4. The process, as recited in claim 1, 2 or 3, wherein during the step of performing the homogenous catalytic decomposition of the CHHP, the weight ratio of the added oil-soluble 1-hydroxy ethidene-1,1-diphosphonic acid (di)octyl ester and the transitional metal ions of the catalyst is 1:1.

5. The process, as recited in claim 1, 2 or 3,, wherein a reactor residence time of an oxidation mixture liquid containing CHHP in each decomposition reaction chamber of the decomposition reaction and distillation vessel is at a range of 5~8 minutes, totaling 20~40 minutes.

6. The process, as recited in claim 1, wherein during the step of performing the homogenous catalytic decomposition of the CHHP, the flow of the steam which serves as the heating medium is controlled to evaporate 30±5% of the cyclohexane in the reaction and distillation vessel.

~~7. A device of the process for preparing cyclohexanol and cyclohexanone by cyclohexane oxidation as recited in claim 1, comprising the homogeneous catalytic decomposition reaction and distillation vessel which is a decomposition reaction and distillation vessel having 3~5 decomposition reaction chambers provided therein, wherein each the decomposition reaction chamber has a tubular heater bundle; and a separating board with a through-hole is provided between each two the decomposition reaction chambers.~~