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Direct Formation of H_2O_2 from H_2 and O_2

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Abstract: The direct combination of hydrogen and oxygen to form hydrogen peroxide in liquid media with prepared catalysts was carried out in a slurry reactor at atmospheric pressure and room temperature. An O_2/H_2 ratio of 2:1 with a 50 mL/min flow rate was used in these experiments. Catalyst activity measurements were tested by the iodometric titration method using $KMnO_4$. The results are discussed based on the effects of support material, catalyst preparation method, reaction time, and medium (type of halide and acid) on hydrogen peroxide yield in direct oxidation of hydrogen to produce hydrogen peroxide. Our results showed that the catalytic performance of a gold-based catalyst was greatly dependent upon the kind of support material, precipitation conditions, and liquid media used in the reaction. The highest yield in the study was obtained with a co-precipitated 10.7 wt% Au/CeO_2 catalyst in a reaction mixture of 0.25 N H_3PO_4, 0.1 M NaBr, and absolute ethanol.

Key Words: Direct oxidation, hydrogen peroxide, gold catalysts

Keywords
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