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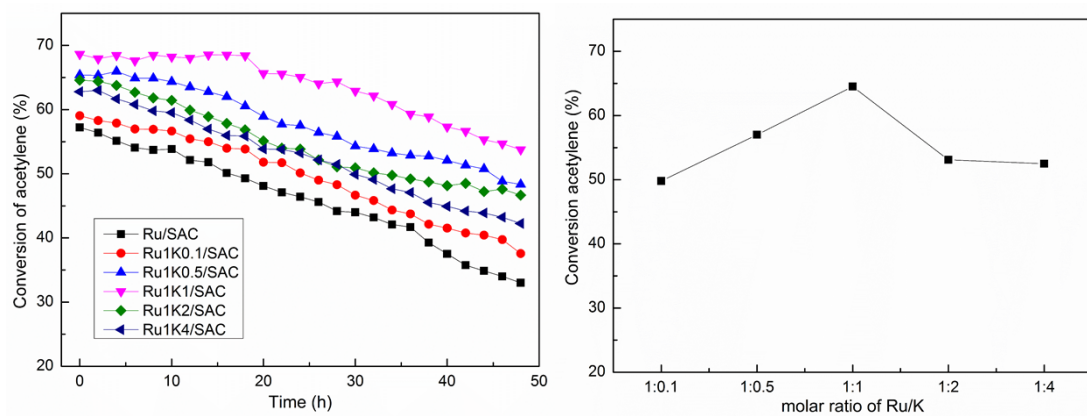
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25 from 1:0.1 to 1:4, (b) the relationship between the acetylene conversion and the molar

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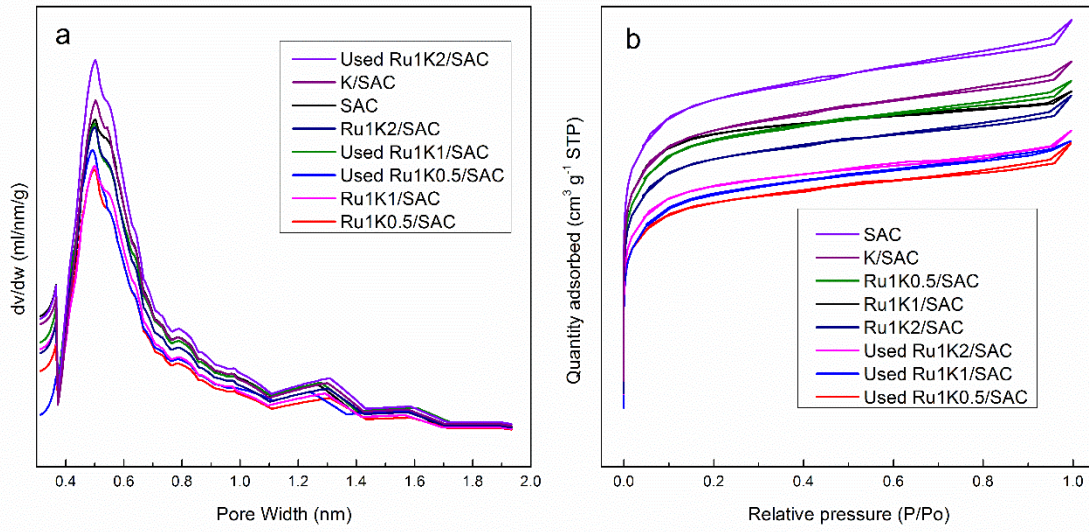
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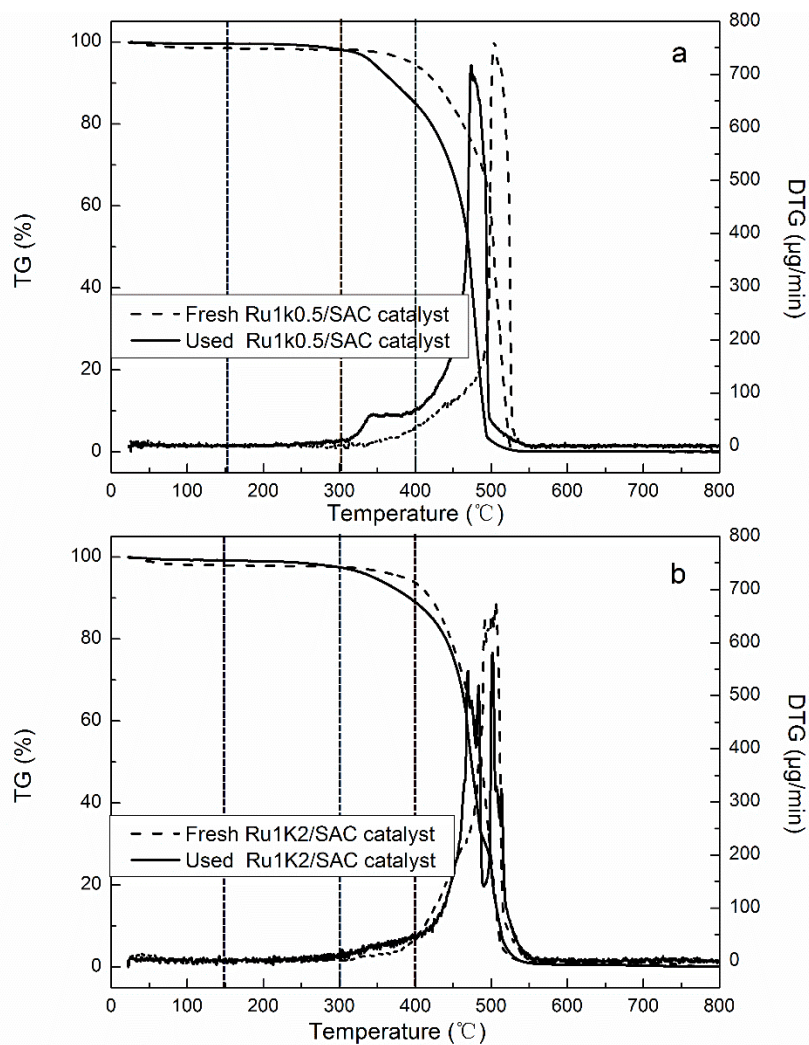
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39 **Fig. S2.** N_2 adsorption-desorption isotherms (a) and the corresponding pore size
 40 distribution of fresh and used samples (b).

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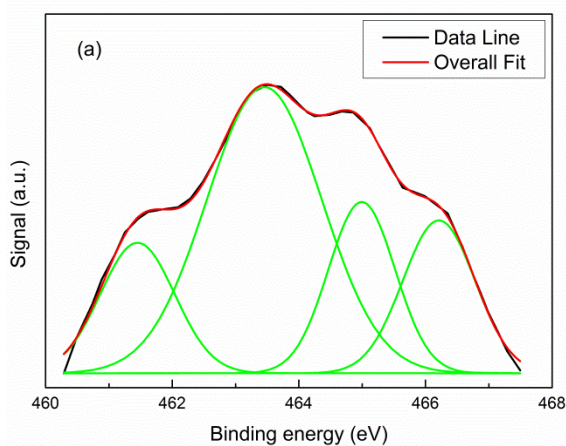
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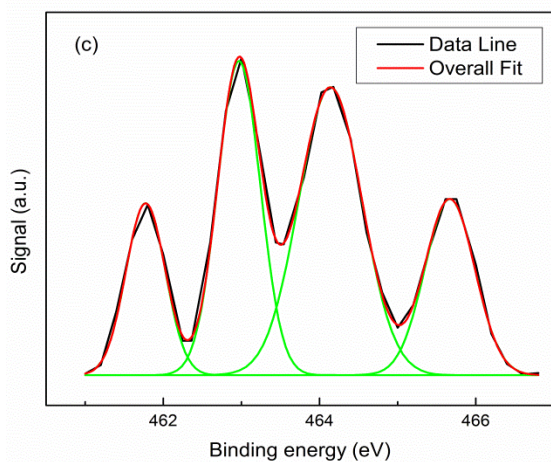
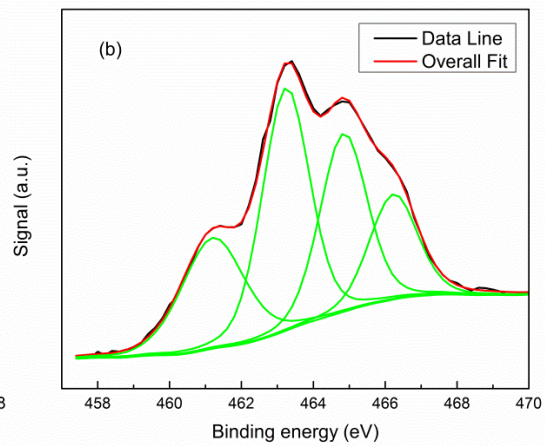
44 Ru1K2/SAC

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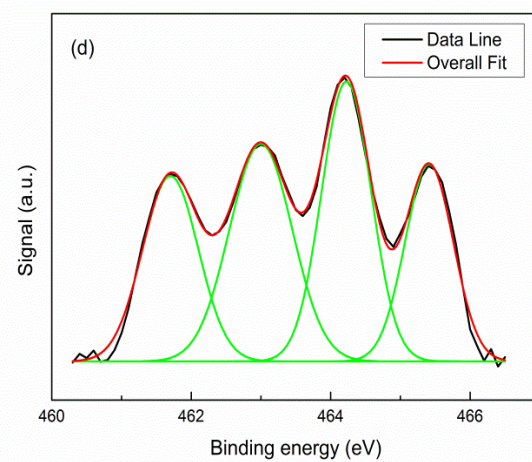
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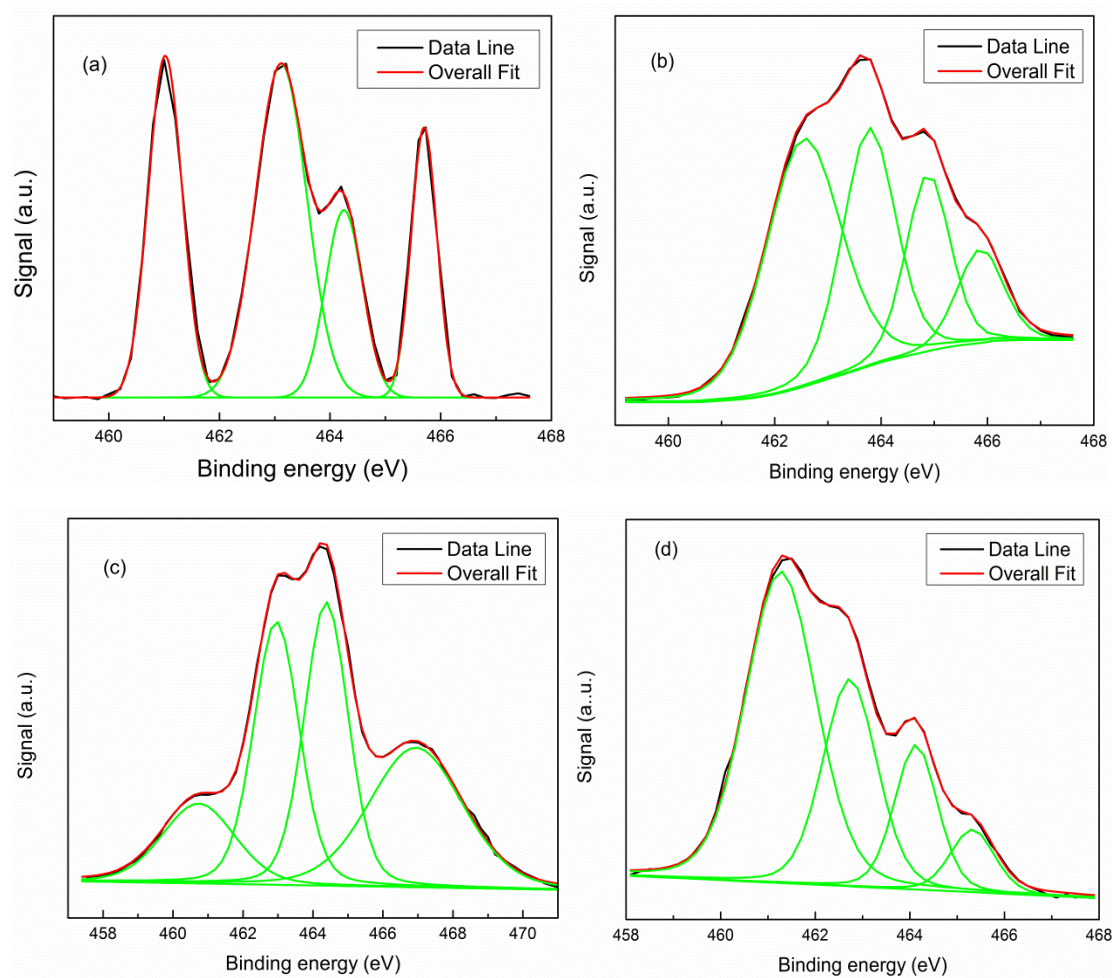


49 **Fig. S4.** Ru 3p_{3/2} XPS spectra of the fresh catalysts : (a) Ru/SAC; (b) Ru1K0.5/SAC;
 50 (c) Ru1K1/SAC; (d) Ru1K2/SAC

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56 **Fig. S5.** Ru 3p3 XPS spectra of the used catalysts : (a) Ru/SAC; (b) Ru1K0.5/SAC; (c)

57 Ru1K1/SAC; (d) Ru1K2/SAC

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66 **Table S1.** Weight loss of fresh and used Ru-based catalysts at different temperature

67 ranges.

Catalysts	Temperature range (°C)			
	<150	150-300	300-400	150-400
Fresh Ru/SAC	1.8	0.6	4.6	5.2
Used Ru/SAC	4.4	4.6	11.4	16
Fresh Ru1K0.5/SAC	1.3	0.5	3.7	4.2
Used Ru1K0.5/SAC	0.3	1.4	13.2	14.6
Fresh Ru1K1/SAC	1.4	0.6	4.7	5.3
Used Ru1K1/SAC	0.4	1.6	13	14.6
Fresh Ru1K2/SAC	1.8	0.5	3.9	4.4
Used Ru1K2/SAC	0.7	1.8	8.5	10.3

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83 **Table S2.** TOF of Ru-based catalysts and the corresponding acetylene conversion and
84 selectivity to VCM.

Catalysts	X_A (%) ^a	S_{VC} (%)	TOF (min^{-1}) ^b
Ru/SAC	10.3	98.9	1.89
Ru1K0.5/SAC	15.3	99.4	2.12
Ru1K1/SAC	18.0	99.6	2.45
Ru1K2/SAC	14.4	99.5	2.02

85 Reaction conditions: $T = 170^\circ\text{C}$, $V(\text{HCl})/V(\text{C}_2\text{H}_2) = 1.15$, $\text{GHSV}(\text{C}_2\text{H}_2) = 2700 \text{ h}^{-1}$, reaction time
86 =12 h.

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