tion of ammonia. Ammonium sulphate is the most important salt of ammonia; its possible useful application as a fertilizer is practically unlimited. As yet the need of fertilizers has not been felt so keenly in Canada as in older established countries, but its use here is bound to extend rapidly. During the last year there has been a tendency for the price of ammonium sulphate to drop, partly owing to the competition of other fertilizers now produced on a large scale by the fixation of atmospheric nitrogen by electrothermic processes, and partly owing to the progress which is being made with Haber's synthetic process for ammonia production. The war has caused a brisk demand for nitrates in the manufacture of explosives, and the removal of these nitrates from the fertilizer market, should bring about an increase in the price of ammonium sulphate.

Cyanides.—In the dry distillation of coal, up to 2 per cent. of the nitrogen of the coal is evolved in the form of cyanide, and is recovered both in the washers and scrubbers along with the ammonia, and in the purifiers where ferrocyanide is formed with the ferric oxide. The potassium cyanide, ferrocyanide and ferricyanide, which are worked up from cyanogen compounds of the gas, are very important by-products of the gas industry. In the twelve months ending March, 1914, Canada imported 1,615,490 lb. of potassium and sodium cyanides and 166,901 lb. of yellow and red prussiate of potash (potassium ferro and ferricyanide). The simple cyanides have a wide application in mining operations; the yellow prussiate is used for making potassium cyanide, for dyeing and for case hardening steel; and the red prussiate is much used in photography.

Coal-tar.—Probably the greater part of the world's production of tar is distilled in order to obtain the more valuable products described later; but there are many uses for entirely raw tar, or for tar in its dehydrated state (i.e. after it has been heated in closed vessels to remove the water, and, incidentally, to recover the benzol). Dehydrated tar finds wide application in the preparation of roofing felt, and for preserving timber, stone, iron, etc. Tar has, weight for weight, a slightly higher heating value than coke, and is now being used as a fuel. Formerly it was simply poured on to solid fuel, but under these conditions combustion was by no means complete; now the tar is usually injected in the form of a fine spray by means of steam or air and so comes in intimate contact with the air, this resulting in complete combustion. Tar is sometimes simply mixed with coke for heating retorts in a gas plant or used in conjunction with coke-oven gas for heating coke ovens. It is also converted into a gas by being passed through red-hot tubes.

There are so many valuable products which may be obtained from tar that its use as a fuel is, from the standpoint of conservation, to be condemned; but it must be admitted that in very many cases the tar has to be used in this way. Large gas and coke-oven plants can profitably have a tar-distilling plant in addition; but the distillation of tar in small works is not remunerative. In the latter case, the tar may be shipped to central distilling plants, but even this procedure is not commercially possible where the gas or coke-oven plant is isolated, and consequently the cost of transportation high. In such cases the use of tar for fuel is the only possible one.

Coal tar is distilled in wrought iron stills. These stills are usually upright cylinders of 10 to 20 tons capacity, sometimes heated by steam, but more often by a direct fire. As water in tar sometimes causes bumping in the stills, it is removed as completely as possible before hand. With thinner tars the water settles out on the surface at ordinary temperatures sufficiently well to be run off, but thicker tars require to be moderately heated to cause a satisfactory separation. The still-head is connected with a condensing worm, from which the various products of distillation are conducted into different receivers. At the end of the distillation process, the fire is drawn out and the temperature allowed to fall to a point at which the pitch left behind in the still—though remaining liquid—will not ignite when it comes in contact with the air. This pitch is then run out into barrels, or other suitable receivers. Sometimes, in the last stages of the distillation, superheated steam or a vacuum is utilized, since either of these causes the high-boiling-point products to pass over at a lower temperature than would otherwise have to be employed. Recently, tar has been successfully treated in continuous distillation apparatus.

As is shown below, the various first products of coal tar give, on refinement, numerous compounds of supreme importance in technical chemistry. The amounts of these compounds obtained from tar vary considerably with the nature of the tar itself; and the following figures merely give an approximate idea of the quantities which may be expected from an average coal tar:

	Per cent.
Derivatives of Coal Tar—	
Benzene and homologues	2.5
Phenol and homologues	2.0
Pyridine and other bases	0.25
Naphthalene	6.0
Heavy oil	22.0
Crude anthracene (30% pure)	1.5
Pitch	60.0
Water and loss	6.0

Commercial Products of Coal Tar; Their Uses and Derivatives.

90% Benzol.—Uses—As a solvent for the manufacture of colors, for extracting fat from bones and seeds, and for making iron varnishes; also, as a detergent; as a fuel for internal combustion engines; and for carburetting gas.

Derivatives—By distillation, pure benzene, toluene, xylene, etc., are obtained. Benzene is widely used in the preparation of numerous technical organic products. From it nitro-benzene, aniline, etc., are readily obtained, and therefore it is the parent substance of the numerous aniline dyes; of many artificial perfumes; and of photographic developers, etc. Toluene and xylene are used in the preparation of certain dyes. The former gives on nitration trinitrotoluene, a substance used in the manufacture of explosives.

50% Benzol.—Use—As a substitute for the 90 per cent. benzol, in the manufacture of certain dyes.

Solvent Naphtha.—Uses.—As a solvent for rubber in the preparation of waterproof fabrics; as a detergent; and a solvent in the purification of anthracene.

Crystalline Carbolic Acid.—Use—As an antiseptic. Derivatives—By nitration, carbolic acid gives picric acid, which is used in the manufacture of many important explosives, and of some dyes. It is the source of many substances used in the color industry (e.g. salicylic acid), and of certain photographic developers (e.g. metol).