CLAIMS

1. A process for preparing acrolein by catalytic gas phase oxidation comprising:

(a) providing a reaction gas comprising

(i) 5 to 10 mol % propylene,

(ii) 0.02 to 0.75 mol % propane, and

(iii) 0.25 to 1.9 mol % of a fuel mixture comprising at least one of methane and ethane,

wherein the molar ratio of the total amount of propane, methane, and ethane to the total amount of propylene is from 0.027:1 to 0.25:1; and

(b) contacting the reaction gas with a mixed metal oxide catalyst to form a mixture comprising acrolein, wherein the mixed metal oxide catalyst comprises one or more of molybdenum, bismuth, cobalt, and iron.

2. The process of claim 1, wherein the fuel mixture comprises methane.

3. The process of claim 1, wherein the reaction gas comprises propylene in an amount of from 7.5 to 8.2 mol %.

4. The process of claim 1, wherein the reaction gas comprises propane in an amount of from 0.03 to 0.62 mol %.

5. The process of claim 1, wherein the reaction gas comprises the fuel mixture in an amount of from 0.5 to 1.4 mol %.

6. The process of claim 2, wherein the reaction gas comprises methane in an amount of from 1.1 to 1.4 mol %.

7. The process of claim 1, wherein the molar ratio of the total amount of propane, methane, and ethane to the total amount of propylene is from 0.1:1 to 0.18:1.

8. The process of claim 1, wherein the mixed metal oxide catalyst comprises (1) a primary component selected from the group consisting of molybdenum, bismuth, and combinations thereof, and (2) a secondary component selected from the group consisting of cobalt, iron, nickel, zinc, tungsten, phosphorous, manganese, potassium, magnesium, silicon, aluminum, and combinations thereof, wherein the primary component and secondary component are in an atomic ratio of from 9:28 to 28:9.

9. The process of claim 1, wherein the fuel mixture comprises sulfur in an amount of less than 30 parts per million by volume of the fuel mixture.

10. A process for preparing acrolein by catalytic gas phase oxidation comprising:

(a) providing a reaction gas comprising

(i) 7.5 to 8.2 mol % propylene,

(ii) 0.03 to 0.62 mol % propane, and

(iii) 0.5 to 1.4 mol % of a fuel mixture comprising at least one of methane and ethane, wherein the fuel mixture comprises sulfur in an amount of less than 30 parts per million by volume of the fuel mixture,

wherein the molar ratio of the total amount of propane, methane, and ethane to the total amount of propylene is from 0.1:1 to 0.18:1; and

(b) contacting the reaction gas with a mixed metal oxide catalyst to form a mixture comprising acrolein, wherein the mixed metal oxide catalyst comprises (1) a primary component selected from the group consisting of molybdenum, bismuth, and combinations

thereof, and (2) a secondary component selected from the group consisting of cobalt, iron, nickel, zinc, tungsten, phosphorous, manganese, potassium, magnesium, silicon, aluminum, and combinations thereof, wherein the primary component and secondary component are in an atomic ratio of from 9:28 to 28:9.