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APPENDIX

Calculation for Catalytic Activity

PROX reaction:

$$CO + 0.5O_2 \rightarrow CO_2 \quad (1)$$

$$H_2 + 0.5O_2 \rightarrow H_2O \quad (2)$$

Table 1 The feed input and output of 1 wt% Au/ $Ce_{0.75}Zr_{0.25}O_2$ at 50 °C

Reactant	Input	Output
CO	11823.79	704.62
O_2	12922.75	610.36

Equation for CO conversion:

$$\text{CO conversion (\%)} = \frac{[CO]_{in} - [CO]_{out}}{[CO_i]} x\ 100$$

$$= \frac{11823.79 - 704.62}{11823.79} x\ 100$$

$$= 94.04\ \%$$

Equation for selectivity:

$$\text{Selectivity (\%)} = \frac{[O_2]_{CO}}{[O_2]_{CO} + [O_2]_{H_2}} x\ 100$$

$$= \frac{0.5x([CO]_{in} - [CO]_{out})}{[O_2]_{in} - [O_2]_{out}} x\ 100$$

$$= \frac{0.5x(11823.79 - 704.62)}{12922.79 - 610.36} x\ 100$$

$$= 49.35\ \%$$

where:

$[CO]_{in}$ = concentration of CO in the reactant gas,

$[CO]_{out}$ = concentration of CO in the effluent gas,

$[O_2]_{in}$ = concentration of O_2 in the reactant gas,

$[O_2]_{out}$ = concentration of O_2 in the effluent gas,

$[O_2]_{CO}$ = amount of O_2 for CO oxidation, and

$[O_2]_{H_2}$ = amount of O_2 for H_2 oxidation.

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