



Full wwPDB X-ray Structure Validation Report ⓘ

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PDB ID : 2VL7
Title : Structure of *S. tokodaii* Xpd4
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Deposited on : 2008-01-08
Resolution : 2.25 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 : 4.02b-467
Mogul : 2022.3.0, CSD as543be (2022)
Xtriage (Phenix) : 1.21
EDS : 3.0
Percentile statistics : 20231227.v01 (using entries in the PDB archive December 27th 2023)
CCP4 : 9.0.004 (Gargrove)
Density-Fitness : 1.0.11
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.40

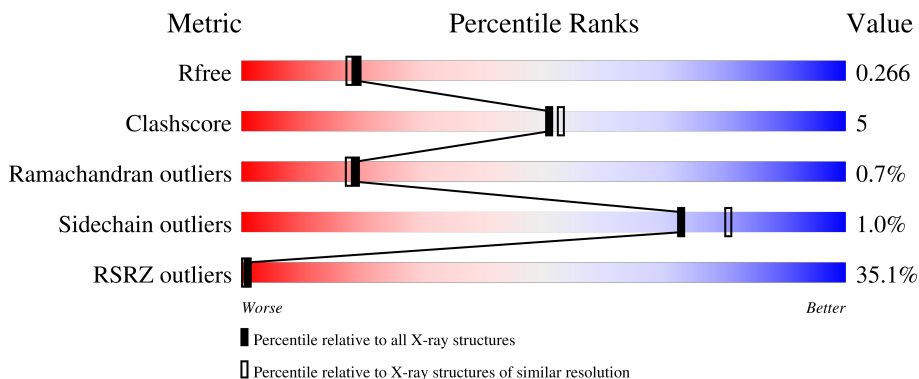
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.25 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	1763 (2.26-2.26)
Clashscore	180529	1919 (2.26-2.26)
Ramachandran outliers	177936	1884 (2.26-2.26)
Sidechain outliers	177891	1885 (2.26-2.26)
RSRZ outliers	164620	1763 (2.26-2.26)

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 $\leq 5\%$.

Mol	Chain	Length	Quality of chain
1	A	540	

2 Entry composition [i](#)

There are 3 unique types of molecules in this entry. The entry contains 3790 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 XPD.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	459	3712	2384	629	681	18	0	0	0

- Molecule 2 is PHOSPHATE ION (three-letter code: PO4) (formula: O₄P).



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

- Molecule 3 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
			Total	O		
3	A	73	73	73	0	0

3 Residue-property plots [i](#)

These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry. Residues are color-coded according to the number of geometric quality criteria for which they contain at least one outlier: green = 0, yellow = 1, orange = 2 and red = 3 or more. Stretches of 2 or more consecutive residues without any outlier are shown as a green connector. Residues present in the sample, but not in the model, are shown in grey.

- Molecule 1: XPD



4 Data and refinement statistics i

Property	Value	Source
Space group	P 21 21 2	Depositor
Cell constants a, b, c, α , β , γ	95.71Å 100.29Å 62.49Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	29.70 – 2.25 29.70 – 2.25	Depositor EDS
% Data completeness (in resolution range)	99.7 (29.70-2.25) 99.6 (29.70-2.25)	Depositor EDS
R_{merge}	0.06	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	4.68 (at 2.24Å)	Xtrriage
Refinement program	REFMAC 5.2.0019	Depositor
R, R_{free}	0.232 , 0.276 0.230 , 0.266	Depositor DCC
R_{free} test set	1472 reflections (5.05%)	wwPDB-VP
Wilson B-factor (Å ²)	57.0	Xtrriage
Anisotropy	0.172	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.32 , 58.9	EDS
L-test for twinning ²	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.33$	Xtrriage
Estimated twinning fraction	0.010 for k,h,-l	Xtrriage
F_o, F_c correlation	0.91	EDS
Total number of atoms	3790	wwPDB-VP
Average B, all atoms (Å ²)	65.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.35% 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: PO4

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	0.50	0/3769	0.63	1/5067 (0.0%)

There are no bond length outliers.

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed($^{\circ}$)	Ideal($^{\circ}$)
1	A	271	ILE	CB-CA-C	5.10	121.81	111.60

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	3712	0	3874	39	0
2	A	5	0	0	0	0
3	A	73	0	0	1	0
All	All	3790	0	3874	39	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 5.

All (39) 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:43:VAL:HG11	1:A:180:VAL:HG21	1.41	1.02
1:A:456:LEU:HD12	1:A:505:ALA:HB2	1.57	0.85
1:A:43:VAL:CG1	1:A:180:VAL:HG21	2.20	0.71
1:A:33:ALA:O	1:A:327:GLY:HA2	1.97	0.65
1:A:533:GLU:HA	1:A:536:ILE:HD12	1.82	0.61
1:A:290:MET:HE1	1:A:305:PRO:HD3	1.81	0.61
1:A:33:ALA:HB3	1:A:39:LYS:CG	2.32	0.60
1:A:11:TRP:CE3	1:A:343:VAL:HG21	2.37	0.58
1:A:43:VAL:HG11	1:A:180:VAL:CG2	2.26	0.56
1:A:34:LYS:N	1:A:37:LEU:HD12	2.21	0.56
1:A:290:MET:O	1:A:303:LYS:HE2	2.06	0.56
1:A:334:THR:OG1	1:A:482:THR:HG22	2.07	0.55
1:A:35:PRO:HD3	1:A:327:GLY:HA3	1.90	0.54
1:A:33:ALA:HB3	1:A:39:LYS:HG2	1.90	0.54
1:A:404:LEU:HD13	1:A:431:LEU:CD2	2.38	0.53
1:A:269:LEU:HD11	1:A:282:LYS:HD3	1.91	0.53
1:A:30:LEU:HB3	1:A:329:LEU:HD21	1.90	0.52
1:A:259:GLY:O	1:A:263:VAL:HG23	2.10	0.52
1:A:506:PHE:HE1	1:A:515:ILE:HD11	1.75	0.51
1:A:11:TRP:HA	1:A:14:GLU:HG2	1.93	0.50
1:A:334:THR:C	1:A:335:LEU:HD22	2.32	0.50
1:A:31:LEU:C	1:A:329:LEU:HD22	2.34	0.47
1:A:195:THR:CG2	1:A:302:VAL:HG13	2.45	0.47
1:A:334:THR:O	1:A:335:LEU:HD22	2.16	0.46
1:A:352:TYR:CE1	1:A:531:ILE:HG21	2.50	0.46
1:A:230:LEU:C	1:A:230:LEU:HD23	2.36	0.46
1:A:402:ILE:HD11	3:A:2058:HOH:O	2.16	0.45
1:A:290:MET:HE1	1:A:305:PRO:CD	2.47	0.45
1:A:456:LEU:HD23	1:A:457:VAL:N	2.32	0.44
1:A:388:LEU:CD2	1:A:434:LEU:HD11	2.48	0.44
1:A:436:MET:HE3	1:A:458:LEU:HD22	2.00	0.43
1:A:502:ILE:CG2	1:A:506:PHE:CZ	3.03	0.42
1:A:209:GLU:O	1:A:213:VAL:HG23	2.20	0.42
1:A:212:ILE:HG23	1:A:216:LEU:HD13	2.02	0.42
1:A:197:LYS:HG2	1:A:302:VAL:HG22	2.02	0.42
1:A:64:LEU:HD12	1:A:149:ALA:HB1	2.02	0.41
1:A:217:ASN:ND2	1:A:267:ALA:HB1	2.36	0.41
1:A:52:LYS:NZ	1:A:320:THR:OG1	2.54	0.41
1:A:388:LEU:CD2	1:A:434:LEU:CD1	3.00	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	451/540 (84%)	429 (95%)	19 (4%)	3 (1%)	19 18

All (3) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	278	LYS
1	A	414	LYS
1	A	275	PRO

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	420/494 (85%)	416 (99%)	4 (1%)	73 80

All (4) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	166	CYS
1	A	308	VAL
1	A	488	SER
1	A	518	CYS

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

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](#)

1 ligand is 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	$\# Z > 2$
2	PO4	A	1541	-	4,4,4	0.94	0	6,6,6	0.58	0

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

No monomer is involved in short contacts.

5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues

There are no chain breaks in this entry.

6 Fit of model and data

6.1 Protein, DNA and RNA chains

Warning: The R factor obtained from EDS is 0.3309, which does not match the depositor's R factor of 0.232. Please interpret the results in this section carefully.

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	459/540 (85%)	1.71	161 (35%) 1 0	55, 64, 81, 92	0

All (161) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	210	ILE	5.5
1	A	348	GLY	5.2
1	A	40	THR	5.2
1	A	506	PHE	4.8
1	A	452	LEU	4.6
1	A	35	PRO	4.6
1	A	61	HIS	4.4
1	A	421	VAL	4.4
1	A	142	LEU	4.3
1	A	478	LEU	4.1
1	A	475	ILE	4.1
1	A	513	VAL	4.0
1	A	473	LYS	3.9
1	A	471	VAL	3.9
1	A	64	LEU	3.8
1	A	33	ALA	3.7
1	A	37	LEU	3.7
1	A	74	LEU	3.6
1	A	205	ARG	3.6
1	A	489	ILE	3.6
1	A	80	PHE	3.6
1	A	212	ILE	3.6
1	A	339	TYR	3.5
1	A	79	GLY	3.5

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Mol	Chain	Res	Type	RSRZ
1	A	188	LEU	3.4
1	A	330	PRO	3.4
1	A	305	PRO	3.4
1	A	36	GLY	3.3
1	A	272	ASP	3.3
1	A	494	THR	3.3
1	A	221	ALA	3.2
1	A	490	ILE	3.2
1	A	512	TYR	3.2
1	A	248	SER	3.2
1	A	275	PRO	3.1
1	A	249	LEU	3.1
1	A	146	ASP	3.1
1	A	175	GLU	3.1
1	A	505	ALA	3.1
1	A	410	ILE	3.1
1	A	294	LEU	3.1
1	A	333	LEU	3.1
1	A	139	ARG	3.0
1	A	540	ALA	3.0
1	A	70	ASN	3.0
1	A	34	LYS	3.0
1	A	171	CYS	2.9
1	A	208	LYS	2.9
1	A	276	VAL	2.9
1	A	30	LEU	2.9
1	A	335	LEU	2.9
1	A	306	SER	2.9
1	A	178	LEU	2.9
1	A	481	LEU	2.9
1	A	308	VAL	2.9
1	A	48	MET	2.9
1	A	187	LEU	2.9
1	A	25	HIS	2.9
1	A	68	TYR	2.8
1	A	394	TYR	2.8
1	A	140	ALA	2.8
1	A	498	ILE	2.7
1	A	470	MET	2.7
1	A	355	CYS	2.7
1	A	493	LEU	2.7
1	A	67	ILE	2.7

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Mol	Chain	Res	Type	RSRZ
1	A	219	ILE	2.7
1	A	47	GLY	2.7
1	A	476	GLU	2.7
1	A	309	ASN	2.7
1	A	482	THR	2.6
1	A	533	GLU	2.6
1	A	20	ILE	2.6
1	A	332	SER	2.6
1	A	492	ASP	2.6
1	A	511	ASP	2.6
1	A	43	VAL	2.6
1	A	315	ALA	2.6
1	A	469	ASP	2.6
1	A	477	ARG	2.6
1	A	507	ARG	2.6
1	A	81	LEU	2.6
1	A	216	LEU	2.6
1	A	502	ILE	2.6
1	A	430	TYR	2.6
1	A	466	VAL	2.5
1	A	311	LEU	2.5
1	A	329	LEU	2.5
1	A	196	ARG	2.5
1	A	293	ASP	2.5
1	A	425	MET	2.5
1	A	415	LYS	2.5
1	A	536	ILE	2.5
1	A	480	LYS	2.5
1	A	534	LYS	2.5
1	A	41	VAL	2.5
1	A	432	VAL	2.5
1	A	539	PHE	2.5
1	A	21	ASN	2.5
1	A	268	TYR	2.4
1	A	436	MET	2.4
1	A	342	VAL	2.4
1	A	387	VAL	2.4
1	A	538	LEU	2.4
1	A	295	TYR	2.4
1	A	456	LEU	2.4
1	A	46	LEU	2.4
1	A	304	VAL	2.3

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Mol	Chain	Res	Type	RSRZ
1	A	225	LYS	2.3
1	A	483	GLY	2.3
1	A	44	GLU	2.3
1	A	164	VAL	2.3
1	A	328	THR	2.3
1	A	336	THR	2.3
1	A	312	ILE	2.3
1	A	472	ARG	2.3
1	A	388	LEU	2.3
1	A	39	LYS	2.3
1	A	253	PRO	2.3
1	A	496	ILE	2.3
1	A	24	LYS	2.3
1	A	53	LYS	2.3
1	A	173	LYS	2.3
1	A	486	GLU	2.3
1	A	194	PHE	2.3
1	A	453	PHE	2.3
1	A	474	ARG	2.2
1	A	244	CYS	2.2
1	A	338	SER	2.2
1	A	484	LYS	2.2
1	A	195	THR	2.2
1	A	488	SER	2.2
1	A	239	ILE	2.2
1	A	362	LEU	2.2
1	A	288	VAL	2.2
1	A	349	ARG	2.1
1	A	50	LEU	2.1
1	A	190	ALA	2.1
1	A	144	ASP	2.1
1	A	395	GLU	2.1
1	A	76	LEU	2.1
1	A	247	LEU	2.1
1	A	278	LYS	2.1
1	A	463	TYR	2.1
1	A	45	VAL	2.1
1	A	176	ASP	2.1
1	A	28	THR	2.1
1	A	495	ALA	2.1
1	A	378	ARG	2.1
1	A	182	ASP	2.1

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Mol	Chain	Res	Type	RSRZ
1	A	297	CYS	2.1
1	A	203	LEU	2.1
1	A	523	ARG	2.0
1	A	390	PHE	2.0
1	A	307	ASP	2.0
1	A	252	LEU	2.0
1	A	204	GLU	2.0
1	A	435	VAL	2.0
1	A	191	ASP	2.0
1	A	31	LEU	2.0
1	A	166	CYS	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 monosaccharides 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(Å ²)	Q<0.9
2	PO4	A	1541	5/5	0.67	0.14	86,86,87,87	0

6.5 Other polymers [i](#)

There are no such residues in this entry.