

Abstract

The present invention is a catalyst comprising:

(i) a compound comprising at least one first metal element selected from boron, magnesium, zirconium, and hafnium, and

(ii) an alkali metal element,

wherein the compound and the alkali metal element are supported on a carrier having silanol groups,

an average particle size of the compound of the first metal element is 0.4 nm or more and 50 nm or less,

the catalyst satisfies the following formula (1):

$$0.90 \times 10^{-21} \text{ (g/number)} \leq X / (Y \times Z) < 10.8 \times 10^{-21} \text{ (g/number)} \quad \cdot \cdot \cdot \text{ formula (1),}$$

in which X is a molar ratio of the alkali metal element to the at least one first metal element in the catalyst, Y is a BET specific surface area of the catalyst (m^2/g), and Z is a number of the silanol groups per unit area ($\text{number}/\text{nm}^2$).