

20. Synthesis of Acetone from Acetylene.

Sango Kunichika and Hirooki Ota.

This study was performed to increase the yield of acetone and to decrease the water to be reacted with.

As the chief catalyst Fe_2O_3 and ZnO were used, which had been found good for the catalytic conversion of acetaldehyde into acetone as reported in the 9th paper on this subject.

Experimental conditions :

volume of catalyst 30c.c., length of preheating furnace 10 cm, length of reaction furnace 30 cm.

Quantitative analysis of condensation products :

Total amount of acetone and aldehydes was measured by hydroxyramine hydrochloride, on the other hand aldehydes were oxidized by H_2SO_4 acidic 0.1N- KMnO_4 solution and acetone was estimated by Iodoform reaction of Messinger's method.

Experimental results :

Catalyst	Mol ratio	Reaction temp.	C_2H_2 Reaction rate (%)	Acetone yield (%)	Pass velocity of H_2O c.c./hr.	C_2H_2 s. v.
ZnO	—	450	36.2	15.1	27.5	191
Fe_2O_3	—	400	71.8	22.1	30.0	187
$\text{Fe}_2\text{O}_3 : \text{ZnO}$	1:4	450	59.8	11.2	30.0	239
∕	1:2	∕	57.2	19.9	35.0	189
∕	1:1	∕	55.4	20.7	35.0	189
∕	2:1	∕	44.6	32.7	30.0	189
∕	4:1	∕	45.6	24.3	32.5	192
$\text{Fe}_2\text{O}_3 : \text{ZnCrO}_4$	1:2	∕	63.7	61.6	30.0	191
∕	1:1	∕	61.4	68.1	30.0	190
∕	2:1	∕	66.4	71.6	30.0	191
∕	4:1	∕	74.6	58.2	25.0	189

Regardless of the mixed ratio of the catalysts, the yield of acetone was maximum when pass velocity of water was 30c.c./hr.

The s. v. and life of the mixed catalysts ($\text{Fe}_2\text{O}_3 : \text{ZnCrO}_4 = 2:1$) were studied under the condition which gave maximum yield of acetone, and it was found that, when s. v. of C_2H_2 was about 200l/hr., the results were the most favorable.

When steam was passed over catalysts at 300°C for 3 hours with the object of reactivation, the yield of acetone decreased independent of such treatment, while reaction rate of C_2H_2 increased.