

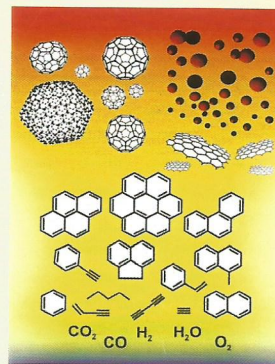
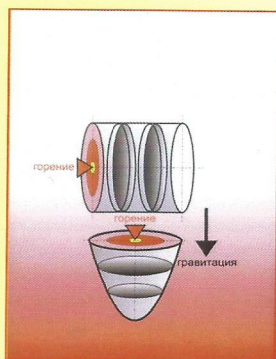
Ministry of Education & Science of the Republic of Kazakhstan / Қазақстан Республикасы Білім және Ғылым Министрлігі  
Министерство Образования и Науки Республики Казахстан

al-Farabi Kazakh National University / әл-Фараби атындағы Қазақ ұлттық университеті  
Казакский национальный университет им. аль-Фараби



# Proceedings of the Joint International VIII Symposium “Combustion & Plasmochemistry”

The Institute of Combustion Problem. Институт проблем горения. МОН РК - Комитет Науки



and

# Scientific & Technical Conference “Energy Efficiency-2015”

National Academy of Science of Ukraine / The Gas Institute  
Української Академії Наук / Газ Інституту  
Национальная академия наук Украины / Институт газа



Бірлескен VIII “ЖАНУ ЖӘНЕ ПЛАЗМОХИМИЯ” халықаралық симпозиумы  
мен “ЭНЕРГИЯЛЫҚ ТИІМДІЛІК-2015” ғылыми техникалық конференциясы

Совместный VIII международный симпозиум “ГОРЕНИЕ И ПЛАЗМОХИМИЯ”  
и научно-техническая конференция “ЭНЕРГОЭФФЕКТИВНОСТЬ-2015”

September, 16-18, 2015, Almaty, Republic of Kazakhstan



VIII Международный симпозиум  
«Горение и плазмохимия»  
Международная научно-техническая конференция  
«Энергоэффективность-2015»

---

- СПОСОБ ПОВЫШЕНИЯ ТЕХНИКО-ЭКОНОМИЧЕСКОЙ И ЭКОЛОГИЧЕСКОЙ ЭФФЕКТИВНОСТИ ИСПОЛЬЗОВАНИЯ ЭКИБАСТУЗСКОГО УГЛЯ ПРИ ФАКЕЛЬНОМ СЖИГАНИИ  
Анд.А. Шишкин, М.Ю. Чернецкий, Арк.А. Шишкин, В.М. Зейфман, Н.Н. Душкина, И.В. Никитин.....129
- ТОНКОСЛОЙНЫЕ ОГНЕЗАЩИТНЫЕ ВСПЕНИВАЮЩИЕСЯ ПОКРЫТИЯ: ИССЛЕДОВАНИЯ И ПРИМЕНЕНИЕ ИХ В РЕСПУБЛИКЕ КАЗАХСТАН  
В.Л.Ефремов, З.А.Лейман, Ф.Х.Хабибуллин.....133
- THE STUDY OF COMBUSTION PROCESS OF CHEMICAL GAS-GENERATING CATRIDGE (CGC) IN THE COMPOSITION OF AMMONIUM NITRATE AND NANO ALUMINUM COMBUSTIBLE ADDITIVES ✓  
Mansurov Z.A., Tulepov M.I., Kazakov Y.V., Tursynbek S., Abdrakova F.Y., Baiseitov D.A....137
- RESEARCH OF CARCINOGENIC PAU FORMATION IN THE MODEL COMBUSTOR OF GTD WITH USE OF THE SUBSTITUTE OF KEROSENE  
I. V. Chechet, J. V. Soloviova-Sokolova, S. V. Lukachev, S. G. Matveev.....141
- PREPARATION OF ASPHALT CONCRETE WITH BEKE OIL SANDS  
Ye. Tileuberdi, B.K. Tuleutaev, Ye.K. Ongarbayev, Ye.I. Imanbayev, Z.A. Mansurov.....142
- СИНТЕЗ КАРБИДА КРЕМНИЯ В ЭЛЕКТРОТЕРМИЧЕСКОМ РЕАКТОРЕ С КИПЯЩИМ СЛОЕМ УГЛЕРОДНЫХ ЧАСТИЦ  
В. А. Бородуля, Л. М. Виноградов, А. Ж. Гребеньков, А. А. Михайлов.....145
- ОЦЕНКА ЭФФЕКТИВНОСТИ ГАЗОТУРБИННЫХ УСТАНОВОК С УТИЛИЗАЦИЕЙ ТЕПЛА НА ПРИМЕРЕ МИНИ-ТЭЦ «ЦЕНТРАЛЬНАЯ» НА О. РУССКИЙ  
Ю.Б. Гончаренко, А.К. Полей.....149
- АНТИОБЛЕДЕНИТЕЛЬНОЕ ПОКРЫТИЕ НА ОСНОВЕ ПОРОШКА ИЗ СИЛИКОНОВЫХ ОТХОДОВ  
M. Nazhipkyzy, D. Alimbay, B.T. Lesbayev, A. Esbolsin, N.G. Prikhodko, T. Temirgaliyeva, G.O.Tureshova, Z.A. Mansurov, A.T.Isanbekova.....153
- МЕТОДЫ СНИЖЕНИЯ ОКСИДОВ АЗОТА В КОТЛАХ, ОСНАЩЕННЫХ ЦИКЛОННО-ВИХРЕВЫМИ ПРЕДТОПКАМИ  
Лесных А.В., Штым К.А.....156
- ТЕОРЕТИЧЕСКИЕ И ЭКСПЕРИМЕНТАЛЬНЫЕ ИССЛЕДОВАНИЯ ПО РАЗРАБОТКЕ НОВОЙ КОНСТРУКЦИИ ВЕТРОЭНЕРГЕТИЧЕСКОЙ УСТАНОВКИ (ВЭУ) С КОНЦЕНТРАТОРОМ ПОТОКА  
Кошумбаев М.Б., Мырзакулов Б.К., Толеуханова А.Б......160
- НОВАЯ КОНСТРУКЦИЯ МАЛОНАПОРНОЙ ГИДРОТУРБИНЫ ДЛЯ МАЛОЙ ГЭС  
Кошумбаев М. Б., Ержан А.А., Босинов Д.Ж......166



**THE STUDY OF COMBUSTION PROCESS OF CHEMICAL GAS-GENERATING  
CATRIDGE (CGC) IN THE COMPOSITION OF AMMONIUM NITRATE AND NANO  
ALUMINUM COMBUSTIBLE ADDITIVES**

**Mansurov Z.A., Tulepov M.I., Kazakov Y.V., Tursynbek S., Abdrakova F.Y., Baiseitov D.A.**

**Abstract**

The regularities of combustion of pyrotechnic composition depending on the content of nanoaluminum have been studied. Chromatographic analysis for composition №2: AN-NA-DC-Mg was performed. Flash point of pyrotechnic component was determined.

**Introduction**

In the industry gas generators are used to increase the yield of oil and gas in the wells, which provides thermal-gas-chemical processing of idled oil and gas wells. In this case, disclosure of fracturing and cleaning of perforated hole from sludge and paraffin in the pipe occur. There are known gas-generating chemical compositions:  $\text{NaClO}_3$  – oxidizer, liquid hydrocarbons such as kerosene, diesel fuel, gas condensate, secondary industrial and vegetable oils are used as fuel;  $\text{NH}_4\text{NO}_3$  – oxidizer, nanocarbon – fuel [1].

Lately when extraction of block stone people try to use substances, which create the pressure in the hole due to combustion reaction in deflagration mode, i.e. in the combustion mode or in the low speed detonation mode [2].

Carbon containing nanostructured materials based on mineral and vegetable raw materials are developed at Institute of Combustion Problems [3].

**Experimental part**

The mixtures were prepared with the different ratio of components: granulated ammonium nitrate (AN), nanoaluminum powder, depleted material (10 % bitumen + 90 % used oil), dispersed coal (DC), magnesium powder. The components were weighed on electronic balances and thoroughly mixed in a phosphorus mortar. The mixtures were loaded into thick-walled pipe with diameter 1,5 cm and height 22,7 cm. The burning process was initiated from top of pipe with initiator composition (50 % Mg+50% smokeless powder). Burning time of mixtures was measured using stopwatch. The burning rate was measured by dividing height of pipe by the burning time.

Flash point of pyrotechnic component was measured using optical pyrometer.

Gases formed in the results of burning of mixtures were determined by using gas chromatography of the brand «Crystal Chromatech 5000».

**Results and their discussions**

Pyrotechnic gas-generating mixtures based on oxidizer and nano aluminum combustible additives were investigated. Burning rate depending on the content of nanoaluminum was determined. Mixture, №1, mass, %: AN – 94; NA – 0,5; depleted material (10 % bitumen + 90 % used oil) – 5,5 %. Ammonium nitrate is granule, it was not milled. The investigation was carried out