

**Supplementary 1.** Phylogenetic analysis of 16S rRNA gene sequence similarities of *Enterobacter* sp. 3TP2A based on the BLAST result using the neighbor-joining method. Scale bar represents 0.1 substitutions per nucleotide position. The organisms and GeneBank accession numbers of analyzed sequences are given in parenthesis.

**Supplementary 2.** Some properties of β-galactosidases from bacterial sources.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Bacteria** | **Enzyme temperature** | **Enzyme pH** | **M.W kDa** | **Reference** |
| *Enterobacter* sp. 3TP2A | 35 oC | 8.0-9.0 | 60 | The present study |
| *Bifidobacterium infantis* HL96 | 37 oC | - | 113 | Hung et al. 38 |
| *Enterobacter agglomerans* B1 | 37-40 oC | 7.5-8.0 | homodimer 248 | Lu et al. 16 |
| *Enterobacter cloacae* B5 | 35 °C | 6.5-10.5 | homotetramer 442 | Lu et al. 19 |
| *Streptococcus* *mitis* | 30-40 oC | 6-6.5 | 268 | Campuzano et al. 20 |
| *Bacillus* sp*.* BPTK4 | 55 oC | 7.0 | 65 | Natarajan et al. 14 |
| *Bacillus subtilis* | 35 oC | 8.0 | 120 | El-kaderet al. 22 |
| *Lactobacillus* sp. | 37 oC | 7.2 | 116 | Sumathy et al. 23 |
| *Escherichia coli* | 35 oC | 7.0 | - | Khedr et al. 35 |
| *Enterobacter cloacae* SJ 6 | 50 oC | 9.0 | 340 | Ghatak 37 |



**Supplementary 3a.** Effect of temperature on β-galactosidase activity in *Enterobacter* sp. 3TP2A



**Supplementary 3b.** Effect of pH on β-galactosidase activity in *Enterobacter* sp. 3TP2A



**Supplementary 4a.** Effect of thermal stability on purified β-galactosidase activity from *Enterobacter* sp.3TP2A



**Supplementary 4b.** Effect of pH stability on purified β-galactosidase activity from *Enterobacter* sp.3TP2A

**Supplementary 5.** Effect of metal ions on the activity of purified β-galactosidase from *E. cloacae*

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Chemicals** | **Percent activity retained (%)** | | | | |
| **1 mM** | **2mM** | **5 mM** | **10 mM** | **20 mM** |
| Ca2+ | 94±2.3 | 95±1.5 | 100±1.5 | 105±1.0 | 84±2.1 |
| Cu2+ | 4.1±0.1 | 0 | 0 | 0 | 0 |
| Mg2+ | 117±1.5 | 125±2.3 | 120±0.3 | 120±1.5 | 147±2.3 |
| Zn2+ | 68±1.8 | 73±0.1 | 92±2.9 | 103±2.7 | ND |
| EDTA | 32±0.9 | 29±0.4 | 27±2.4 | 25±0.3 | 24±0.8 |

**ND:** Not determined

**Supplementary 6.** Effect of inhibitors on the activity of purified β-galactosidase

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Chemicals** | **Percent activity retained (%)** | | | |
| **1mM** | **2mM** | **4mM** | **8mM** |
| N-ethylmaleimide | 0 | 0 | 0 | 0 |
| DTT | 100±1.5 | 102±2.1 | 97±0.3 | 108±1.9 |
| β-Mercaptoethanol | 102±1.2 | 99±1.4 | ND | 114±1.5 |
| Iodoacetamide | 99±3.02 | 87±4.3 | 94±1.4 | 93±1.7 |
|  | **0.2 mM** | **0.4 mM** | **1 mM** | **2 mM** |
| PCMB | 13.7±0.4 | 13.9±0.5 | 13.08±0.8 | 13.3±0.2 |