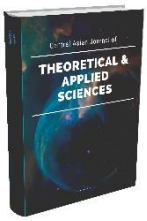

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Fuel Combustion Processes at Thermal Power Plants

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Abstract: *Fuel is natural and artificial, depending on whether it is extracted or prepared for combustion. Fuel that exists in nature in a form ready for use is called natural fuel. Extraction of coal, oil shale, peat, oil, gas, firewood, agricultural waste, natural fuel.*

Keywords: *Fuel, heat, gas fuel, work on fuel, dry mass, organic mass, chemical reaction.*

A combustible substance, the main component of which is carbon, is called a fuel. As a result of the rapid occurrence of a chemical reaction, the fuel releases heat from itself. The following requirements are imposed on the fuel: the release of a large amount of heat during combustion, a small amount of substances harmful to nature in the combustion products, rapid and complete combustion; it is cheap to produce and easy to process and transport. Fuels are natural and artificial, depending on the method of extraction or preparation. Fuel that exists in nature in a ready-to-use form is called natural fuel. Natural fuels are coal, oil shale, peat, oil, gas, firewood, agricultural waste. Fuels derived from the processing of natural fuels or substances in general are called artificial fuels. These include coke, pulverized solid fuel, briquettes, charcoal, gasoline, kerosene, diesel fuel, diesel fuel, motor oil, fuel oil, blast furnace and coke oven gases, natural gas processing gases. Fuel can be solid, liquid and gaseous. To solid fuel include coal, peat, oil shale, coke, charcoal. Oil and oil products (gasoline, kerosene, diesel and motor oils, gas oil, fuel oil, boiler fuel) can be included in the composition of liquid fuels.

Examples of gas fuels are coke and blast furnace, generator, oil refining gases, propane, acetylene, coal gases. The composition of the fuel includes organic and mineral substances. Organic matter includes carbon (S), hydrogen (N), oxygen (O), nitrogen (N), and sulfur (S). The amount of these chemical elements and their compounds is different in different fuels. For example, the composition of oil and products of its processing consists mainly of carbon and hydrogen. Regardless of the aggregate state of the fuel, its main content is carbon and hydrogen, their amount in liquid fuel is 85-87%, and in solid fuel 50-90%. The amount of oxygen element in solid fuel reaches 6.5%, and in liquid fuel up to 25%. The total amount of hydrogen and carbon in the gas ranges from 0.3 to 95%. S and N are more commonly found as a compound, i.e. as methane gas (SN). When fuel is formed in nature, the amount of chemical elements in its composition also changes. If the number of some chemical elements decreases, the number of others

increases. In particular, an increase in fuel combustion leads to an increase in the amount of carbon in its content. For example, anthracite contains 93% carbon, working part of the fuel

$S^{u} + H^{u} + O^{u} + N^{u} + S^{u} + A^{u} + W^{u} = 100\%$

dry mass fraction

$S^{к} + H^{к} + O^{к} + N^{к} + S^{к} + A^{к} = 100\%$

part of the combustible mass

$S^{ё} + H^{ё} + O^{ё} + N^{ё} + S^{ё} = 100\%$

part of the organic mass

$S^{o} + H^{o} + O^{o} + N^{o} = 100\%$

The more carbon in the fuel, the less oxygen and vice versa. An increase in the amount of oxygen reduces the heat transfer of the fuel. During the reaction (combustion) of chemical elements in the fuel, a different amount of heat is released. Carbon is the main component of solid and liquid fuels. It is in the form of a complex chemical compound with oxygen, hydrogen, nitrogen, sulfur and other elements. Hydrogen is present in the fuel in small quantities, but its presence greatly affects the ability of the fuel to give off heat. Oxygen is in the form of an organic compound with combustible elements in the fuel. Preferably, the fuel does not contain oxygen because it can oxidize combustible elements, especially hydrogen, during fuel storage. Nitrogen in fuel is an inert gas. Does not burn and does not help to burn. When fuel is burned, nitrogen is added to the combustion product - flue gas. It is better if the fuel does not contain nitrogen. Nitrogen is the internal fuel ballast. When sulfur is burned, sulfur oxide (IV) - SO is formed, a gas that poisons the air and has a bad effect on metal parts of boilers and machines. It is better if there is no sulfur in the fuel. Ash contains various non-combustible mineral compounds. Ash is formed during the combustion of fuel and consists of slag, slag and other oxides. Ash prevents the combustion of combustible elements in the fuel and takes part of the heat with it. It is better that the fuel does not contain moisture, because the heat is spent on the evaporation of moisture during combustion. The moisture contained in the fuel is divided into external air and internal moisture. Moisture and ash make up the external ballast of the fuel.

Substances that interfere with the combustion of fuel are called ballast. The main part of carbon in coke is vacuoles. Coals suitable for coking are called coking or hardening. Coal, from which coke is obtained in the form of monolithic dense pieces - bricks, is used in blast furnaces for iron smelting and other purposes. Coal is divided into three types: low-grade coal, hard coal and anthracite. Low-grade coal contains a large amount of oxygen, ash, sulfur and moisture. Therefore, low-grade coals have the ability to ignite spontaneously. They cannot be stored for a long time. Gas, artificial liquid motor fuel and other valuable products for the chemical industry are obtained from low-grade coals. Coal is the main type of fossil fuel. Liquid fuel is mainly obtained by separating the steam generated by heating fuel oil at a temperature of 300-370 C into various fractions and their condensation (liquefaction): liquefied gas 1%, gasoline about 15%, kerosene about 17%, diesel fuel about 18% and fuel. oils about 45% and residual weight about 4%.

When fuel oil is heated under high pressure to a high temperature, light liquid products are obtained as a result of the breakdown of heavy molecules in it. Fuel oil consists of 84-86% carbon (fuel) and 10-12% hydrogen and is used as a motor or boiler fuel. Gas fuel is mainly natural gas, it includes methane (marsh gas) SN, hydrogen N, nitrogen N , higher carbon compounds SN, carbon monoxide SO, carbon dioxide SO. After cleaning the domestic gas, a special additive is added to it - an odorizer in order to detect a gas leak that has a specific smell. When fuel oil is heated under high pressure to a high temperature, light

liquid products are obtained as a result of the breakdown of heavy molecules in it. Fuel oil consists of 84-86% carbon (fuel) and 10-12% hydrogen and is used as a motor or boiler fuel. Gas fuel is mainly natural gas, it includes methane (marsh gas) SN, hydrogen N, nitrogen N , higher carbon compounds SN, carbon monoxide SO, carbon dioxide SO. After cleaning the domestic gas, a special additive is added to it - an odorizer in order to detect a gas leak that has a specific smell. When fuel oil is heated under high pressure to a high temperature, light liquid products are obtained as a result of the breakdown of heavy molecules in it. Fuel oil consists of 84-86% carbon (fuel) and 10-12% hydrogen and is used as a motor or boiler fuel. Gas fuel is mainly natural gas, it includes methane (marsh gas) SN, hydrogen N, nitrogen N , higher carbon compounds SN, carbon monoxide SO, carbon dioxide SO. After cleaning the domestic gas, a special additive is added to it - an odorizer in order to detect a gas leak that has a specific smell. Gas fuel - mainly natural gas, it includes methane (marsh gas) SN, hydrogen N, nitrogen N, higher carbon compounds SN, carbon monoxide SO, carbon dioxide SO. After cleaning the domestic gas, a special additive is added to it - an odorizer in order to detect a gas leak that has a specific smell. Gas fuel - mainly natural gas, it includes methane (marsh gas) SN, hydrogen N, nitrogen N, higher carbon compounds SN, carbon monoxide SO, carbon dioxide SO. After cleaning the domestic gas, a special additive is added to it - an odorizer in order to detect a gas leak that has a specific smell.

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