CLAIMS

1. A method for producing a methacrylic acid ester, which comprises the following steps:

a dehydration reaction step: a step of having acetone undergo a dehydration reaction in the presence of a dehydration reaction catalyst to obtain a reaction mixture containing propyne, propadiene, and water, wherein the dehydration reaction catalyst is a catalyst containing silicon and at least one selected from the group consisting of Group 1 metal elements and Group 2 metal elements;

a propyne/propadiene separation step: a step of separating a mixture containing propyne and propadiene as main components from the reaction mixture obtained in the dehydration reaction step;

a propyne purification step: a step of separating the mixture containing propyne and propadiene as main components separated in the propyne/propadiene separation step into a liquid, gas, or gas-liquid mixture containing propyne as a main component, and a liquid, gas, or gas-liquid mixture containing propadiene as a main component; and

a carbonylation reaction step: a step of bringing the liquid, gas, or gas-liquid mixture containing propyne as a main component obtained in the propyne purification step into contact with carbon monoxide and an alcohol having 1 to 3 carbon atoms in the presence of a catalyst containing at least one selected from the group consisting of Group 8 metal elements, Group 9 metal

elements, and Group 10 metal elements to obtain a methacrylic acid ester.

2. The method according to claim 1, wherein the reaction mixture in the dehydration reaction step further contains unreacted acetone, and in the propyne/propadiene separation step, a mixture containing the unreacted acetone is obtained by separating the mixture containing propyne and propadiene as main components.

3. The method according to claim 2, further comprising the following step:

an acetone circulation step: a step of supplying at least a part of acetone contained in the mixture containing the unreacted acetone obtained in the propyne/propadiene separation step to the dehydration reaction step.

4. The method according to any one of claims 1 to 3, further comprising the following step:

an isomerization reaction step: a step of isomerizing the liquid, gas, or gas-liquid mixture containing propadiene as a main component obtained in the propyne purification step in the presence of an isomerization catalyst to obtain a mixture containing propyne and propadiene as main components.

5. The method according to any one of claims 1 to 4, further comprising the following step:

a methacrylic acid ester purification step: a step of recoverying propyne and an alcohol having 1 to 3 carbon atoms from the reaction mixture containing the methacrylic acid ester obtained in the carbonylation reaction step, the unreacted propyne, and the unreacted alcohol having 1 to 3 carbon atoms, and also purifying the methacrylic acid ester.

6. The method according to claim 5, further comprising the following step:

an alcohol circulation step: a step of supplying at least a part of the alcohol having 1 to 3 carbon atoms obtained in the methacrylic acid ester purification step to the carbonylation reaction step.