CLAIMS

[Claim 1]

A catalyst for producing at least one of an unsaturated aldehyde compound, an unsaturated carboxylic acid compound, and a conjugated diene, comprising, as an essential component,

molybdenum;

bismuth;

and cobalt, wherein

with respect to a peak intensity at $2\theta = 25.3° \pm 0.2°$ in an X-ray diffraction pattern obtained by using CuKα rays as an X-ray source, a changing rate (Q1) per 1000 hours of reaction time represented by the following formulae (1) to (4) is 16 or less.

$$Q1 = \{(U1/F1 - 1) \times 100\}/T \times 1000 \quad (1)$$

F1 = (peak intensity of catalyst before oxidation reaction at $2\theta = 25.3° \pm 0.2°$)/(peak intensity of catalyst before oxidation reaction at $2\theta = 26.5° \pm 0.2°$) × 100 (2)

U1 = (peak intensity of catalyst after oxidation reaction at $2\theta = 25.3° \pm 0.2°$)/(peak intensity of catalyst after oxidation reaction at $2\theta = 26.5° \pm 0.2°$) × 100 (3)

T = time (hr) during which oxidation reaction is carried out (4)

[Claim 2]

The catalyst for producing at least one of an unsaturated aldehyde compound, an unsaturated carboxylic acid compound, and a conjugated diene according to claim 1, wherein with respect to a peak intensity at $2\theta = 25.3° \pm 0.2°$ in an X-ray diffraction pattern obtained by using CuKα rays as an X-ray source, a changing amount (D1) per 1000 hours of reaction time represented by the following formula (5) and the formulae (2) to (4) is 4.1 or less.

$$D1 = (U1 - F1)/T \times 1000 \quad (5)$$

[Claim 3]

The catalyst for producing at least one of an unsaturated aldehyde compound, an unsaturated carboxylic acid compound, and a conjugated diene according to claim 1 or 2, wherein a composition of a catalytically active component is represented by the following formula (A):

$$Mo_{a1}Bi_{b1}Ni_{c1}Co_{d1}Fe_{e1}X_{f1}Y_{g1}Z_{h1}O_{i1} \quad (A)$$

(in the formula, Mo, Bi, Ni, Co and Fe represent molybdenum, bismuth, nickel, cobalt and iron, respectively; X is at least one element selected from tungsten, antimony, tin, zinc, chromium, manganese, magnesium, silica, aluminum, cerium and titanium; Y is at least one element selected from sodium, potassium, cesium, rubidium, and thallium; Z belongs to the 1st to 16th groups in the periodic table and means at least one element selected from elements other than the above Mo, Bi, Ni, Co, Fe, X, and Y; a1, b1, c1, d1, e1, f1, g1, h1, and i1 represent the number of atoms of molybdenum, bismuth, nickel, cobalt, iron, X, Y, Z, and oxygen, respectively; when $a1 = 12$, $0 < b1 \leq 7$, $0 \leq c1 \leq 10$, $0 < d1 \leq 10$, $0 < c1 + d1 \leq 20$, $0 \leq e1 \leq 5$, $0 \leq f1 \leq 2$, $0 \leq g1 \leq 3$, $0 \leq h1 \leq 5$, and i1 is a value determined by an oxidation state of each element).

[Claim 4]

The catalyst for producing at least one of an unsaturated aldehyde compound, an unsaturated carboxylic acid compound, and a conjugated diene according to any one of claims 1 to 3, wherein a catalytically active component is carried on an inert carrier in the catalyst.

[Claim 5]

The catalyst for producing at least one of an unsaturated aldehyde compound, an unsaturated carboxylic acid compound, and a conjugated diene according to claim 4, wherein the inert carrier is silica, alumina, or a mixture thereof.

[Claim 6]

A method for producing at least one of an unsaturated aldehyde compound, an unsaturated carboxylic acid compound, and a conjugated diene, the method comprising using the catalyst for producing at least one of an unsaturated aldehyde compound, an unsaturated carboxylic acid compound, and a conjugated diene according to any one of claims 1 to 5.

[Claim 7]

The method according to claim 7, wherein the unsaturated aldehyde compound is acrolein, the unsaturated carboxylic acid compound is acrylic acid, and the conjugated diene is 1,3-butadiene.