

# Cost-Effective Production, Characterization, and Application of Alkaline Protease from Haloalkaliphilic *Virgibacillus Salaris* VS-23

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## ABSTRACT

An efficient alkaline protease producer, *Virgibacillus salarius* VS-23 isolated from the saline desert of Kutch was used for production studies of alkaline protease. Alkaline protease production was optimized by adopting a One Variable at a Time (OVAT) approach in a submerged fermentation system. Protease production was achieved and optimized using various factors such as incubation time, pH, NaCl concentration, nitrogen sources, and carbon sources. Incubation time and salt concentration were the primary factors that affected enzyme production significantly. Protease production was suppressed by yeast extract and peptone. Optimum protease production of 327.41 U/ml/min was achieved at 3% (w/v) NaCl, 9 pH, 0.5% gelatin, 1% casein enzyme hydrolysate, and 1% (w/v) Xylose after 48 hours of incubation time. Furthermore, Protease production was achieved and optimized using various agricultural and kitchen wastes. Moong water (40 %, v/v), Brown bread (1%, w/v), Rice water (40%, v/v), Wheat bran (1%, w/v), and Ground nut seed cake (1%, w/v) were found to be optimum for maximal protease production. Among the substrates used, a maximum of 194 U/mL and 108 U/mL enzyme activity was achieved with moong water (40 %, v/v) and brown bread (1%, w/v), respectively. The enzyme was also tested for industrial applications, such as silver recovery from x-ray films and blood stain removal, demonstrating its potential industrial value. The use of agro-kitchen waste for enzyme production is commercially significant due to the low cost of these raw materials, offering a sustainable and cost-effective approach to producing proteases with desirable industrial properties.

**Keywords:** Alkaline protease, Cost-effective production, Agricultural waste, Silver recovery, *Virgibacillus salarius*

## How to Cite

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