



wwPDB X-ray Structure Validation Summary Report ⓘ

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PDB ID : 7JSR / pdb_00007jsr
Title : Crystal structure of the large glutamate dehydrogenase composed of 180 kDa subunits from Mycobacterium smegmatis
Authors : Lazaro, M.; Melero, R.; Huet, C.; Lopez-Alonso, J.P.; Delgado, S.; Dodu, A.; Bruch, E.M.; Abriata, L.A.; Alzari, P.M.; Valle, M.; Lisa, M.N.
Deposited on : 2020-08-15
Resolution : 6.27 Å(reported)

This is a wwPDB X-ray Structure Validation Summary 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 Phenix2.0rc1
Mogul : 2022.3.0, CSD as543be (2022)
Xtriage (Phenix) : 2.0rc1
EDS : 3.0
Percentile statistics : 20231227.v01 (using entries in the PDB archive December 27th 2023)
CCP4 : 9.0.006 (Gargrove)
Density-Fitness : 1.0.12
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.43.1

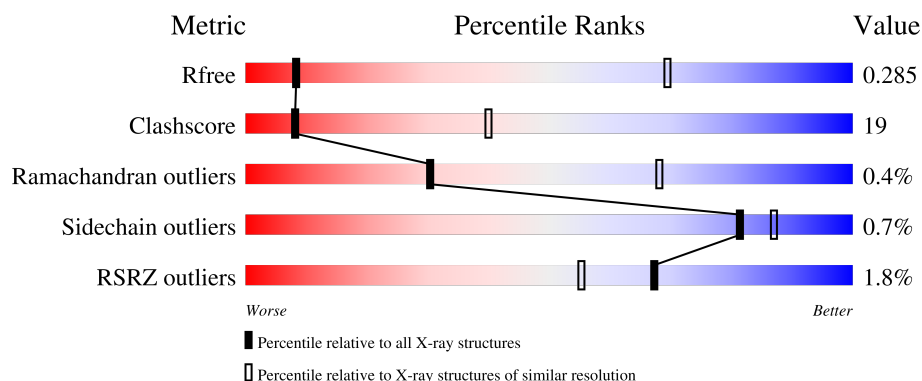
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 6.27 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}	164625	1093 (8.50-4.00)
Clashscore	180529	1134 (8.50-4.00)
Ramachandran outliers	177936	1003 (8.50-4.00)
Sidechain outliers	177891	1026 (8.50-3.96)
RSRZ outliers	164620	1088 (8.50-4.00)

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	1611	 2% 60% 35% . .
1	B	1611	 2% 61% 36% . .

2 Entry composition

There is only 1 type of molecule in this entry. The entry contains 24096 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 NAD-specific glutamate dehydrogenase.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
1	A	1554	Total	C	N	O	S	Se	0	0	0
			12015	7553	2149	2279	7	27			
1	B	1564	Total	C	N	O	S	Se	0	0	0
			12081	7590	2162	2295	7	27			

There are 34 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-16	MSE	-	initiating methionine	UNP A0R1C2
A	-15	HIS	-	expression tag	UNP A0R1C2
A	-14	HIS	-	expression tag	UNP A0R1C2
A	-13	HIS	-	expression tag	UNP A0R1C2
A	-12	HIS	-	expression tag	UNP A0R1C2
A	-11	HIS	-	expression tag	UNP A0R1C2
A	-10	HIS	-	expression tag	UNP A0R1C2
A	-9	GLU	-	expression tag	UNP A0R1C2
A	-8	ASN	-	expression tag	UNP A0R1C2
A	-7	LEU	-	expression tag	UNP A0R1C2
A	-6	TYR	-	expression tag	UNP A0R1C2
A	-5	PHE	-	expression tag	UNP A0R1C2
A	-4	GLN	-	expression tag	UNP A0R1C2
A	-3	GLY	-	expression tag	UNP A0R1C2
A	-2	ALA	-	expression tag	UNP A0R1C2
A	-1	ALA	-	expression tag	UNP A0R1C2
A	0	SER	-	expression tag	UNP A0R1C2
B	-16	MSE	-	initiating methionine	UNP A0R1C2
B	-15	HIS	-	expression tag	UNP A0R1C2
B	-14	HIS	-	expression tag	UNP A0R1C2
B	-13	HIS	-	expression tag	UNP A0R1C2
B	-12	HIS	-	expression tag	UNP A0R1C2
B	-11	HIS	-	expression tag	UNP A0R1C2
B	-10	HIS	-	expression tag	UNP A0R1C2
B	-9	GLU	-	expression tag	UNP A0R1C2

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Chain	Residue	Modelled	Actual	Comment	Reference
B	-8	ASN	-	expression tag	UNP A0R1C2
B	-7	LEU	-	expression tag	UNP A0R1C2
B	-6	TYR	-	expression tag	UNP A0R1C2
B	-5	PHE	-	expression tag	UNP A0R1C2
B	-4	GLN	-	expression tag	UNP A0R1C2
B	-3	GLY	-	expression tag	UNP A0R1C2
B	-2	ALA	-	expression tag	UNP A0R1C2
B	-1	ALA	-	expression tag	UNP A0R1C2
B	0	SER	-	expression tag	UNP A0R1C2

- Molecule 1: NAD-specific glutamate dehydrogenase





R1471	T1372	R1240	S1141	E1053	S973	D858	S765	T628	S541	R451
D1478	M1375	A1241	A1142	L1054	G969	M959	S765	W629	S541	I452
T1479	T1376	I1245	G1143	P1056	N970	D859	V768	V632	E544	Q453
F1480	L1379	G1246	V1144	A1058	S974	M960	E769	V633	L544	D454
A1482	R1380	A1253	I1152	L1059	H975	D877	G770	R640	L456	L457
L1487	R1381	K1280	K1154	I1060	N976	R876	R774	F647	T460	T460
L1382	L1382	L1263	L1156	K1061	R977	R877	V778	P648	N462	N462
L1492	V1383	K1264	I1157	A1062	L978	D880	A779	V657	V463	V463
S1497	W1389	V1267	S1159	L1064	N980	D881	R780	L658	G464	G464
R1501	L1390	L1288	D983	K1065	D983	Y882	G781	T664	D465	D465
D1502	L1391	L1288	D984	A1066	H984	L883	G782	T665	D466	D466
R1510	M1392	V1277	L1175	P1067	R985	V884	L783	L557	M467	M467
R1514	R1394	L1282	M1178	D1069	D986	V885	R784	E559	I468	I468
D1515	P1395	F1286	E1181	L1070	R987	D888	S786	L671	A471	A471
D1516	Q1396	P1287	V1182	M1073	F988	K889	D787	L675	Y484	Y484
L1521	A1399	T1288	D1192	G1077	L989	G990	F792	F676	Y484	Y484
E1533	G1401	R1289	Q1193	T1078	P991	T891	R793	D677	A487	A487
P1534	E1402	E1287	N1194	K1081	D994	A902	T794	Q680	F488	F488
E1544	I1404	H1301	D1195	A1082	R997	W908	I796	R686	D491	D491
W1545	M1405	Q1302	M1197	D1087	R1002	D911	G798	D687	Y492	Y492
T1548	R1406	L1303	M1197	D1087	F1006	A912	L799	V575	F496	F496
N1549	F1407	R1304	S1200	D1092	F1014	F913	Q803	A692	A497	A497
V1553	R1417	E1306	R1201	D1096	A1014	S915	K806	A693	P498	P498
L1560	E1420	I1307	A1204	Q1097	K1018	I919	V811	D698	I502	I502
T1561	W1421	T1309	A1205	I1098	K1018	G920	P812	P583	I508	I508
E1562	L1422	V1313	L1208	G1102	I1021	Y921	A815	L705	D514	D514
Y1564	D1426	D1318	S1209	V1105	S1022	K924	V821	D706	S515	S515
K1565	D1445	I1322	M1214	A1106	G1024	A925	V821	I707	S516	S516
T1573	L1446	Y1326	D1217	A1107	G1026	M926	P825	V710	K517	K517
L1574	I1450	V1337	N1221	K1108	Y1027	I928	P825	L711	L518	L518
S1575	G1453	V1337	N1221	I1110	Y1028	T929	A831	T721	V619	V619
A1577	L1454	V1340	N1225	G1111	S1029	F941	R835	L722	L520	L520
A1578	Y1455	R1341	R1226	E1112	I1035	R942	R835	R723	T523	T523
R1579	Q1456	I1349	E1227	G1113	P1036	R943	R839	N738	A524	A524
Q1580	Y1457	D1354	L1228	G1114	M944	M944	E841	V613	E525	E525
I1581	S1458	D1354	P1232	L1116	D952	F953	G842	R612	D526	D526
S1588	L1459	R1357	S1233	G1117	R952	T954	E841	L743	R527	R527
GLY	V1462	R1358	E1234	V1118	R953	V954	G842	L744	V528	V528
THR	I1463	I1359	K1235	T1119	T954	V955	E943	L745	L531	L531
GLY	D1464	R1360	E1236	T1119	R1042	V956	E944	P746	T532	T532
THR	T1468	G1363	I1237	R1132	R1042	V956	E944	L747	V533	V533
THR			R1238	R1132	R1042	V956	E944	L748	Y534	Y534
GLY			R1239	R1132	R1042	V956	E944	L749	L535	L535
				R1137	R1042	V956	E944	L754	G536	G536
				A1137	R1042	V956	E944	L755	S539	S539
				R1140	R1042	V956	E944	L756	A540	A540

4 Data and refinement statistics

Property	Value	Source
Space group	C 2 2 21	Depositor
Cell constants a, b, c, α , β , γ	151.56Å 253.54Å 399.72Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	24.98 – 6.27 24.98 – 6.27	Depositor EDS
% Data completeness (in resolution range)	98.4 (24.98-6.27) 84.9 (24.98-6.27)	Depositor EDS
R_{merge}	0.06	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	0.67 (at 6.51Å)	Xtriage
Refinement program	PHENIX 1.21.1_5286	Depositor
R, R_{free}	0.226 , 0.284 0.228 , 0.285	Depositor DCC
R_{free} test set	875 reflections (5.01%)	wwPDB-VP
Wilson B-factor (Å ²)	329.5	Xtriage
Anisotropy	0.347	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.25 , 420.9	EDS
L-test for twinning ²	$\langle L \rangle = 0.44$, $\langle L^2 \rangle = 0.27$	Xtriage
Estimated twinning fraction	0.046 for 1/2*h-1/2*k,-3/2*h-1/2*k,-l 0.058 for 1/2*h+1/2*k,3/2*h-1/2*k,-l	Xtriage
F_o, F_c correlation	0.87	EDS
Total number of atoms	24096	wwPDB-VP
Average B, all atoms (Å ²)	456.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.07% 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](#)

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	0.32	0/12213	0.64	5/16558 (0.0%)
1	B	0.33	0/12281	0.67	13/16652 (0.1%)
All	All	0.33	0/24494	0.66	18/33210 (0.1%)

There are no bond length outliers.

The worst 5 of 18 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	1237	ILE	N-CA-C	9.75	119.78	110.42
1	B	49	LEU	N-CA-C	9.41	121.22	110.97
1	B	1239	ARG	N-CA-C	-8.06	102.45	111.07
1	B	1042	ARG	N-CA-C	7.72	119.69	111.28
1	B	1194	ASN	N-CA-C	6.30	119.12	111.82

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts [i](#)

In the following table, the Non-H and H(model) columns list the number of non-hydrogen atoms and hydrogen atoms in the chain respectively. The H(added) column lists the number of hydrogen atoms added and optimized by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, whereas Symm-Clashes lists symmetry-related clashes.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	12015	0	11963	468	0
1	B	12081	0	12022	469	0
All	All	24096	0	23985	919	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 19.

The worst 5 of 919 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:1483:LEU:HD23	1:A:1542:ILE:HG12	1.22	1.13
1:A:1483:LEU:CD2	1:A:1542:ILE:HG12	1.87	1.04
1:A:1226:ARG:HD3	1:A:1233:SER:HA	1.43	1.00
1:B:1226:ARG:HD3	1:B:1233:SER:HA	1.44	0.98
1:B:355:MSE:SE	1:B:371:PHE:CD2	2.68	0.96

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	1544/1611 (96%)	1488 (96%)	50 (3%)	6 (0%)	30	68
1	B	1556/1611 (97%)	1499 (96%)	52 (3%)	5 (0%)	37	72
All	All	3100/3222 (96%)	2987 (96%)	102 (3%)	11 (0%)	30	68

5 of 11 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	462	ASN
1	B	462	ASN
1	A	187	ASP
1	B	187	ASP
1	B	326	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	A	1257/1266 (99%)	1249 (99%)	8 (1%)	84	88
1	B	1263/1266 (100%)	1254 (99%)	9 (1%)	81	87
All	All	2520/2532 (100%)	2503 (99%)	17 (1%)	81	87

5 of 17 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	B	394	THR
1	B	545	LEU
1	A	545	LEU
1	B	1	MSE
1	B	2	ILE

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 17 such sidechains are listed below:

Mol	Chain	Res	Type
1	B	968	ASN
1	B	1225	ASN
1	A	1225	ASN
1	B	79	GLN
1	B	103	ASN

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 [i](#)

There are no ligands in this entry.

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, 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	1527/1611 (94%)	-0.09	27 (1%) 67 55	366, 451, 525, 581	0
1	B	1537/1611 (95%)	-0.08	28 (1%) 67 55	364, 455, 529, 592	0
All	All	3064/3222 (95%)	-0.09	55 (1%) 67 55	364, 453, 527, 592	0

The worst 5 of 55 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	1286	PHE	5.4
1	A	381	VAL	4.6
1	A	64	PRO	3.5
1	B	1297	GLU	3.3
1	A	423	PRO	3.3

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 monosaccharides in this entry.

6.4 Ligands [i](#)

There are no ligands in this entry.

6.5 Other polymers [i](#)

There are no such residues in this entry.