
1	B	441	HIS

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 oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

3 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	SO4	B	501	-	4,4,4	0.32	0	6,6,6	0.11	0
2	4HY	B	500	-	22,22,22	2.01	6 (27%)	31,31,31	1.06	1 (3%)
2	4HY	A	500	-	22,22,22	1.92	7 (31%)	31,31,31	1.12	1 (3%)

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	4HY	B	500	-	-	0/8/8/8	0/2/2/2
2	4HY	A	500	-	-	0/8/8/8	0/2/2/2

All (13) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	500	4HY	C3-C1	4.62	1.47	1.39
2	A	500	4HY	C3-C1	4.25	1.46	1.39
2	B	500	4HY	C13-C14	3.81	1.59	1.51
2	A	500	4HY	C13-C14	3.61	1.58	1.51
2	B	500	4HY	C11-C9	3.07	1.45	1.39
2	A	500	4HY	C11-C9	2.66	1.44	1.39
2	A	500	4HY	C12-C2	2.48	1.43	1.38
2	B	500	4HY	C12-C2	2.40	1.43	1.38
2	B	500	4HY	C9-I3	2.28	2.15	2.10
2	B	500	4HY	C5-I1	2.13	2.14	2.10
2	A	500	4HY	O1-C8	2.11	1.40	1.36
2	A	500	4HY	C8-C6	2.08	1.43	1.39
2	A	500	4HY	C9-I3	2.07	2.14	2.10

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	500	4HY	C2-O2-C7	3.65	124.16	118.40
2	A	500	4HY	C2-O2-C7	3.60	124.08	118.40

There are no chirality outliers.

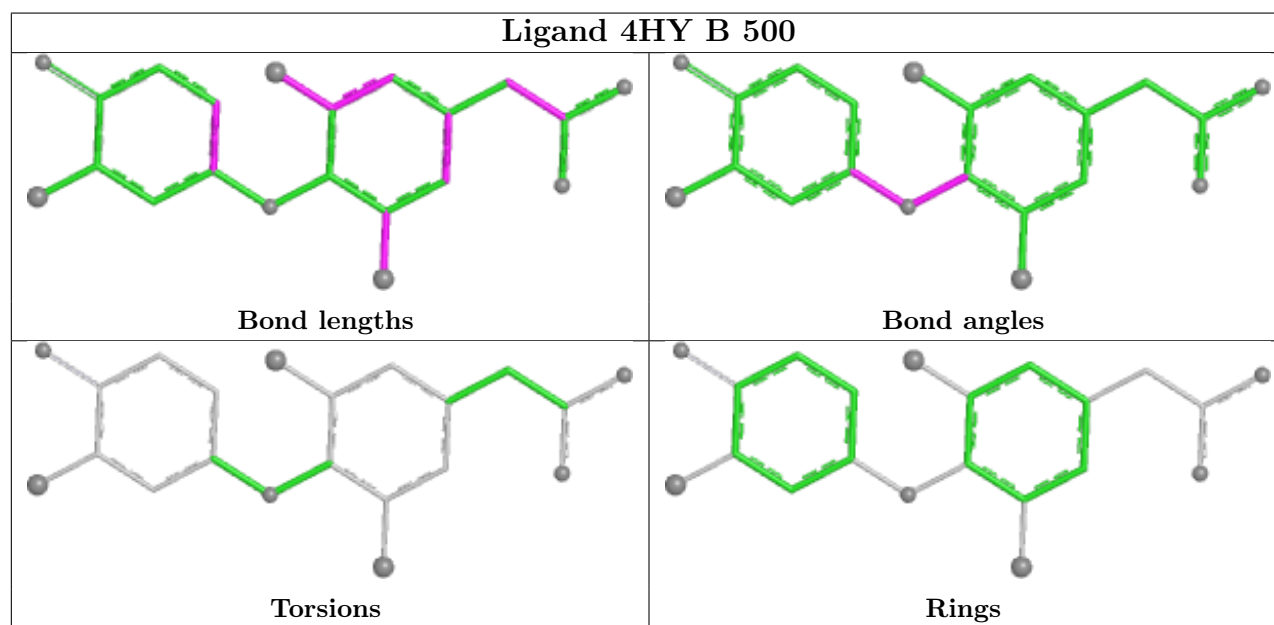
There are no torsion outliers.

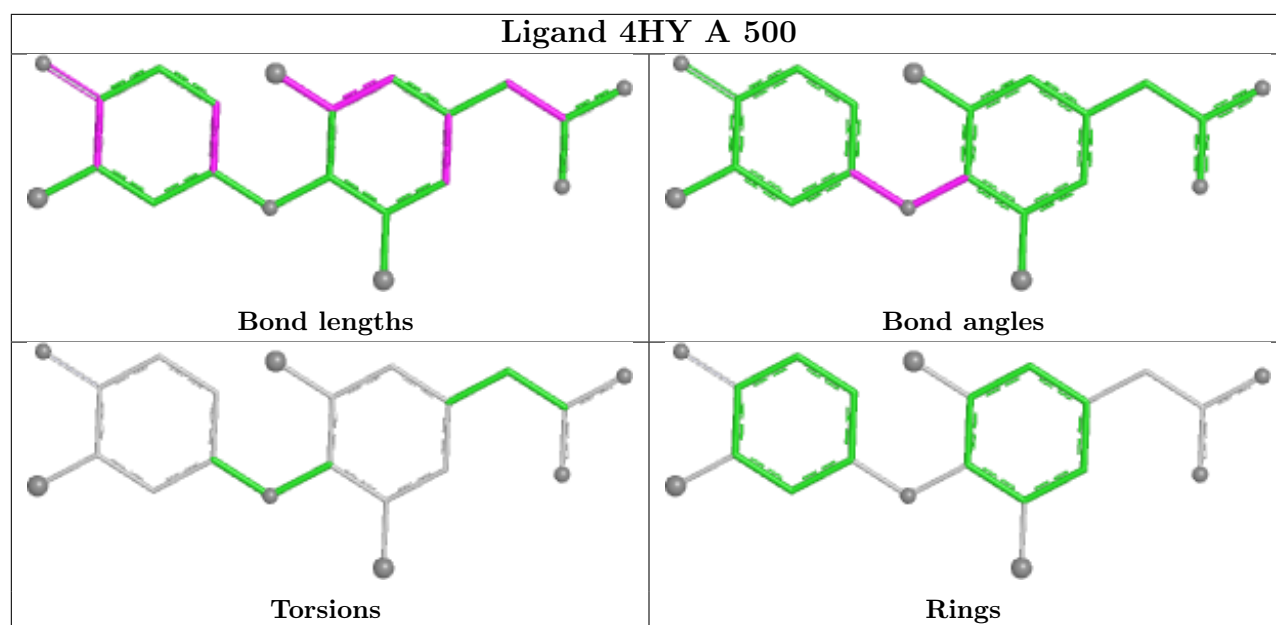
There are no ring outliers.

2 monomers are involved in 2 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	B	500	4HY	1	0
2	A	500	4HY	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, 95th 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 ²)	Q<0.9
1	A	245/266 (92%)	0.33	11 (4%) 38 35	7, 23, 47, 66	0
1	B	248/266 (93%)	0.35	17 (6%) 23 20	8, 23, 55, 73	0
All	All	493/532 (92%)	0.34	28 (5%) 29 26	7, 23, 50, 73	0

All (28) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	237	SER	6.7
1	A	236	GLY	6.7
1	B	236	GLY	5.4
1	B	235	GLN	5.4
1	A	234	ALA	5.2
1	B	255	ILE	5.2
1	A	235	GLN	4.9
1	B	258	ALA	4.8
1	A	254	PRO	4.6
1	B	237	SER	4.5
1	A	262	GLY	4.5
1	B	259	PRO	4.2
1	A	238	HIS	4.0
1	B	254	PRO	3.9
1	A	210	HIS	3.4
1	B	253	ALA	3.3
1	B	234	ALA	3.2
1	A	459	PHE	3.1
1	A	253	ALA	3.0
1	A	261	GLY	2.8
1	B	262	GLY	2.7
1	B	239	TRP	2.6
1	B	456	LEU	2.5
1	B	242	LYS	2.5

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Mol	Chain	Res	Type	RSRZ
1	B	238	HIS	2.4
1	B	260	GLU	2.4
1	B	252	GLN	2.0
1	B	250	ILE	2.0

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 oligosaccharides in this entry.

6.4 Ligands [i](#)

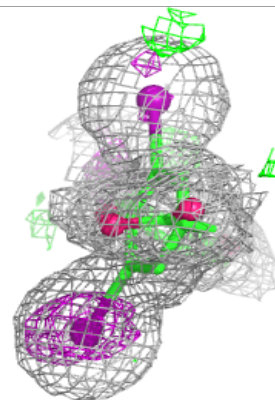
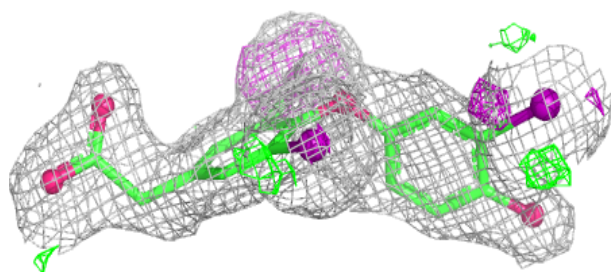
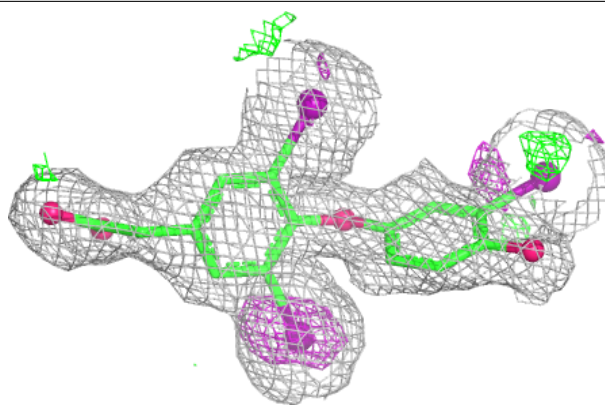
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists 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
3	SO4	B	501	5/5	0.96	0.11	39,40,41,41	0
2	4HY	A	500	21/21	0.99	0.06	18,21,29,35	0
2	4HY	B	500	21/21	1.00	0.06	17,21,27,32	0

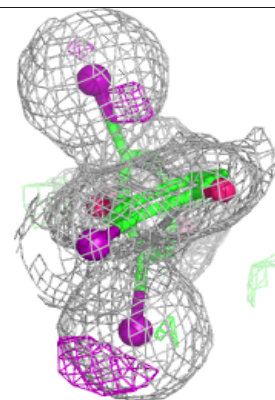
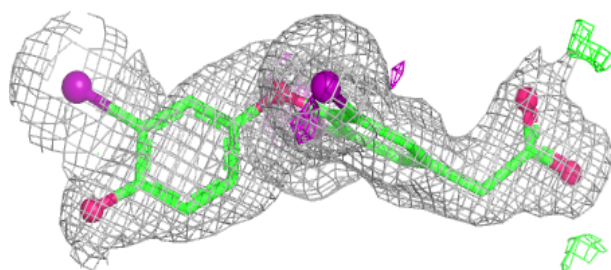
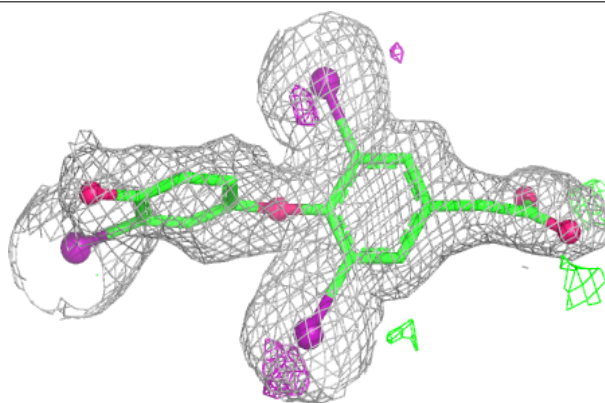
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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

Electron density around 4HY A 500:

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

**Electron density around 4HY B 500:**

$2mF_o-DF_c$ (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.