WHAT CAN THE CHEMIST DO FOR SASKATCHEWAN

By R. D. McLaurin, Professor of Chemistry, University of Saskatchewan

WHEN the word chemist is used many people think of the Pharmacist whi is a dispensing chemist. Another general conception of the chemist is a person whose occupation is to anlyse substances and detect falsifications. There are a great many phases of chemistry and specialised types of work and the specialist in a particular phase of a subject has been characterised by a specific name, such as Organic, Physical, Biochemist, Inorganic and Analytical and these branches are again subdivided many times. The general methods of the chemist are two—destructive and constructive, analytical and synthetic, war and peace. The war has done more than anything else to educate the general public to a realization that chemistry is interwoven into every industrial and agricultural condition, that the economic welfare of the nation and the health of its citizens is in a very large measure dependent on the manner in which our chemical knowledge is applied in daily life.

Saskatchewan's Problems

One of the most urgent and fundamental problems for Saskatchewan is the development of her lignite resources. This means to the people of the province

(*a*) Cheap fuel.
(*b*) Cheap power.
(*c*) Permanent agriculture and prosperity.

Permanent agriculture is inseparable from the development of industries as has been demonstrated in all the older countries of the world. The vast majority of farmers in the west seem to think that the supply of plant food in the prairie soils in inexhaustible but such is not a fact and the time is rapidly coming when it will be necessary to return to the soil the elements which are being removed by each crop. This can be done by manufacturing the plant food in the west and in order to establish industries cheap power must be available. It has already been shown that power may be developed from lignite.

What is Lignite

In colloquial language it is a low grade coal. What is coal? What is its chemical nature and constitution? A complete knowledge of the constitution of this substance would enable us to explain more fully the coking process, the formation of gases, combustion, etc., of this very complicated substance. Coal is a mixture of very complex organic compounds formed by the decomposition of cellulose (wood), resins, gums, and vegetable fats.

No one has ever been able to establish that free carbon exists in coal and the compounds known as the coal tar products (benzene, and its hydrocarbon derivatives, phenol, cresol, napthalene, etc.) are not present as such in the coal to more than one per cent. The above compounds are formed from coal by destructive distillation at low temperatures and our knowledge in regard to the constitution of coal has been obtained chiefly from the results of this method of treating coal.

Carbonizing of Coal or Lignite

Carbonisation of coal means the decomposing of the coal without access of air, by the action of heat into its volatile constituents and a fixed resideue which is carbon and ash. The method of heating the coal is a very important consideration from the standpoint both of the coke and the gaseous products. From the standpoint of fuel efficiency this method of treating coal deserves much more attention than it has received in the past, and it has been shown by many investigators that carbonising lignite is the most economical method of utilizing it.

By carbonising the coal it is converted into two improved forms of fuel—coke and gas—with a combined heating value about 85 per cent that of the coal and the tar products and ammonia are saved which are much more valuable for other purposes that they are for fuel. It has been shown by Mr. Darling and Prof. Babcock that Saskatchewan lignite at Estevan and also the North Dakota lignites yield about 10,000 cubic feet of gas which has a heating value of 440 B.T.U's. per cubic foot as compared with coal gas 630 B.T.U.'s. Six thousand cubic feet of this gas will carbonize a ton of lignite so for every ton carbonised there will be a surplus of four thousand cubic feet. This surplus may be used in a gas engine for generating electric power. From every ton of lignite there is about 15 gallons of oil and tar, 65 gallons of ammonjacal liquor and a carbon residue of 955 pounds.

Fuel

This carbon residue may be made into briquettes at a total cost of $3.41 a ton and the fuel value of these briquettes is practically equal to anthracite coal (about 12-13). Assuming that there is imported into Saskatchewan 1,000,000 tons of eastern and western coal at an average price of $10.00 to the consumer, which would make a total cost of $10,000,000. Briquettes made from the residue of above process could be delivered at $5.00 per ton which would be an economy of $5,000,000. Our fuel which would be practically equal to anthracite coal in heating value would cost us what we pay for freight on coal from Fort William to Saskatoon.

Power

Prof. Babcock has shown that by treating lignite as above described power may be generated at a cost which will rival hydro electric power. Dr. Darling claims that electric power may be produced from lignite for $8.00 per horse power year (at the switch board) which is cheaper than it is at Niagara Falls. The experimental work and development has now reached a stage where this industry can be placed on a commercial basis. As these resources are still in the hands of the Federal Government a provincial power project should be developed by them in the best interests of the people of the province. The natural resources are the inheritance of the people who have thus far developed the agricultural possibilities of the province and they should be assisted or allowed to help themselves to maintain a constant supply of plant food in the soil. This can only be done by returning to the soil such constituents as potassium, nitrogen, phosphorus, etc., which are removed by each crop. In order to manufacture fertilizers or plant food cheaply it is necessary to have cheap power.

By-Products

The utilization of the tar products such as benzene, cresol, napthalene, will form separate industries by themselves amd will be discussed later. The ammonia may be converted into ammonium sulphate. The ammonia derived from every ton of lignite when converted into amonium sulphate.

would amount to about 15 pounds which would be worth as a fertilizer 3-4 cents a pound in N.Y.

LOANS FOR BUYING OF CATTLE

SEEING the necessity of developing agriculture to take the place of a declining lumber industry, business men of Ashland, Wisconsin, conceived a plan which, because of its merit, has been adopted in many other sections. The Ashland Commercial club made a survey of the country tributary to Ashland, which showed the number of farmers who would buy cows if credit could be arranged. Eacg farmer was asked to sign an application showing the number of cows he then had, the number he wanted to buy, the breed preferred, whether pure-bred or grade animals were desired, and the number of acres cleared. He agreed to raise all heifer calves, to accept the cows purchased, and to pay actual cost at Ashland, paying within three years for the cows bought from his monthly cream check and at the rate of not less than $3.00 a month a cow. Payment was secured by chattel mortgage on the cows and their progeny, and if necessary, other personal property. Two banks agreed to furnish the money to buy cattle, with interest at six per cent of the business men would guarantee them against loss; in other words, if the business men would lend their credit to the farmers. This was done. The bankers then appointed a committee to pass upon the applications. A competent committee was selected to buy the cows. In 1913, five carloads of grade cows, representing an investment of $9,475, were purchased. By January 1st, 1914, $2,613.74 was repaid. No guarantor was called upon to make good. Worthy farmers got their cows on three-year notes, interest at six per cent, secured by chattel mortgages and not by mortgages on their farms. There was a better understanding between farmer and business man, better conditions in the country, improved homes, more silos, better barns, intelligent feeding, and a general educational campaign. Live stock raising has become the leading industry in this community. Cteameries and cheese factories have been built. Community breeding has been made effective and testing associations are flourishing.—*Raymond Baker, in The Banker-Farmer.*

PROTECTION OF PRAIRIE FOWL

JUST before the opening of the prairie chicken shooting season, the Game Branch of the Department of Agriculture issued an appeal to the sportsmen of the province to spare the chicken this year, in view of their increasing scarcity.

During the year 1915, chicken and partridge were so scarce that the legislature shortened the chicken shooting season by reports received by the Game Branch, chicken were even scarcer than in 1915. It has been suggested that The Game Act should be amended to prohibit the hunting of prairie chicken for a period of years, but this suggestion cannot be considered until the next session of the legislature.

The economical value of the prairie chicken is too often over-looked. It is a scientific fact that birds of the grouse family destroy myriads of injurious insects, which, if unchecked, would play havoc with the crops and make mighty inroads upon the farmers' profits.

The Bob-white quail, which belongs to the same order as the grouse, is described in connection with the destruction of insects and weed seeds as, "The most marvellous engine of destruction ever put together of flesh and blood." The grouse, whose habits are very similar to those of the fuail, might justly be classed as an agency of equal usefulness, living as they do chiefly upon insects during the breeding season and principally upon a diet of weed seeds in the fall and winter.

The wheat crop is one that suffers most from the attack of insects, the chicnch-bug, the hessian-fly and the wheat plant lice at times doing damage that almost amounts to a calamity. The crops of Saskatchewan have not yet suffered to an alarming extent by the ravages of insects, but in the light of present-day knowledge are we not justified in saying that the grouse and other useful birds are responsible in a large degree for the absence of these pests. The hessian-fly played havoc with the wheat crops in Indianna and Ohio in 1900, over two million acres of wheat being ruined. This fly has been found on a few Saskatchewan farms, where it has done considerable damage, and any factor that tends to hold this and other pests in check is deserving of more than passing interest.—*The Agricultural Gazette.*

Miracle

By Professor G

ALASKA, or Miracl the late Pastor $1.00 a pound or his devoted followers, into prominence in Sas means of separating fa surplus cash. Professo has kindly given *The Sa Prairie Farm* the follow subject:

During the past two interest has been arouse in Saskatchewan. It h publicity as a result of quiries are reaching u advisability of growin place of Marquis or Re advisable therefore to p ler form such informatio able to gather concerni order that those inte access to the facts rega value.

During the past fou wheat has been subje competitive tests wit other varieties of wheat ion field. Much of th cluded here has been test, but bulletins of t Department of Agricult own upon where ou incomplete.

Descript

Alaska wheat belong sub-species of wheat. neither a typical flour w wheat. The head of A or "seven-headed" as i The head being branch fine appearance, and i never neglect to exhibi attempting a sale of the somewhat flattened and the beards detach ver crop becomes mature long, strong, large an tant to rust. While it that this wheat tillers tests show that in this even equal our common

False Claim

Among many other Alaska wheat, high yi foremost, but high qu emphasized. Claims o have come to us fro No. 357 of the departm Washington, quotes fr in advertising this wh interesting—but erron "Alaska wheat is a res on the part of Abraha farmer, who realized t "double" wheat crop fected. After working perfected a head of w central head around other short heads, I repeat in the plantin six or ten times grea wheat. The double h 1904 and the next su resulted, and every h

"The seven pounds of 1906 brought fort 222¼ times the plant plant to the acre, 22 acre."

The reader will rea weaknesses of the ab yet several of the im grain have been u casions in Saskatch of selling the seed of bitant prices. The "double" and "perfe leading. Again, the wheat with one sing round which were nin and if this head would ing it meant a crop six than ordinary whea intended of course w should conclude that such a composite form heads, must logically nine times greater tha head. The truth is most favored conditi more than from thre under normal conditi of the crop is uniform four heads, consisting remainder short or possibility of the big many of the flower