

Chemical Route for Synthesis of Citric Acid from Citrus Juices [†]

Naveen Prasad B.S. ^{1,*}, Sivamani Selvaraju ^{1,*}, Senthilkumar P. ^{2,*}

¹ Chemical Engineering Section, Salalah College of Technology, Sultanate of Oman

² Department of Chemical Engineering, Sathyabama Institute of Science and Technology

* Correspondence: bsnaveenprasad@gmail.com (N.P.B.S); sivman.sel@gmail.com (S.S.), sensen10@gmail.com (S.P);

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Abstract: Citric acid is the main tricarboxylic acid present in citrus fruits such as lemons, lime, oranges, grapefruit, grapes, etc. These fruits contain sufficient citric acid. The properties of citric acid make it an important additive for application in various industries such as the food, pharmaceuticals, disinfection, and cleaning industries. The aim of this experimental study is to produce citric acid from orange and grape juices. The chemical route for the synthesis of citric acid from citrus juices involves three steps: (i) Neutralization to adjust pH to 9-10 with 2.5 M NaOH solution, (ii) Addition of CaCl₂ solution, and (iii) Acidification with H₂SO₄ solution to produce citric acid. Juice containing citric acid is neutralized with NaOH solution to obtain trisodium citrate. Then, trisodium citrate is added with CaCl₂ solution to produce calcium citrate. Finally, calcium citrate is acidified with H₂SO₄ solution to collect crystals of citric acid. In this study, the fruits were crushed, juice filtered, neutralized, added CaCl₂ solution, and acidified to obtain citric acid. The experiments were carried out by varying different volumes of 2.5 M NaOH solution during neutralization, concentrations of CaCl₂ solution, and volume of H₂SO₄ solution. The percentage of citric acid yield collected from grape juice varied from 44.1 to 79.53%. Similarly, the percentage yield of citric acid was calculated to be from 60.1 to 96.3%. It was found that the percentage of citric acid yield increased with increasing pH and decreased with increasing CaCl₂ concentration. Thus, it could be concluded that the orange juice yielded more citric acid than grape juice.

Keywords: Orange juice; Grape juice; Neutralization; Acidification; Citric acid.

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Conflicts of Interest

The authors declare no conflict of interest.