



Full wwPDB X-ray Structure Validation Report ⓘ

May 29, 2020 – 01:45 am BST

PDB ID : 1AIB
Title : STRUCTURAL BASIS FOR THE CATALYTIC ACTIVITY OF ASPARTATE AMINOTRANSFERASE K258H LACKING THE PYRIDOXAL-5'-PHOSPHATE BINDING LYSINE RESIDUE
Authors : Jaeger, J.; Jansonius, J.N.
Deposited on : 1994-05-10
Resolution : 2.80 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 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)
Xtrriage (Phenix) : **NOT EXECUTED**
EDS : **NOT EXECUTED**
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) : 2.11

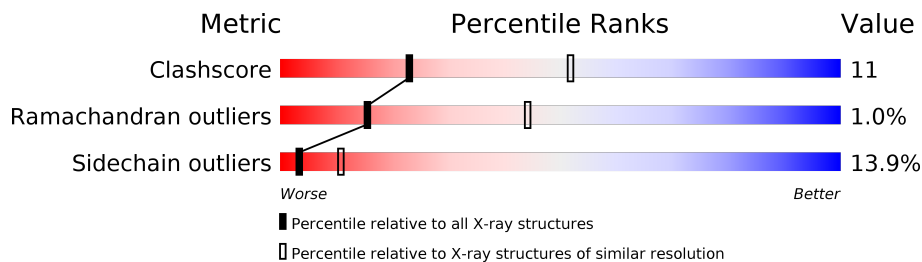
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.80 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	141614	3569 (2.80-2.80)
Ramachandran outliers	138981	3498 (2.80-2.80)
Sidechain outliers	138945	3500 (2.80-2.80)

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 ≥ 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	396	
1	B	396	

2 Entry composition i

There are 3 unique types of molecules in this entry. The entry contains 6192 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.

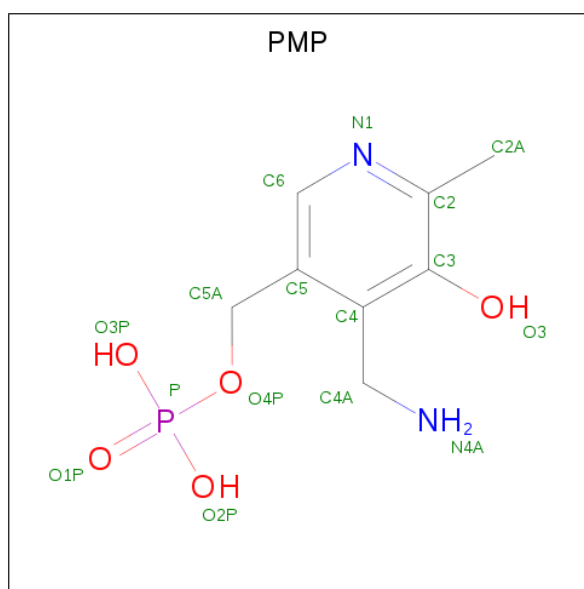
- Molecule 1 is a protein called ASPARTATE AMINOTRANSFERASE.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	396	Total 3070	C 1936	N 537	O 584	S 13	0	0	0
1	B	396	Total 3070	C 1936	N 537	O 584	S 13	0	0	0

There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	258	HIS	LYS	ENGINEERED MUTATION	UNP P00509
B	258	HIS	LYS	ENGINEERED MUTATION	UNP P00509

- Molecule 2 is 4'-DEOXY-4'-AMINOPYRIDOXAL-5'-PHOSPHATE (three-letter code: PMP) (formula: C₈H₁₃N₂O₅P).



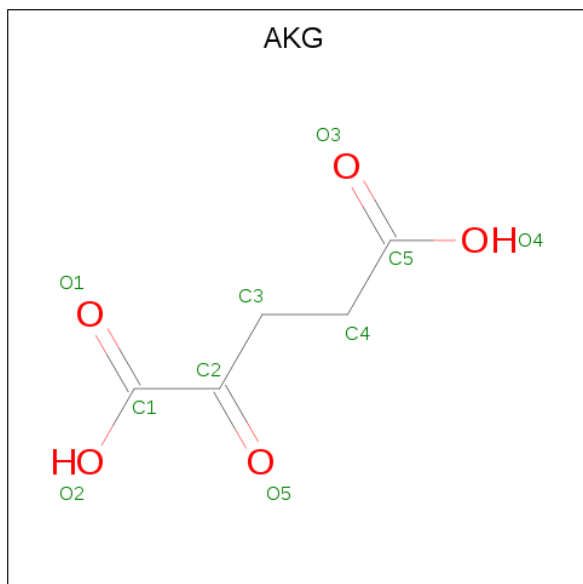
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
			Total	C	N	O	P		
2	A	1	Total 16	C 8	N 2	O 5	P 1	0	0

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Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
			Total	C	N	O	P		
2	B	1	16	8	2	5	1	0	0

- Molecule 3 is 2-OXOGLUTARIC ACID (three-letter code: AKG) (formula: C₅H₆O₅).



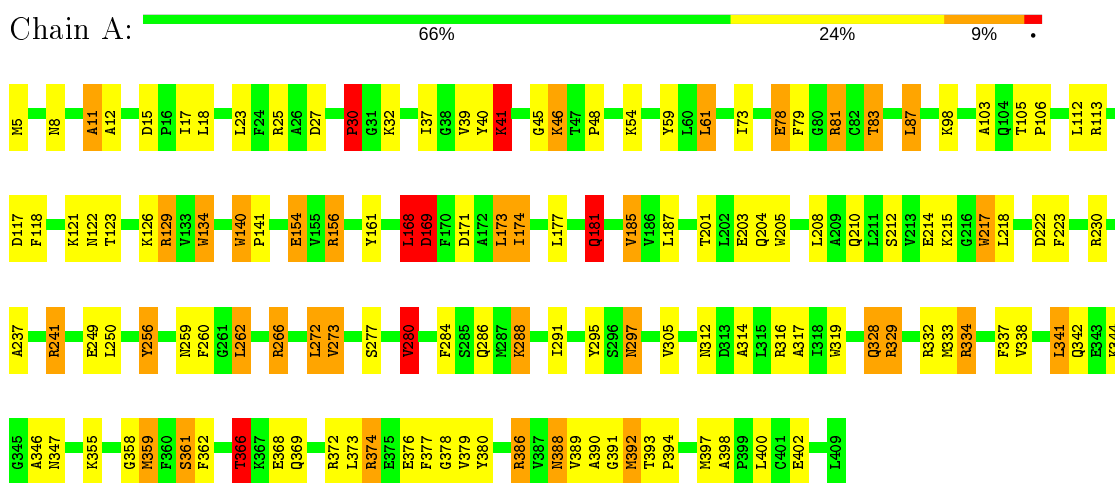
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
			Total	C	O		
3	A	1	10	5	5	0	0
3	B	1	10	5	5	0	0

3 Residue-property plots [i](#)

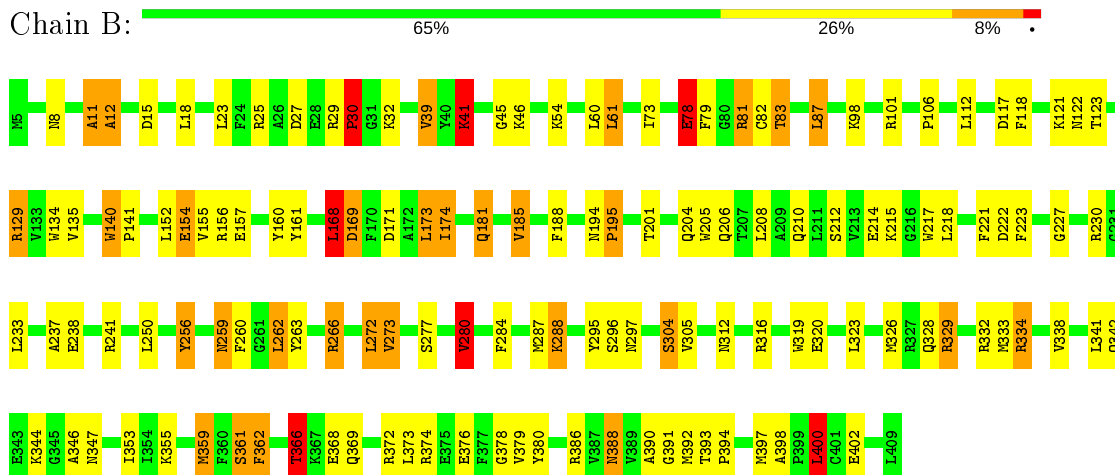
These plots are drawn for all protein, RNA and DNA chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry. Residues are color-coded according 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: ASPARTATE AMINOTRANSFERASE



- Molecule 1: ASPARTATE AMINOTRANSFERASE



4 Data and refinement statistics

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

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	86.60Å 79.80Å 89.80Å 90.00° 119.00° 90.00°	Depositor
Resolution (Å)	10.00 – 2.80	Depositor
% Data completeness (in resolution range)	(Not available) (10.00-2.80)	Depositor
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
Refinement program	X-PLOR	Depositor
R, R_{free}	0.219 , (Not available)	Depositor
Estimated twinning fraction	No twinning to report.	Xtrriage
Total number of atoms	6192	wwPDB-VP
Average B, all atoms (Å ²)	25.0	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: AKG, PMP

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	0.93	0/3132	1.74	63/4244 (1.5%)
1	B	0.93	0/3132	1.75	61/4244 (1.4%)
All	All	0.93	0/6264	1.75	124/8488 (1.5%)

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
1	A	0	1
1	B	0	1
All	All	0	2

There are no bond length outliers.

All (124) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	266	ARG	NE-CZ-NH1	12.05	126.32	120.30
1	A	81	ARG	CA-CB-CG	10.80	137.17	113.40
1	B	81	ARG	CA-CB-CG	10.36	136.18	113.40
1	B	316	ARG	NE-CZ-NH2	-10.13	115.23	120.30
1	B	169	ASP	CA-C-N	-9.73	95.79	117.20
1	B	334	ARG	NE-CZ-NH1	9.71	125.16	120.30
1	B	266	ARG	NE-CZ-NH1	9.51	125.06	120.30
1	B	319	TRP	CD1-CG-CD2	9.33	113.76	106.30
1	A	329	ARG	NE-CZ-NH1	9.27	124.94	120.30
1	A	169	ASP	CA-C-N	-9.11	97.16	117.20
1	A	266	ARG	NE-CZ-NH2	-8.89	115.85	120.30
1	A	319	TRP	CD1-CG-CD2	8.80	113.34	106.30

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	329	ARG	NE-CZ-NH1	8.69	124.65	120.30
1	A	386	ARG	NE-CZ-NH1	8.62	124.61	120.30
1	A	316	ARG	NE-CZ-NH2	-8.59	116.00	120.30
1	A	217	TRP	CD1-CG-CD2	8.59	113.17	106.30
1	B	329	ARG	NE-CZ-NH2	-8.45	116.08	120.30
1	A	140	TRP	CD1-CG-CD2	8.39	113.01	106.30
1	B	140	TRP	CD1-CG-CD2	8.21	112.87	106.30
1	B	217	TRP	CD1-CG-CD2	8.21	112.86	106.30
1	A	329	ARG	NE-CZ-NH2	-8.13	116.23	120.30
1	A	272	LEU	CA-CB-CG	8.08	133.88	115.30
1	A	217	TRP	CE2-CD2-CG	-8.00	100.90	107.30
1	B	272	LEU	CA-CB-CG	7.97	133.64	115.30
1	A	359	MET	CG-SD-CE	-7.97	87.44	100.20
1	B	217	TRP	CE2-CD2-CG	-7.86	101.01	107.30
1	A	346	ALA	CA-C-N	-7.76	100.12	117.20
1	A	334	ARG	NE-CZ-NH1	7.75	124.17	120.30
1	B	359	MET	CG-SD-CE	-7.70	87.88	100.20
1	B	386	ARG	NE-CZ-NH2	-7.67	116.47	120.30
1	A	205	TRP	CE2-CD2-CG	-7.63	101.20	107.30
1	B	346	ALA	CA-C-N	-7.59	100.50	117.20
1	A	280	VAL	CB-CA-C	-7.58	97.00	111.40
1	B	205	TRP	CD1-CG-CD2	7.53	112.32	106.30
1	A	185	VAL	CG1-CB-CG2	-7.52	98.87	110.90
1	B	319	TRP	CG-CD1-NE1	-7.51	102.59	110.10
1	A	140	TRP	CE2-CD2-CG	-7.46	101.33	107.30
1	B	287	MET	CA-CB-CG	-7.32	100.86	113.30
1	A	205	TRP	CD1-CG-CD2	7.30	112.14	106.30
1	B	205	TRP	CE2-CD2-CG	-7.21	101.53	107.30
1	B	280	VAL	CB-CA-C	-7.16	97.80	111.40
1	B	140	TRP	CE2-CD2-CG	-7.05	101.66	107.30
1	A	319	TRP	CG-CD1-NE1	-6.97	103.13	110.10
1	A	256	TYR	CB-CG-CD1	-6.84	116.89	121.00
1	B	134	TRP	CE2-CD2-CG	-6.80	101.86	107.30
1	B	366	THR	CA-CB-CG2	6.75	121.85	112.40
1	B	134	TRP	CD1-CG-CD2	6.73	111.68	106.30
1	B	400	LEU	CA-CB-CG	6.73	130.77	115.30
1	A	319	TRP	CE2-CD2-CG	-6.68	101.96	107.30
1	B	11	ALA	N-CA-C	6.67	129.00	111.00
1	B	230	ARG	N-CA-CB	-6.67	98.60	110.60
1	A	134	TRP	CE2-CD2-CG	-6.66	101.97	107.30
1	A	386	ARG	NE-CZ-NH2	-6.63	116.99	120.30
1	A	129	ARG	CB-CG-CD	-6.56	94.54	111.60

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	25	ARG	NE-CZ-NH1	6.54	123.57	120.30
1	B	101	ARG	NE-CZ-NH2	-6.54	117.03	120.30
1	B	319	TRP	CE2-CD2-CG	-6.51	102.09	107.30
1	B	266	ARG	NE-CZ-NH2	-6.50	117.05	120.30
1	A	305	VAL	CG1-CB-CG2	-6.48	100.53	110.90
1	B	30	PRO	N-CA-C	6.47	128.92	112.10
1	B	185	VAL	CG1-CB-CG2	-6.46	100.56	110.90
1	A	11	ALA	N-CA-C	6.45	128.41	111.00
1	B	386	ARG	NE-CZ-NH1	6.38	123.49	120.30
1	A	366	THR	CA-CB-CG2	6.34	121.28	112.40
1	A	230	ARG	N-CA-CB	-6.33	99.21	110.60
1	A	329	ARG	CG-CD-NE	-6.33	98.52	111.80
1	B	8	ASN	N-CA-CB	-6.26	99.32	110.60
1	A	161	TYR	CB-CG-CD2	-6.21	117.27	121.00
1	A	30	PRO	N-CA-C	6.21	128.25	112.10
1	B	366	THR	N-CA-CB	-6.21	98.51	110.30
1	A	134	TRP	CD1-CG-CD2	6.18	111.25	106.30
1	A	113	ARG	NE-CZ-NH2	-6.17	117.21	120.30
1	B	400	LEU	CB-CG-CD2	-6.15	100.54	111.00
1	B	238	GLU	CA-CB-CG	6.14	126.92	113.40
1	B	333	MET	CG-SD-CE	-6.08	90.48	100.20
1	A	168	LEU	CA-C-N	6.07	130.55	117.20
1	A	203	GLU	CA-CB-CG	-5.98	100.25	113.40
1	A	366	THR	N-CA-CB	-5.96	98.98	110.30
1	A	392	MET	CG-SD-CE	-5.94	90.70	100.20
1	A	113	ARG	NE-CZ-NH1	5.92	123.26	120.30
1	A	333	MET	CG-SD-CE	-5.86	90.83	100.20
1	B	41	LYS	N-CA-CB	-5.84	100.09	110.60
1	A	347	ASN	N-CA-CB	-5.81	100.14	110.60
1	A	129	ARG	NE-CZ-NH2	-5.80	117.40	120.30
1	B	217	TRP	CG-CD1-NE1	-5.80	104.30	110.10
1	A	316	ARG	CG-CD-NE	-5.79	99.64	111.80
1	A	41	LYS	N-CA-CB	-5.78	100.21	110.60
1	B	305	VAL	CG1-CB-CG2	-5.76	101.68	110.90
1	B	129	ARG	CB-CG-CD	-5.74	96.69	111.60
1	B	168	LEU	CA-C-N	5.73	129.80	117.20
1	A	8	ASN	N-CA-CB	-5.66	100.42	110.60
1	B	140	TRP	CG-CD2-CE3	5.60	138.94	133.90
1	B	160	TYR	CB-CG-CD1	-5.59	117.64	121.00
1	A	230	ARG	NE-CZ-NH1	5.58	123.09	120.30
1	A	41	LYS	CA-CB-CG	5.57	125.65	113.40
1	A	217	TRP	CG-CD1-NE1	-5.56	104.54	110.10

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	389	VAL	CG1-CB-CG2	-5.56	102.01	110.90
1	B	78	GLU	N-CA-CB	5.55	120.58	110.60
1	A	25	ARG	NE-CZ-NH1	5.48	123.04	120.30
1	A	328	GLN	CA-CB-CG	-5.45	101.40	113.40
1	A	374	ARG	NE-CZ-NH2	-5.44	117.58	120.30
1	B	316	ARG	CG-CD-NE	-5.43	100.39	111.80
1	B	347	ASN	N-CA-CB	-5.42	100.85	110.60
1	B	174	ILE	CB-CG1-CD1	-5.40	98.77	113.90
1	A	280	VAL	N-CA-CB	5.39	123.35	111.50
1	A	174	ILE	CB-CG1-CD1	-5.38	98.85	113.90
1	B	11	ALA	CA-C-N	5.37	129.00	117.20
1	B	288	LYS	CA-CB-CG	-5.35	101.63	113.40
1	B	329	ARG	CG-CD-NE	-5.35	100.56	111.80
1	A	288	LYS	CA-CB-CG	-5.32	101.70	113.40
1	A	241	ARG	NE-CZ-NH1	5.29	122.94	120.30
1	B	8	ASN	CA-CB-CG	5.27	125.00	113.40
1	B	129	ARG	NE-CZ-NH2	-5.24	117.68	120.30
1	A	59	TYR	CB-CG-CD1	-5.21	117.87	121.00
1	A	140	TRP	CG-CD2-CE3	5.20	138.57	133.90
1	B	161	TYR	CB-CG-CD2	-5.18	117.89	121.00
1	A	355	LYS	CA-CB-CG	5.18	124.80	113.40
1	B	374	ARG	CB-CA-C	-5.17	100.07	110.40
1	B	256	TYR	CB-CG-CD1	-5.16	117.90	121.00
1	B	320	GLU	CA-CB-CG	-5.14	102.09	113.40
1	A	40	TYR	CB-CG-CD2	-5.14	117.92	121.00
1	B	319	TRP	CB-CG-CD1	-5.13	120.34	127.00
1	A	217	TRP	CG-CD2-CE3	5.05	138.45	133.90
1	B	280	VAL	N-CA-CB	5.03	122.56	111.50

There are no chirality outliers.

All (2) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	169	ASP	Mainchain
1	B	169	ASP	Mainchain

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	3070	0	3012	75	0
1	B	3070	0	3012	67	0
2	A	16	0	10	4	0
2	B	16	0	6	1	0
3	A	10	0	4	2	0
3	B	10	0	4	0	0
All	All	6192	0	6048	140	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 11.

All (140) 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:17:ILE:HG21	3:A:412:AKG:O5	1.57	1.02
2:A:411:PMP:H5A1	2:A:411:PMP:N4A	1.81	0.93
2:A:411:PMP:HNA1	2:A:411:PMP:H5A1	1.35	0.92
1:A:386:ARG:NH1	3:A:412:AKG:O1	2.13	0.79
1:A:266:ARG:HD2	1:B:297:ASN:O	1.87	0.75
1:B:41:LYS:HE2	1:B:391:GLY:HA2	1.71	0.73
1:B:201:THR:H	1:B:204:GLN:HE21	1.39	0.69
1:A:41:LYS:HE2	1:A:391:GLY:HA2	1.74	0.69
1:A:297:ASN:O	1:B:266:ARG:HD2	1.93	0.69
1:A:201:THR:H	1:A:204:GLN:HE21	1.41	0.68
1:B:366:THR:HG22	1:B:369:GLN:H	1.57	0.68
1:A:337:PHE:HD1	1:A:397:MET:HE2	1.63	0.63
1:A:208:LEU:O	1:A:212:SER:HB2	2.01	0.61
1:A:222:ASP:OD2	2:A:411:PMP:N1	2.34	0.61
1:A:41:LYS:HZ1	1:A:393:THR:HG23	1.67	0.60
1:B:373:LEU:HB3	1:B:379:VAL:HB	1.83	0.59
1:A:201:THR:HG23	1:A:204:GLN:HE21	1.68	0.59
1:B:284:PHE:O	1:B:288:LYS:HG3	2.03	0.59
1:B:41:LYS:CD	1:B:45:GLY:HA2	2.34	0.58
1:A:32:LYS:HA	1:A:378:GLY:HA3	1.86	0.57
1:B:41:LYS:HD2	1:B:45:GLY:HA2	1.85	0.57
1:A:366:THR:HG22	1:A:369:GLN:H	1.69	0.57
1:B:32:LYS:HA	1:B:378:GLY:HA3	1.87	0.57
1:A:187:LEU:HD21	1:A:222:ASP:HB2	1.86	0.56
1:B:366:THR:HG22	1:B:369:GLN:N	2.21	0.56
1:B:15:ASP:HB3	1:B:18:LEU:HB2	1.87	0.56

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:61:LEU:HD12	1:B:61:LEU:HD12	1.87	0.56
1:B:392:MET:HG2	1:B:400:LEU:HD21	1.87	0.56
2:A:411:PMP:N4A	2:A:411:PMP:C5A	2.62	0.56
1:A:277:SER:O	1:A:280:VAL:HG23	2.07	0.55
1:B:171:ASP:O	1:B:174:ILE:HG22	2.08	0.54
1:B:78:GLU:HA	1:B:81:ARG:HG3	1.89	0.54
1:B:79:PHE:O	1:B:83:THR:HG23	2.08	0.53
1:A:250:LEU:HB3	1:A:273:VAL:HG13	1.89	0.53
1:B:250:LEU:HB3	1:B:273:VAL:HG13	1.89	0.53
1:A:46:LYS:O	1:A:48:PRO:HD3	2.08	0.53
1:B:29:ARG:HG3	1:B:30:PRO:HD2	1.91	0.53
1:A:260:PHE:HB3	1:A:262:LEU:HD22	1.91	0.52
1:B:237:ALA:O	1:B:241:ARG:HD3	2.08	0.52
1:B:260:PHE:HB3	1:B:262:LEU:HD22	1.92	0.52
1:A:284:PHE:O	1:A:288:LYS:HG3	2.09	0.52
1:A:359:MET:HB3	1:A:388:ASN:ND2	2.25	0.52
1:B:41:LYS:NZ	1:B:45:GLY:HA2	2.24	0.52
1:A:171:ASP:O	1:A:174:ILE:HG22	2.10	0.51
1:A:78:GLU:HA	1:A:81:ARG:HG3	1.92	0.51
1:A:129:ARG:HA	1:A:154:GLU:O	2.11	0.51
1:A:373:LEU:HB3	1:A:379:VAL:HB	1.90	0.51
1:A:366:THR:HG22	1:A:369:GLN:N	2.25	0.51
1:A:185:VAL:HG22	1:A:218:LEU:HD23	1.94	0.50
1:A:237:ALA:O	1:A:241:ARG:HD3	2.11	0.50
1:B:201:THR:OG1	1:B:204:GLN:HG3	2.11	0.50
1:B:328:GLN:O	1:B:332:ARG:HD3	2.12	0.50
1:A:15:ASP:HB3	1:A:18:LEU:HB2	1.93	0.50
1:B:208:LEU:O	1:B:212:SER:HB2	2.11	0.50
1:B:397:MET:CE	1:B:397:MET:HA	2.42	0.50
1:A:376:GLU:HB2	1:A:377:PHE:CD2	2.48	0.49
1:A:41:LYS:CD	1:A:45:GLY:HA2	2.42	0.49
1:A:83:THR:O	1:A:87:LEU:HD22	2.13	0.49
1:B:227:GLY:HA3	1:B:323:LEU:HD21	1.94	0.49
1:B:359:MET:HB3	1:B:388:ASN:ND2	2.27	0.49
1:B:397:MET:HE3	1:B:397:MET:HA	1.94	0.49
1:A:168:LEU:HD21	1:A:173:LEU:HD23	1.94	0.49
1:B:329:ARG:NH2	1:B:393:THR:HA	2.28	0.49
1:B:87:LEU:O	1:B:241:ARG:HD2	2.13	0.49
1:A:392:MET:HG2	1:A:400:LEU:HD21	1.95	0.48
1:A:366:THR:HG23	1:A:368:GLU:OE1	2.13	0.48
1:A:334:ARG:NH2	1:A:361:SER:OG	2.46	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:185:VAL:HG22	1:B:218:LEU:HD23	1.96	0.48
1:A:41:LYS:HD2	1:A:45:GLY:HA2	1.95	0.48
1:B:393:THR:HB	1:B:394:PRO:HD2	1.95	0.48
1:B:78:GLU:O	1:B:82:CYS:HB2	2.13	0.48
1:A:41:LYS:NZ	1:A:45:GLY:HA2	2.29	0.47
1:A:87:LEU:O	1:A:241:ARG:HD2	2.14	0.47
1:A:201:THR:HG23	1:A:204:GLN:NE2	2.29	0.46
1:B:277:SER:O	1:B:280:VAL:HG23	2.16	0.46
1:B:41:LYS:HE3	1:B:41:LYS:HB3	1.72	0.46
1:B:168:LEU:HD21	1:B:173:LEU:CD2	2.45	0.46
1:B:366:THR:HG23	1:B:368:GLU:OE1	2.16	0.46
1:A:378:GLY:O	1:A:380:TYR:HD1	1.99	0.45
1:B:106:PRO:HD2	1:B:295:TYR:CZ	2.52	0.45
1:A:134:TRP:HA	1:A:156:ARG:O	2.17	0.45
1:B:41:LYS:HZ3	1:B:45:GLY:HA2	1.82	0.45
1:B:73:ILE:HG12	1:B:296:SER:O	2.17	0.44
1:B:378:GLY:O	1:B:380:TYR:HD1	2.00	0.44
1:A:106:PRO:HD2	1:A:295:TYR:CZ	2.52	0.44
1:A:41:LYS:HZ1	1:A:393:THR:CG2	2.30	0.44
1:A:79:PHE:O	1:A:83:THR:HG23	2.16	0.44
1:A:73:ILE:HD11	1:B:18:LEU:HD21	2.00	0.44
1:A:168:LEU:HD21	1:A:173:LEU:CD2	2.48	0.44
1:A:177:LEU:O	1:A:217:TRP:HZ2	2.00	0.44
1:B:118:PHE:O	1:B:122:ASN:HB2	2.18	0.43
1:B:201:THR:HG23	1:B:204:GLN:HE21	1.82	0.43
1:A:329:ARG:NH2	1:A:392:MET:O	2.49	0.43
1:B:188:PHE:O	1:B:221:PHE:HA	2.18	0.43
1:A:388:ASN:ND2	1:A:390:ALA:H	2.17	0.43
1:B:222:ASP:OD2	2:B:411:PMP:N1	2.51	0.43
1:B:323:LEU:HD12	1:B:326:MET:HE3	2.01	0.43
1:B:201:THR:H	1:B:204:GLN:NE2	2.11	0.43
1:B:334:ARG:NH2	1:B:361:SER:OG	2.51	0.43
1:A:314:ALA:O	1:A:317:ALA:HB3	2.19	0.43
1:B:117:ASP:O	1:B:121:LYS:HG2	2.19	0.43
1:A:328:GLN:O	1:A:332:ARG:HD3	2.19	0.42
1:B:168:LEU:HD21	1:B:173:LEU:HD22	2.00	0.42
1:B:353:ILE:HA	1:B:353:ILE:HD13	1.74	0.42
1:A:118:PHE:O	1:A:122:ASN:HB2	2.18	0.42
1:A:393:THR:HB	1:A:394:PRO:HD2	2.01	0.42
1:A:341:LEU:HA	1:A:341:LEU:HD12	1.90	0.42
1:A:46:LYS:HG3	1:A:48:PRO:HG3	2.02	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:83:THR:O	1:B:87:LEU:HD22	2.20	0.42
1:A:103:ALA:O	1:A:105:THR:HG23	2.20	0.42
1:B:362:PHE:HA	1:B:362:PHE:HD1	1.75	0.42
1:A:249:GLU:HA	1:A:273:VAL:O	2.20	0.41
1:A:329:ARG:NH2	1:A:393:THR:HA	2.35	0.41
1:B:60:LEU:HD11	1:B:304:SER:HB3	2.02	0.41
1:A:337:PHE:O	1:A:341:LEU:HB2	2.20	0.41
1:B:256:TYR:HA	1:B:259:ASN:HD21	1.85	0.41
1:A:334:ARG:NH1	1:A:358:GLY:O	2.52	0.41
1:B:129:ARG:HA	1:B:154:GLU:O	2.20	0.41
1:B:135:VAL:O	1:B:157:GLU:HA	2.19	0.41
1:B:329:ARG:NH2	1:B:393:THR:HG22	2.35	0.41
1:B:39:VAL:HG22	1:B:263:TYR:CZ	2.55	0.41
1:A:286:GLN:CD	1:B:12:ALA:HB2	2.41	0.41
1:B:140:TRP:HA	1:B:141:PRO:HD2	1.82	0.41
1:A:117:ASP:O	1:A:121:LYS:HG2	2.20	0.41
1:A:397:MET:HA	1:A:397:MET:CE	2.51	0.41
1:B:388:ASN:ND2	1:B:390:ALA:H	2.19	0.41
1:B:398:ALA:O	1:B:402:GLU:HG3	2.20	0.41
1:A:374:ARG:HH11	1:A:374:ARG:HD3	1.74	0.41
1:B:233:LEU:HD13	1:B:323:LEU:CD2	2.51	0.41
1:A:181:GLN:H	1:A:181:GLN:HG2	1.54	0.40
1:A:280:VAL:O	1:A:284:PHE:HB2	2.21	0.40
1:A:291:ILE:HG23	1:A:295:TYR:CZ	2.56	0.40
1:A:83:THR:HB	1:A:256:TYR:OH	2.21	0.40
1:A:388:ASN:HD22	1:A:390:ALA:H	1.70	0.40
1:A:41:LYS:CE	1:A:391:GLY:HA2	2.49	0.40
1:A:398:ALA:O	1:A:402:GLU:HG3	2.20	0.40
1:B:194:ASN:HA	1:B:195:PRO:HA	1.84	0.40
1:A:140:TRP:HA	1:A:141:PRO:HD2	1.79	0.40
1:A:397:MET:HA	1:A:397:MET:HE3	2.04	0.40
1:A:397:MET:HE3	1:A:397:MET:O	2.22	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	A	394/396 (100%)	371 (94%)	19 (5%)	4 (1%)	15	44
1	B	394/396 (100%)	371 (94%)	19 (5%)	4 (1%)	15	44
All	All	788/792 (100%)	742 (94%)	38 (5%)	8 (1%)	15	44

All (8) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	30	PRO
1	A	181	GLN
1	B	12	ALA
1	B	30	PRO
1	B	181	GLN
1	A	11	ALA
1	B	11	ALA
1	A	12	ALA

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	A	320/320 (100%)	277 (87%)	43 (13%)	4	12
1	B	320/320 (100%)	274 (86%)	46 (14%)	3	10
All	All	640/640 (100%)	551 (86%)	89 (14%)	3	11

All (89) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	5	MET
1	A	23	LEU
1	A	27	ASP
1	A	30	PRO

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Mol	Chain	Res	Type
1	A	37	ILE
1	A	39	VAL
1	A	41	LYS
1	A	46	LYS
1	A	54	LYS
1	A	61	LEU
1	A	78	GLU
1	A	83	THR
1	A	87	LEU
1	A	98	LYS
1	A	112	LEU
1	A	123	THR
1	A	126	LYS
1	A	154	GLU
1	A	156	ARG
1	A	168	LEU
1	A	169	ASP
1	A	173	LEU
1	A	181	GLN
1	A	210	GLN
1	A	214	GLU
1	A	215	LYS
1	A	223	PHE
1	A	259	ASN
1	A	262	LEU
1	A	272	LEU
1	A	273	VAL
1	A	280	VAL
1	A	297	ASN
1	A	312	ASN
1	A	338	VAL
1	A	341	LEU
1	A	342	GLN
1	A	344	LYS
1	A	361	SER
1	A	362	PHE
1	A	366	THR
1	A	372	ARG
1	A	388	ASN
1	B	23	LEU
1	B	27	ASP
1	B	30	PRO

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Mol	Chain	Res	Type
1	B	39	VAL
1	B	41	LYS
1	B	46	LYS
1	B	54	LYS
1	B	61	LEU
1	B	78	GLU
1	B	83	THR
1	B	87	LEU
1	B	98	LYS
1	B	112	LEU
1	B	123	THR
1	B	152	LEU
1	B	154	GLU
1	B	155	VAL
1	B	156	ARG
1	B	168	LEU
1	B	173	LEU
1	B	181	GLN
1	B	195	PRO
1	B	206	GLN
1	B	210	GLN
1	B	214	GLU
1	B	215	LYS
1	B	223	PHE
1	B	259	ASN
1	B	262	LEU
1	B	272	LEU
1	B	273	VAL
1	B	280	VAL
1	B	304	SER
1	B	312	ASN
1	B	338	VAL
1	B	341	LEU
1	B	342	GLN
1	B	344	LYS
1	B	355	LYS
1	B	361	SER
1	B	362	PHE
1	B	366	THR
1	B	372	ARG
1	B	376	GLU
1	B	388	ASN

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Mol	Chain	Res	Type
1	B	400	LEU

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (20) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	166	HIS
1	A	189	HIS
1	A	204	GLN
1	A	206	GLN
1	A	226	GLN
1	A	258	HIS
1	A	259	ASN
1	A	312	ASN
1	A	339	ASN
1	A	388	ASN
1	B	166	HIS
1	B	189	HIS
1	B	204	GLN
1	B	206	GLN
1	B	226	GLN
1	B	259	ASN
1	B	312	ASN
1	B	339	ASN
1	B	342	GLN
1	B	388	ASN

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 carbohydrates in this entry.

5.6 Ligand geometry

4 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	AKG	A	412	-	3,9,9	2.72	1 (33%)	4,11,11	2.18	2 (50%)
2	PMP	B	411	-	16,16,16	3.51	7 (43%)	21,23,23	2.17	3 (14%)
3	AKG	B	412	-	3,9,9	5.56	1 (33%)	4,11,11	1.47	1 (25%)
2	PMP	A	411	-	16,16,16	1.98	7 (43%)	21,23,23	1.88	4 (19%)

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	AKG	A	412	-	-	0/3/9/9	-
2	PMP	B	411	-	-	2/8/8/8	0/1/1/1
3	AKG	B	412	-	-	1/3/9/9	-
2	PMP	A	411	-	-	4/8/8/8	0/1/1/1

All (16) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	B	412	AKG	O5-C2	9.57	1.37	1.22
2	B	411	PMP	O4P-C5A	-9.41	1.09	1.45
2	B	411	PMP	P-O4P	-6.07	1.40	1.60
3	A	412	AKG	O5-C2	4.63	1.29	1.22
2	B	411	PMP	C5A-C5	4.37	1.62	1.50
2	B	411	PMP	C5-C4	-3.58	1.35	1.40
2	A	411	PMP	C3-C2	-3.16	1.37	1.40
2	B	411	PMP	C3-C2	-2.99	1.37	1.40
2	A	411	PMP	P-O4P	2.95	1.69	1.60
2	A	411	PMP	C5A-C5	-2.81	1.43	1.50
2	A	411	PMP	C4A-C4	-2.68	1.42	1.51

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	411	PMP	C5-C4	-2.41	1.37	1.40
2	B	411	PMP	P-O2P	-2.38	1.45	1.54
2	A	411	PMP	C2-N1	2.25	1.38	1.33
2	B	411	PMP	C2-N1	2.21	1.38	1.33
2	A	411	PMP	O4P-C5A	-2.14	1.37	1.45

All (10) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	411	PMP	O4P-C5A-C5	7.33	123.33	109.35
2	A	411	PMP	O4P-C5A-C5	5.90	120.58	109.35
2	A	411	PMP	C6-C5-C4	4.15	121.05	118.12
2	B	411	PMP	C6-C5-C4	4.01	120.96	118.12
3	A	412	AKG	C3-C4-C5	2.98	117.66	112.67
2	A	411	PMP	C5-C6-N1	-2.79	119.18	123.82
3	A	412	AKG	C3-C2-C1	2.67	127.97	121.32
2	B	411	PMP	C5-C6-N1	-2.53	119.61	123.82
3	B	412	AKG	O5-C2-C3	-2.15	116.71	120.38
2	A	411	PMP	O3P-P-O4P	-2.10	101.13	106.73

There are no chirality outliers.

All (7) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	B	411	PMP	C5A-O4P-P-O2P
2	A	411	PMP	C5-C4-C4A-N4A
3	B	412	AKG	C2-C3-C4-C5
2	A	411	PMP	C3-C4-C4A-N4A
2	A	411	PMP	C4-C5-C5A-O4P
2	B	411	PMP	C5-C4-C4A-N4A
2	A	411	PMP	C6-C5-C5A-O4P

There are no ring outliers.

3 monomers are involved in 7 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	A	412	AKG	2	0
2	B	411	PMP	1	0
2	A	411	PMP	4	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

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.