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Alcohol Motor Fuels

Leo M. Christensen
Iowa State College

R. M. Hixon
Iowa State College

E. I. Fulmer
Iowa State College

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tion increased rapidly for a period of from 4 to 8 hours then decreased to a low and fairly constant value. The total consumption of oxygen was approximately one-third of the amount required for complete oxidation of the glucose.

The respiratory quotient during the period of high oxygen consumption attained a value of about 1.2, then decreased to about 0.8 where it remained fairly constant.

With ammonium nitrogen the percentage of glucose carbon that appeared as CO_2 -carbon was less than with nitrate nitrogen. The nitrate apparently was able to serve partially as an hydrogen acceptor.

IOWA STATE COLLEGE,
AMES, IOWA.

ALCOHOL MOTOR FUELS

LEO M. CHRISTENSEN, R. M. HIXON AND E. I. FULMER

The proposal to encourage the use of power alcohol made from farm crops grown in the Continental United States, as an aid to agriculture, is not new. Since the last consideration, something more than ten years ago, anhydrous ethyl alcohol has become commercially available. This development makes it feasible to use alcohol-gasoline mixtures. The power alcohol project is thus placed upon a new basis and is worthy of a new consideration.

An examination of the physical-chemical properties of alcohol-gasoline mixtures shows that these properties are not additive. The blends containing 10 to 20 per cent of alcohol do not differ from gasoline in such a manner as to make them unsuited for use in present day gasoline engines. On the contrary, the differences which do exist are of such a nature as to favor their use as fuels. Thorough dynamometer and road tests have shown that such blends are, in most respects, superior to gasoline. They give the same or better mileage, as easy or easier starting, will stand higher compression without detonation, give smoother engine operation, greater power and cleaner combustion. These blends can safely be handled in present commercial distribution and storage equipment. There are no technical difficulties in their preparation, distribution, or use, and this has been amply demonstrated by widespread commercial sale in foreign countries and lately on an experimental basis in the United States.

The 10 per cent blend will cost approximately 2 cents per gallon

more than the base gasoline at the present time. The National use of such a blend would require 600,000,000 bushels of corn or its equivalent in other farm crops each year. This outlet is of such a magnitude that it can readily take care of the annual variations in the production of agricultural materials. Further, the use of power alcohol can be expanded as required to take the increasing output of a profitable scientific agriculture. The development of alcohol engines is anticipated and the use of power alcohol can be expected to increase very greatly as petroleum supplies are depleted. Alcohol can be made from agricultural products at a price which will allow it to compete with fuels other than petroleum so that it must be considered an economically efficient industry of the future, whose immediate development is desirable.

Agriculture is in the position of choosing now the future route it shall follow. If it elects to cut heavily into production, revert to power animals and in general become more self sustaining, it can no longer purchase the products of industry in important quantity. If it be allowed to expand its production beyond the limits of domestic food requirements, it can continue as a gainful occupation and again exchange its products for those of industry. The power alcohol program furnishes a means for establishing and maintaining the latter arrangement.

DEPARTMENT OF CHEMISTRY,
IOWA STATE COLLEGE,
AMES, IOWA.

REDUCTION OF FURAN AND THE PREPARATION OF TETRAMETHYLENE DERIVATIVES

DONALD F. STARR AND R. M. HIXON

During the study of the nitrogen heterocyclics, a convenient method of preparing δ -chlorovaleronitrile was desired. The synthesis developed involved the procedure of Gilman and Louisinian for decarboxylation of furoic acid. The furan obtained was reduced in the presence of palladous oxide palladium black giving a 95 per cent yield of tetrahydrofuran which was split with hydrogen chloride yielding 55 per cent of the theoretical tetramethylene chlorohydrin. Treatment of the chlorohydrin with phosphorus tribromide gave a 98 per cent yield of tetramethylene chlorobromide which gave a 52 per cent yield of δ -chlorovalero nitrile when re-