

Секция 7. Химия и химическая технология на иностранном языке

by lowering the pressure in the stabilization column. For this we equip the unit with an additional compressor and heat exchanger. With decreasing pressure, the volume of rising vapors increases, and the throughput of the concentration part decreases. Only a change in thermodynamic conditions leads to a simultaneous decrease in temperature. Lowering the temperature in the column cube is favorable, the energy consumption is reduced, and the operating conditions of the heating equipment are improved. But lowering the temperature of the top of the column, leads to the fact that instead of an air-cooling device, you need to install, for example, a propane evaporator.

You can organize a refrigeration cycle by installing a compressor on the stabilization gas line. Compressing the stabilization gas, we expend energy, and the gas temperature becomes higher. If this stream is sent to a heat exchanger for heating the raw condensate, then it is possible to save energy costs and to abandon the air cooling apparatus. In our scheme, the stable condensate leaves the installation with a high temperature and an additional the

recuperative heat exchanger could be installed. To create a low temperature at the top of the column, we organize an internal propane refrigeration cycle. The stream from the top of the column is sent to the new compressor, then it gives heat to the unstable condensate and is sent to the separator. After that, it is sent for mixing with the feed gas entering the enterprise, and later for further processing. The liquid from the separator is sent to the top of the column. It will also be necessary to install a control throttle in front of the column to relieve pressure. Once in the column, the liquid evaporates and cools the top of the column.

The developed model of the stabilization unit in the Aspen HYSYS program allowed to consider two variants of the stabilization column operation, during the processing of condensate and oil. Pressure, temperature regimes and loads are selected for efficient operation of the column and auxiliary equipment for oil stabilization. When implementing the proposed solution, you can extend the life of the company, save jobs, increase the economic attractiveness of Orenburg.

References

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INFLUENCE OF SUPPORT AND PREPARATION METHOD IN GOLD CATALYZED GLYCEROL OXIDATION

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Glycerol is a promising reagent because it is a major co-product of biodiesel production. Its conversion into valuable products is of utmost importance for biomass valorization and it is a polyfunctional material, which is very useful as a feedstock for fine chemical synthesis.

Catalysts containing supported gold nanoparticles are considered as the most favorable for liquid-phase glycerol oxidation. In gold catalysis, the nature of the support is known to be a crucial factor because gold nanoparticle performance strongly depends on their interaction with the support, which not only influences their size and morphology, but,

a variety of other properties.

In the present paper a comparative study of gold supported on different metal oxides (Al_2O_3 , MgO , $MgAl_2O_4$ spinel) in liquid phase oxidation of glycerol was implemented. For each support the influence of two preparation methods, namely deposition-precipitation with urea (DPU) and sol-immobilization (THPC-protected sol) was also investigated. The aim of this study was to highlight the influence of the precursor protective layer in mediating the support effect on catalytic activity and comparing $MgAl_2O_4$ spinel with individual oxide supports.

Catalysts were characterized by the following

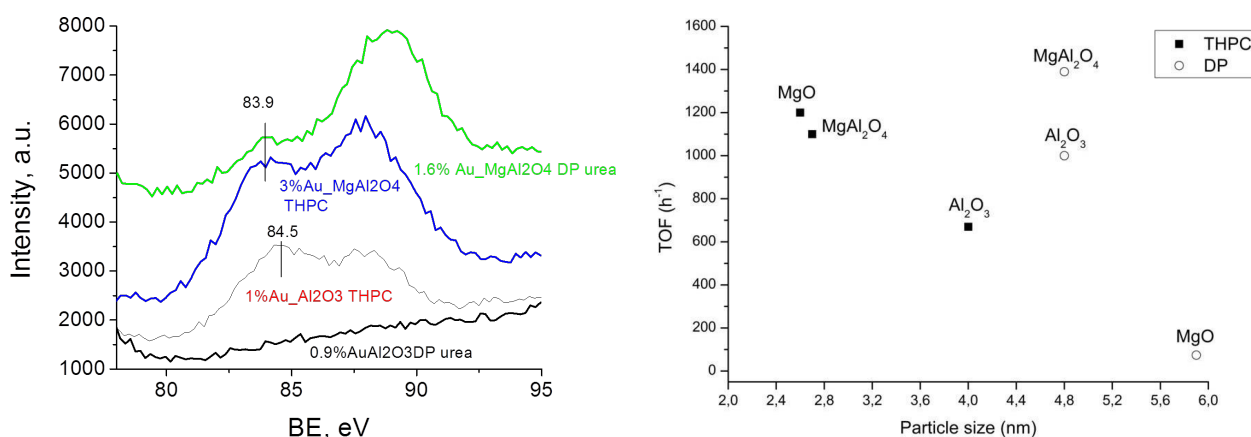


Fig. 1. a) XPS spectra of Au 4f7/2 and 4f5/2 binding energy region of the studied catalysts; b) correlation between TOF and particle size for different supports and preparation methods

Table 1. Catalytic activity in the glycerol oxidation of gold catalysts

Support	Au content, Wt%	Preparation method	TOF (h ⁻¹)	Au mean size (nm) (TEM)	Selectivity, % (at 90% of conversion)	
					C3	C2/C1
Al ₂ O ₃	1	THPC	670	4.0	68	32
	0.9	DP	1000	4.8	64	36
MgO	1	THPC	1200	2.6	64	36
	1.1	DP	74	5.9	78	22
MgAl ₂ O ₄	3	THPC	1100	2.7	65	35
		DP	1390	4.8	71	29

methods: transmission electron microscopy (TEM); X-ray diffraction (XRD); adsorption measurements, plasma atomic emission spectroscopy (ICP-AES), X-ray photoelectron spectroscopy (XPS), catalytic tests in glycerol liquid-phase oxidation by oxygen (300 kPa) at 50 °C.

Analysis of TEM measurements showed that particle size distribution for the studied catalysts differ significantly. Average size of gold particles depends on both the support type and the preparation method.

Adsorption measurements showed that SBET did not change significantly after Au deposition for all samples except Au/MgO THPC.

XRD patterns revealed that after gold deposition, crystalline structure of Al₂O₃ and MgAl₂O₄ supports were not changed neither for THPC not for DPU methods.

Data of figure 1a shows the Au 4f XPS binding energy region for the studied catalysts.

Table 1 shows the catalytic results in terms of

turnover frequency based on the total amount of Au and selectivity for glyceric acid (C3), tartronic acid, (C2) and glycolic acid (C1) containing products. Figure 1b correlates the TOFs with particle size for the two series of catalysts.

For deposition-precipitation method Au/Al₂O₃ is more active than Au/MgO, while for sol immobilization, the contrary occurs and Au/MgO is more active than Au/Al₂O₃. Activities of Au catalysts supported on MgAl₂O₄ spinel (very little studied in the literature as support for gold deposition) are high and close to each other for catalysts prepared by both methods. A good selectivity to glyceric acid (64–78%) was observed for all the catalysts.

It is suggested that Au particle size and interaction of Au with support are activity determining parameters, while gold content do not play a significant role. This study gets an insight on the importance of the direct contact between the support and the gold particle.