

## United States Patent [19]

Carrera et al.

[11] Patent Number: 5,227,294

Date of Patent: [45]

Jul. 13, 1993

## [54] METHOD OF PRODUCING SURFACTIN WITH THE USE OF MUTANT OF BACILLUS

**SUBTILIS** 

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of Italy

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[21] Appl. No.: 718,464

[22] Filed: Jun. 20, 1991

[30] Foreign Application Priority Data

Jun. 22, 1990 [IT] Italy ...... 20738 A/90 Italy ...... 22176 A/90 Nov. 23, 1990 [IT]

[51] Int. Cl.<sup>5</sup> ...... C12P 21/02; C12P 1/125 [52] U.S. Cl. ...... 435/71.2; 435/71.1;

435/252.31; 435/252.5 [58] Field of Search ...... 435/71.2, 71.1, 252.5, 435/252.31

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Primary Examiner—Herbert J. Lilling Attorney, Agent, or Firm-Sughrue, Mion, Zinn, Macpeak & Seas

**ABSTRACT** [57]

The present invention relates to a stable mutant of Bacillus subtilis which can produce surfactin with high yields, a method of producing surfactin with the use of the strain and the use of the surfactin obtained for pharmaceutical, energy and environmental problems.

11 Claims, 11 Drawing Sheets



FIG. I

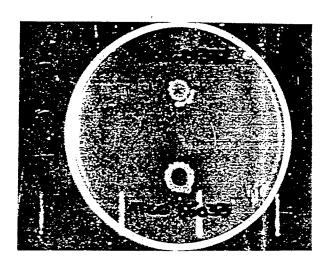


FIG. 2

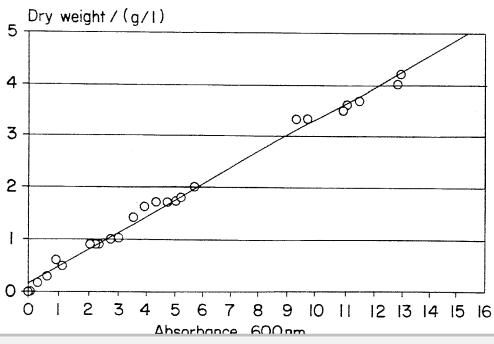




FIG. 3

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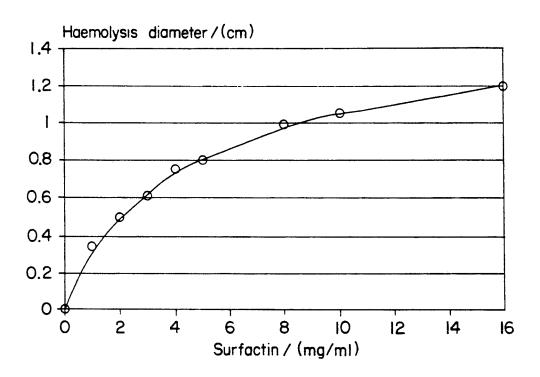


FIG. 4

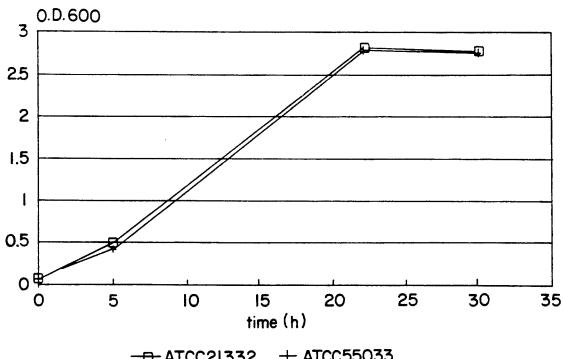






FIG.5

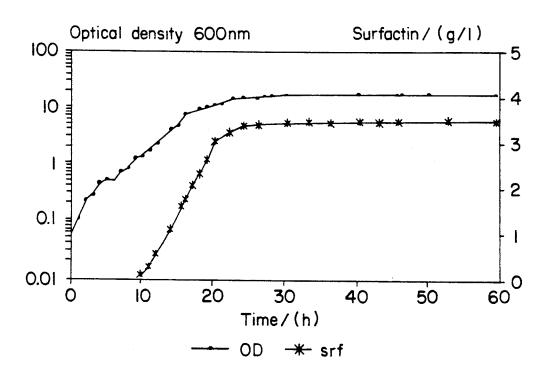


FIG.6

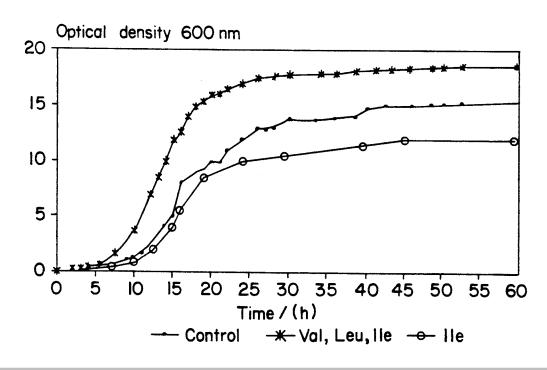




FIG.7

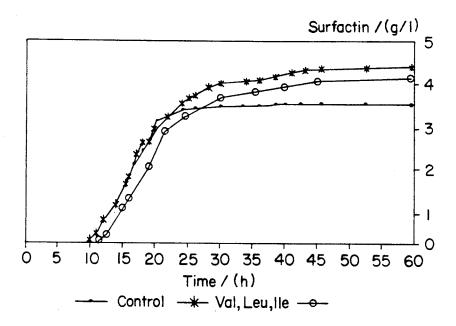
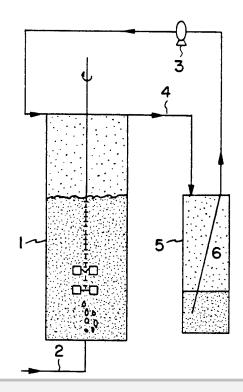


FIG.8





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