



# Full wwPDB X-ray Structure Validation Report ⓘ

May 16, 2020 – 01:13 pm BST

PDB ID : 2HKR  
Title : Structures of the carbinolamine and schiff-base intermediates in the reductive half-reaction of aromatic amine dehydrogenase (AADH) with p-methoxyphenylethylamine  
Authors : Roujeinikova, A.; Leys, D.  
Deposited on : 2006-07-05  
Resolution : 1.40 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.

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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) : 1.13  
EDS : 2.11  
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) : 2.11

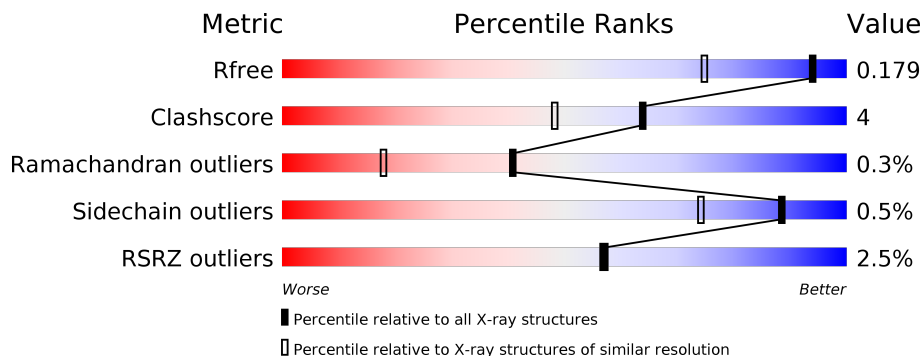
# 1 Overall quality at a glance i

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 1.40 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	1714 (1.40-1.40)
Clashscore	141614	1812 (1.40-1.40)
Ramachandran outliers	138981	1763 (1.40-1.40)
Sidechain outliers	138945	1762 (1.40-1.40)
RSRZ outliers	127900	1674 (1.40-1.40)

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 on 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	D	122	<div style="display: flex; align-items: center;"> <div style="width: 2%; height: 10px; background-color: red; margin-right: 5px;"></div> <div style="width: 80%; height: 10px; background-color: green; margin-right: 5px;"></div> <div style="width: 10%; height: 10px; background-color: yellow; margin-right: 5px;"></div> <div style="width: 10%; height: 10px; background-color: grey;"></div> </div> <p style="font-size: small; margin-top: 5px;">2%      80%      10%      10%</p>
1	H	122	<div style="display: flex; align-items: center;"> <div style="width: 12%; height: 10px; background-color: red; margin-right: 5px;"></div> <div style="width: 88%; height: 10px; background-color: green; margin-right: 5px;"></div> <div style="width: 12%; height: 10px; background-color: yellow;"></div> </div> <p style="font-size: small; margin-top: 5px;">12%      88%      12%</p>
2	A	362	<div style="display: flex; align-items: center;"> <div style="width: 0%; height: 10px; background-color: red; margin-right: 5px;"></div> <div style="width: 92%; height: 10px; background-color: green; margin-right: 5px;"></div> <div style="width: 7%; height: 10px; background-color: yellow; margin-right: 5px;"></div> <div style="width: 1%; height: 10px; background-color: grey;"></div> </div> <p style="font-size: small; margin-top: 5px;">%      92%      7%      •</p>
2	B	362	<div style="display: flex; align-items: center;"> <div style="width: 0%; height: 10px; background-color: red; margin-right: 5px;"></div> <div style="width: 92%; height: 10px; background-color: green; margin-right: 5px;"></div> <div style="width: 7%; height: 10px; background-color: yellow; margin-right: 5px;"></div> <div style="width: 1%; height: 10px; background-color: grey;"></div> </div> <p style="font-size: small; margin-top: 5px;">%      92%      7%      •</p>

## 2 Entry composition [i](#)

There are 5 unique types of molecules in this entry. The entry contains 8897 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 Aromatic amine dehydrogenase, small subunit.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	D	110	Total 863	C 530	N 151	O 167	S 15	0	5	0
1	H	122	Total 987	C 603	N 170	O 199	S 15	0	11	0

There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
D	109	TRQ	TRP	MODIFIED RESIDUE	UNP Q0VKG6
H	109	TRQ	TRP	MODIFIED RESIDUE	UNP Q0VKG6

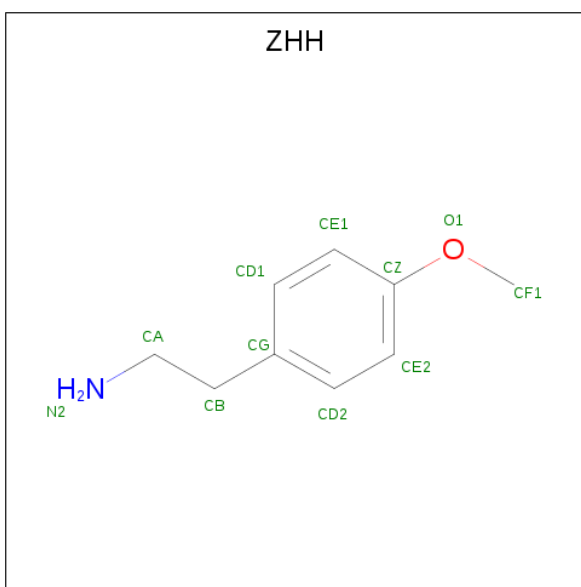
- Molecule 2 is a protein called Aromatic amine dehydrogenase, large subunit.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
2	A	360	Total 2836	C 1792	N 492	O 538	S 14	0	8	0
2	B	360	Total 2804	C 1768	N 486	O 536	S 14	0	3	0

There are 2 discrepancies between the modelled and reference sequences:

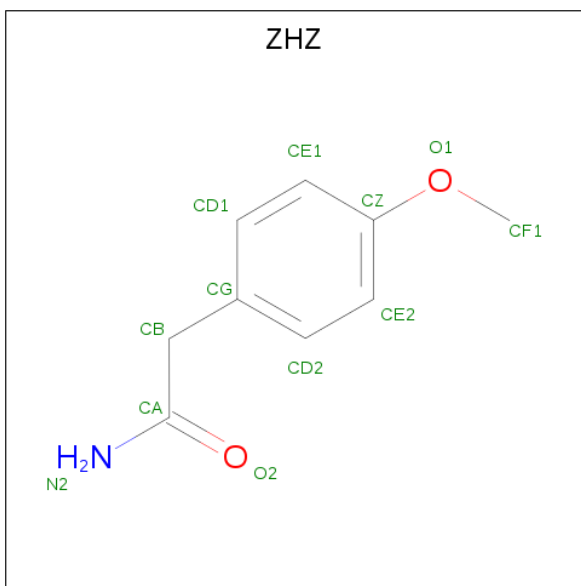
Chain	Residue	Modelled	Actual	Comment	Reference
A	433	THR	-	EXPRESSION TAG	UNP Q0VKG7
B	433	THR	-	EXPRESSION TAG	UNP Q0VKG7

- Molecule 3 is 2-(4-METHOXYPHENYL)ETHANAMINE (three-letter code: ZHH) (formula: C<sub>9</sub>H<sub>13</sub>NO).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
			Total	C	N	O		
3	D	1	11	9	1	1	0	0

- Molecule 4 is 2-(4-METHOXYPHENYL)ACETAMIDE (three-letter code: ZHZ) (formula:  $C_9H_{11}NO_2$ ).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
			Total	C	N	O		
4	H	1	13	10	1	2	0	1

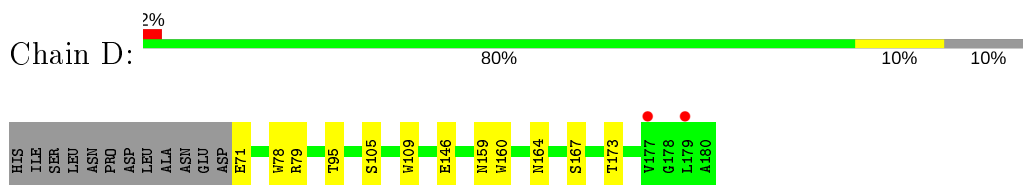
- Molecule 5 is water.

<b>Mol</b>	<b>Chain</b>	<b>Residues</b>	<b>Atoms</b>		<b>ZeroOcc</b>	<b>AltConf</b>
5	D	130	Total 130	O 130	0	1
5	H	134	Total 134	O 134	0	2
5	A	578	Total 578	O 578	0	0
5	B	541	Total 541	O 541	0	0

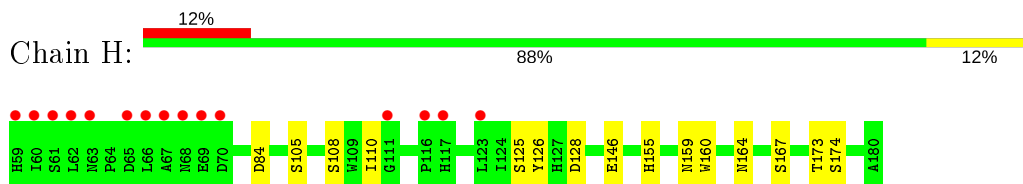
### 3 Residue-property plots [i](#)

These plots are drawn for all protein, RNA and DNA 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.

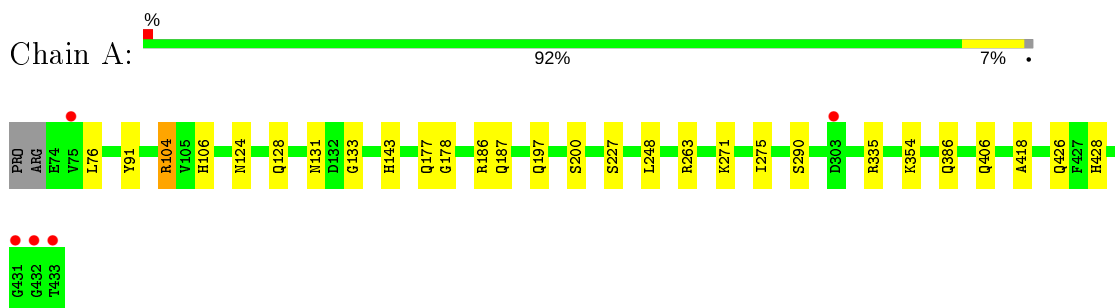
- Molecule 1: Aromatic amine dehydrogenase, small subunit



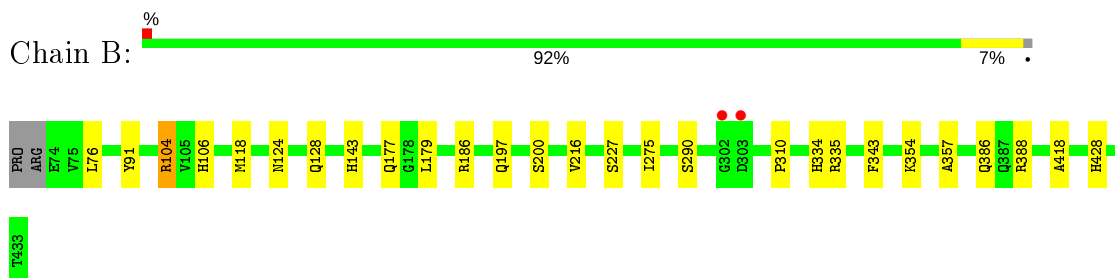
- Molecule 1: Aromatic amine dehydrogenase, small subunit



- Molecule 2: Aromatic amine dehydrogenase, large subunit



- Molecule 2: Aromatic amine dehydrogenase, large subunit



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	70.85Å 88.81Å 80.04Å 90.00° 90.39° 90.00°	Depositor
Resolution (Å)	15.00 – 1.40 20.01 – 1.40	Depositor EDS
% Data completeness (in resolution range)	100.0 (15.00-1.40) 97.6 (20.01-1.40)	Depositor EDS
$R_{merge}$	(Not available)	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	1.76 (at 1.40Å)	Xtrriage
Refinement program	REFMAC 5.2.0005	Depositor
R, $R_{free}$	0.149 , 0.171 0.158 , 0.179	Depositor DCC
$R_{free}$ test set	9515 reflections (5.02%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	13.1	Xtrriage
Anisotropy	0.104	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.36 , 50.1	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.51$ , $\langle L^2 \rangle = 0.35$	Xtrriage
Estimated twinning fraction	0.012 for h,-k,-l	Xtrriage
$F_o, F_c$ correlation	0.97	EDS
Total number of atoms	8897	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	17.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.33% of the height of the origin peak. No significant pseudotranslation is detected.*

<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

### 5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: TRQ, ZHH, ZHZ

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	D	0.53	0/886	0.63	0/1206
1	H	0.53	0/1005	0.62	0/1372
2	A	0.55	0/2929	0.65	0/3967
2	B	0.55	0/2878	0.63	0/3901
All	All	0.55	0/7698	0.64	0/10446

Chiral center outliers are detected by calculating the chiral volume of a chiral center and verifying if the center is modelled as a planar moiety or with the opposite hand. A planarity outlier is detected by checking planarity of atoms in a peptide group, atoms in a mainchain group or atoms of a sidechain that are expected to be planar.

Mol	Chain	#Chirality outliers	#Planarity outliers
2	B	0	1

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
2	B	310	PRO	Peptide

### 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	D	863	0	776	10	0
1	H	987	0	856	14	0
2	A	2836	0	2796	28	0
2	B	2804	0	2728	20	0
3	D	11	0	12	2	0
4	H	13	0	6	4	0
5	A	578	0	0	3	0
5	B	541	0	0	0	0
5	D	130	0	0	3	0
5	H	134	0	0	2	0
All	All	8897	0	7174	62	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 (62) 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)
2:A:104:ARG:HH11	2:A:106:HIS:HE1	1.29	0.78
1:D:95[B]:THR:HG22	5:D:1536:HOH:O	1.85	0.75
1:H:105:SER:HA	1:H:164:ASN:HD21	1.52	0.75
2:B:104:ARG:HH11	2:B:106:HIS:HE1	1.32	0.74
1:H:110[B]:ILE:HD13	1:H:125[B]:SER:HA	1.70	0.73
5:H:1560:HOH:O	2:B:118[B]:MET:SD	2.48	0.72
2:A:124:ASN:HD21	2:A:178:GLY:H	1.36	0.71
2:B:91:TYR:OH	2:B:428:HIS:HD2	1.75	0.69
1:D:105:SER:HA	1:D:164:ASN:HD21	1.58	0.68
2:B:197:GLN:NE2	2:B:227:SER:H	1.95	0.65
2:A:91:TYR:OH	2:A:428:HIS:HD2	1.80	0.65
2:A:197:GLN:NE2	2:A:227:SER:H	1.97	0.62
2:A:335:ARG:H	2:A:386:GLN:HE22	1.46	0.61
2:B:335:ARG:H	2:B:386:GLN:HE22	1.48	0.61
2:A:271:LYS:NZ	5:A:905:HOH:O	2.35	0.58
2:A:335:ARG:H	2:A:386:GLN:NE2	2.01	0.58
2:B:197:GLN:HE21	2:B:227:SER:H	1.51	0.58
2:B:335:ARG:H	2:B:386:GLN:NE2	2.01	0.57
3:D:1502:ZHH:HF12	2:B:179:LEU:HD23	1.86	0.57
1:D:167:SER:HB2	2:B:177:GLN:HE22	1.68	0.57
2:A:197:GLN:HE21	2:A:227:SER:H	1.51	0.56
2:A:91:TYR:OH	2:A:428:HIS:CD2	2.59	0.56
1:H:167:SER:HB2	2:A:177:GLN:HE22	1.72	0.55
2:B:106:HIS:HD2	2:B:418:ALA:O	1.90	0.54

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:71:GLU:N	5:D:1588:HOH:O	2.43	0.51
2:A:248:LEU:HD13	2:A:263:ARG:HD3	1.92	0.50
2:A:106:HIS:HD2	2:A:418:ALA:O	1.95	0.50
2:A:133:GLY:O	2:A:428:HIS:HE1	1.96	0.49
2:A:124:ASN:ND2	2:A:178:GLY:H	2.09	0.49
1:D:109:TRQ:HB2	1:D:160:TRP:NE1	2.29	0.48
2:A:131:ASN:H	2:A:187:GLN:HE22	1.61	0.47
1:H:159:ASN:HD22	2:A:177:GLN:NE2	2.11	0.47
2:A:143:HIS:HD2	5:A:622:HOH:O	1.96	0.47
1:D:78:TRP:CE2	1:D:79[B]:ARG:HG3	2.50	0.47
1:H:173[B]:THR:HG21	2:B:76:LEU:CD1	2.45	0.46
2:B:275:ILE:HA	2:B:290:SER:HA	1.97	0.46
1:H:155:HIS:HE1	5:A:457:HOH:O	1.97	0.46
1:D:146:GLU:CD	2:B:354:LYS:HZ1	2.18	0.46
4:H:1501[B]:ZHZ:HF11	2:A:124:ASN:CG	2.36	0.46
5:D:1535:HOH:O	2:B:143:HIS:HE1	1.99	0.45
2:A:128:GLN:HE22	2:A:186:ARG:C	2.19	0.45
2:B:128:GLN:HE22	2:B:186:ARG:C	2.20	0.44
2:A:275:ILE:HA	2:A:290:SER:HA	2.00	0.44
1:H:159:ASN:HB2	4:H:1501[B]:ZHZ:HF13	2.00	0.44
2:B:343:PHE:HB3	2:B:357:ALA:HB2	2.00	0.43
1:H:173[B]:THR:HG21	2:B:76:LEU:HD13	2.00	0.43
5:H:1539:HOH:O	2:A:143:HIS:HE1	2.01	0.43
1:H:108:SER:HB2	1:H:126[B]:TYR:O	2.18	0.43
1:D:173:THR:HG21	2:A:76:LEU:CD1	2.48	0.43
4:H:1501[A]:ZHZ:HF11	2:A:124:ASN:OD1	2.19	0.43
2:A:186:ARG:HH22	2:A:426:GLN:NE2	2.17	0.42
1:D:173:THR:HG21	2:A:76:LEU:HD13	2.01	0.42
1:D:159:ASN:HD22	2:B:177:GLN:NE2	2.18	0.42
1:H:146:GLU:CD	2:A:354:LYS:HZ1	2.23	0.41
4:H:1501[B]:ZHZ:HF11	2:A:124:ASN:ND2	2.36	0.41
2:A:131:ASN:H	2:A:187:GLN:NE2	2.19	0.40
2:B:334:HIS:HA	2:B:386:GLN:HE22	1.86	0.40
3:D:1502:ZHH:HF11	2:B:124:ASN:ND2	2.36	0.40

There are no symmetry-related clashes.

## 5.3 Torsion angles [i](#)

### 5.3.1 Protein backbone [i](#)

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	D	112/122 (92%)	110 (98%)	2 (2%)	0	100	100
1	H	129/122 (106%)	126 (98%)	3 (2%)	0	100	100
2	A	366/362 (101%)	352 (96%)	13 (4%)	1 (0%)	41	18
2	B	360/362 (99%)	346 (96%)	12 (3%)	2 (1%)	25	7
All	All	967/968 (100%)	934 (97%)	30 (3%)	3 (0%)	41	18

All (3) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
2	B	216	VAL
2	A	200	SER
2	B	200	SER

### 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	D	100/106 (94%)	100 (100%)	0	100	100
1	H	113/106 (107%)	113 (100%)	0	100	100
2	A	312/306 (102%)	309 (99%)	3 (1%)	76	53
2	B	305/306 (100%)	303 (99%)	2 (1%)	84	66
All	All	830/824 (101%)	825 (99%)	5 (1%)	88	70

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

Mol	Chain	Res	Type
2	A	104	ARG
2	A	406[A]	GLN
2	A	406[B]	GLN
2	B	104	ARG
2	B	388	ARG

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (35) such sidechains are listed below:

Mol	Chain	Res	Type
1	D	139	GLN
1	D	143	GLN
1	D	164	ASN
1	H	139	GLN
1	H	143	GLN
1	H	155	HIS
1	H	164	ASN
2	A	86	GLN
2	A	106	HIS
2	A	124	ASN
2	A	128	GLN
2	A	143	HIS
2	A	177	GLN
2	A	180	ASN
2	A	187	GLN
2	A	197	GLN
2	A	231	GLN
2	A	261	GLN
2	A	386	GLN
2	A	424	GLN
2	A	426	GLN
2	A	428	HIS
2	B	86	GLN
2	B	106	HIS
2	B	128	GLN
2	B	143	HIS
2	B	177	GLN
2	B	180	ASN
2	B	187	GLN
2	B	197	GLN
2	B	231	GLN
2	B	386	GLN
2	B	424	GLN
2	B	426	GLN

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Mol	Chain	Res	Type
2	B	428	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](#)

3 non-standard protein/DNA/RNA residues 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
1	TRQ	H	109[A]	1	11,16,18	4.60	4 (36%)	11,22,26	1.63	2 (18%)
1	TRQ	D	109	1,3	11,16,18	4.04	3 (27%)	11,22,26	1.44	1 (9%)
1	TRQ	H	109[B]	1	11,16,18	4.61	4 (36%)	11,22,26	1.65	2 (18%)

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
1	TRQ	H	109[A]	1	-	0/4/16/21	0/2/2/2
1	TRQ	D	109	1,3	-	0/4/16/21	0/2/2/2
1	TRQ	H	109[B]	1	-	0/4/16/21	0/2/2/2

All (11) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	H	109[A]	TRQ	O7-CZ2	13.56	1.44	1.22
1	H	109[B]	TRQ	O7-CZ2	13.56	1.44	1.22
1	D	109	TRQ	O7-CZ2	12.24	1.41	1.22
1	H	109[A]	TRQ	CE3-CZ3	5.09	1.41	1.33

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	H	109[B]	TRQ	CE3-CZ3	5.09	1.41	1.33
1	D	109	TRQ	CE3-CZ3	3.73	1.39	1.33
1	H	109[A]	TRQ	CH2-CZ3	-3.00	1.41	1.48
1	H	109[B]	TRQ	CH2-CZ3	-3.00	1.41	1.48
1	D	109	TRQ	CH2-CZ3	-2.85	1.41	1.48
1	H	109[A]	TRQ	CD2-CE3	-2.13	1.40	1.44
1	H	109[B]	TRQ	CD2-CE3	-2.13	1.40	1.44

All (5) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	H	109[A]	TRQ	CZ3-CH2-CZ2	3.38	121.07	113.19
1	H	109[B]	TRQ	CZ3-CH2-CZ2	3.38	121.07	113.19
1	D	109	TRQ	CZ3-CH2-CZ2	3.22	120.71	113.19
1	H	109[A]	TRQ	CG-CB-CA	2.73	118.75	114.53
1	H	109[B]	TRQ	CG-CB-CA	2.73	118.75	114.53

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

1 monomer is involved in 1 short contact:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
1	D	109	TRQ	1	0

## 5.5 Carbohydrates [i](#)

There are no carbohydrates 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
4	ZHZ	H	1501[B]	-	12,12,12	5.96	4 (33%)	15,15,15	2.58	7 (46%)
4	ZHZ	H	1501[A]	-	12,12,12	5.96	4 (33%)	15,15,15	2.57	7 (46%)
3	ZHH	D	1502	1	10,11,11	1.01	1 (10%)	12,13,13	0.82	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
4	ZHZ	H	1501[B]	-	-	2/6/6/6	0/1/1/1
4	ZHZ	H	1501[A]	-	-	2/6/6/6	0/1/1/1
3	ZHH	D	1502	1	-	3/5/5/5	0/1/1/1

All (9) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	H	1501[B]	ZHZ	CE2-CD2	18.95	1.73	1.38
4	H	1501[A]	ZHZ	CE2-CD2	18.95	1.73	1.38
4	H	1501[B]	ZHZ	O2-CA	6.04	1.42	1.24
4	H	1501[A]	ZHZ	O2-CA	6.04	1.42	1.24
4	H	1501[B]	ZHZ	CA-N2	4.41	1.47	1.32
4	H	1501[A]	ZHZ	CA-N2	4.41	1.47	1.32
3	D	1502	ZHH	O1-CZ	2.77	1.43	1.37
4	H	1501[B]	ZHZ	O1-CZ	2.15	1.42	1.37
4	H	1501[A]	ZHZ	O1-CZ	2.15	1.42	1.37

All (14) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	H	1501[B]	ZHZ	O2-CA-N2	-6.19	105.61	122.50
4	H	1501[A]	ZHZ	O2-CA-N2	-6.19	105.61	122.50
4	H	1501[B]	ZHZ	O2-CA-CB	-4.74	110.51	121.06
4	H	1501[A]	ZHZ	O2-CA-CB	-4.74	110.51	121.06
4	H	1501[B]	ZHZ	CD2-CE2-CZ	-2.96	116.11	119.73
4	H	1501[A]	ZHZ	CD2-CE2-CZ	-2.96	116.11	119.73
4	H	1501[B]	ZHZ	CD1-CE1-CZ	2.78	123.14	119.73
4	H	1501[A]	ZHZ	CD1-CE1-CZ	2.78	123.14	119.73
4	H	1501[B]	ZHZ	CE2-CD2-CG	-2.76	117.23	121.03
4	H	1501[A]	ZHZ	CE2-CD2-CG	-2.76	117.23	121.03
4	H	1501[B]	ZHZ	CB-CA-N2	-2.60	111.93	116.49

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	H	1501[A]	ZHZ	CB-CA-N2	-2.60	111.93	116.49
4	H	1501[B]	ZHZ	CE1-CD1-CG	2.41	124.33	121.03
4	H	1501[A]	ZHZ	CE1-CD1-CG	2.41	124.33	121.03

There are no chirality outliers.

All (7) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	D	1502	ZHH	CE2-CZ-O1-CF1
3	D	1502	ZHH	CE1-CZ-O1-CF1
4	H	1501[A]	ZHZ	CE1-CZ-O1-CF1
4	H	1501[A]	ZHZ	CE2-CZ-O1-CF1
4	H	1501[B]	ZHZ	CE2-CZ-O1-CF1
4	H	1501[B]	ZHZ	CE1-CZ-O1-CF1
3	D	1502	ZHH	N2-CA-CB-CG

There are no ring outliers.

3 monomers are involved in 6 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	H	1501[B]	ZHZ	3	0
4	H	1501[A]	ZHZ	1	0
3	D	1502	ZHH	2	0

## 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 [i](#)

### 6.1 Protein, DNA and RNA chains [i](#)

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	D	109/122 (89%)	-0.10	2 (1%) 68 68	9, 15, 25, 34	0
1	H	121/122 (99%)	0.44	15 (12%) 4 3	9, 15, 41, 48	0
2	A	360/362 (99%)	-0.30	5 (1%) 75 74	8, 12, 23, 33	0
2	B	360/362 (99%)	-0.12	2 (0%) 89 88	8, 15, 27, 41	0
All	All	950/968 (98%)	-0.12	24 (2%) 57 57	8, 13, 28, 48	0

All (24) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	H	60	ILE	9.8
1	H	66	LEU	7.5
1	H	68	ASN	5.4
1	H	70	ASP	4.5
1	H	62	LEU	4.0
2	B	303	ASP	3.9
2	A	75	VAL	3.8
1	H	67	ALA	3.7
1	H	63	ASN	3.6
1	H	59	HIS	3.5
1	D	179	LEU	3.3
1	H	61	SER	3.0
1	H	111[A]	GLY	2.9
2	B	302	GLY	2.7
2	A	431	GLY	2.6
2	A	433	THR	2.6
1	H	117	HIS	2.3
2	A	432	GLY	2.3
1	H	69	GLU	2.3
1	H	123	LEU	2.2
1	H	65	ASP	2.2

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Mol	Chain	Res	Type	RSRZ
2	A	303	ASP	2.1
1	H	116	PRO	2.0
1	D	177	VAL	2.0

## 6.2 Non-standard residues in protein, DNA, RNA chains [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
1	TRQ	D	109	15/17	0.95	0.07	12,13,16,16	0
1	TRQ	H	109[A]	15/17	0.96	0.07	9,12,16,17	2
1	TRQ	H	109[B]	15/17	0.96	0.07	9,12,14,15	2

## 6.3 Carbohydrates [i](#)

There are no carbohydrates 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
4	ZHZ	H	1501[B]	12/12	0.87	0.14	18,24,29,32	1
4	ZHZ	H	1501[A]	12/12	0.87	0.14	18,24,29,32	1
3	ZHH	D	1502	11/11	0.87	0.12	19,26,36,38	0

## 6.5 Other polymers [i](#)

There are no such residues in this entry.