

PRODUCTION OF ACRYLAMIDE FROM ACRYLONITRILE BY  
NITRILE HYDRATASE OF RHODOCOCCUS SPECIES STRAIN J-1

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Acrylamide is an important industrial chemical used as a monomer for synthetic fibers, flocculent agent etc. Acrylamide is produced by hydration of acrylonitrile with sulfuric acid. This reaction gives a low yield due to formation of carboxylic acid and ammonia. Our studies on nitrile hydratase from Rhodococcus species strain J-1 showed that the enzyme has high affinity for the substrates 3-cyanopyridine (100%) acrylonitrile (106%) 4-cyanopyridine (129%) and 2-thiophenecarbonitrile (116%). Amidase activity of the cell extract at 30°C was only 0.068 mol/min/mg for propionamide (100%) and less for acrylamide (52%) and Nicotinamide (10%). Amidase activity was also inhibited at high concentrations of nitrile compounds. So we optimized the conditions for production of acrylamide from acrylonitrile using the resting cells of Rhodococcus species strain J-1. Optimum pH was 8.0 and highest activity was observed between 40° to 50°C. Enzyme activity was stable upto 30°C. Nitrile hydratase activity was inhibited at a acrylonitrile concentration of 7M. Under optimum conditions at 20°C a reaction mixture containing 3.96 mg/ml of Rhodococcus species strain J-1 cells converted 6.8 M of acrylonitrile into acrylamide (483 mg/ml) in 5h. The yield was 100%.