

INFLUENCE OF FUEL COMPOSITION ON TOTAL ENERGY RESOURCES

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Combustion fuels are essentially limited to compounds of carbon, hydrogen and oxygen by the requirement that combustion products be non-offensive and biodegradable. Properties of these compounds are determined by their chemical structure, but can often be related in a gross way to their hydrogen to carbon ratio. The quality of fuels for continuous combustion decreases with the hydrogen to carbon ratio, and the hydrogen content of a crude petroleum limits the amounts of preferred fuel oils that can be made from it. Also, the removal of impurities such as sulfur, nitrogen, etc., from fuels at present requires the use of hydrogen. Other potential raw materials - shale, coal, etc. - are poorer in hydrogen, and thus future fuel manufacture will require the manufacture of this element in relatively pure form.

The production of hydrogen from water, the most probable source, requires the expenditure of energy, and thus improving fuel quality reduces the total energy resources availability. For various specific situations, e.g., coal conversion, the magnitude of this effect can be calculated, and these calculations may aid in emphasizing areas of desirable compromises among fuel quality, combustor or engine design, and emission regulations.