

within 20 per cent., while at 40 deg. C. the same limit would confine it to within 15 per cent.

The table also illustrates again the rapid increase in the time interval as the temperature of the determination of the viscosity approaches the melting point. Thus under 60 deg. C. the space interval is 4.6 for the 50 per cent. H mixture, but this is increased to 25.6 for the 80 per cent. H mixture at 40 deg. C.

The examples that have been cited have been in series of tars of nearly uniform composition. An illustration of the effect of free carbon on the relation between the melting point and the viscosity is given in Table III. The effect of the free carbon is very marked. In the Schutte and float test the times are markedly increased. With the Engler the results are more irregular, but show a marked increase with the high carbon tar. From a physical standpoint, the increase of free carbon might

be expected to have this effect. It impedes the flow of the material with increase of temperature, and in that way up to the point at which the free carbon tends to weaken the binding and lasting qualities of the tar would seem to be a desirable addition.

The inclusion of both the melting point and the viscosity in a physical examination of refined tars to be used as binders would seem to be warranted. The viscosity at 100 deg. C. compared with the melting point would give an indication of the behaviour of the tar with uniform distributors, and also an indication of its resistance to temperature changes when used on the road.

In conclusion, first, the viscosity of tars of the same composition varies with the melting point, but not in direct ratio; second, the viscosity of tars of the same melting point but of different carbon content increased with the carbon content.

TABLE I.  
A Series of Samples of Refined Tar Made from Same Raw Tar.

Sample No.	Free Carbon.	Distillation. Total to 315 C.	Melting Point.	Schutte Penetrometer.	Viscosity, Engler. 100 c.c. at 100° C.	Float Test at 50 C.
5 . . . . .	12.1	21.8	....	29 sec. at 40° F.	94 sec.	34 sec.
7 . . . . .	12.0	19.2	....	108 " at 40° F.	127 "	38 "
8 . . . . .	14.0	16.4	....	114 " at 50° F.	159 "	58 "
9 . . . . .	14.4	14.9	86.9	85 " at 60° F.	208 "	75 "
10 . . . . .	17.2	12.7	99.7	90 " at 70° F.	335 "	110 "
11 . . . . .	18.2	10.4	108.7	88 " at 80° F.	431 "	170 "

TABLE II.  
Comparison of Mixtures of Tar H and Tar D on Engler Viscosimeter. 100 c.c. at Three Temperatures.

Mixture.	Carbon, Est.	40° C.	50° C.	60° C.
40 per cent. H . . . . .	4.4	75.7 sec.	54.6 sec.	41.0 sec.
60 per cent. D . . . . .				
50 per cent. H . . . . .	5.0	88.1 "	57.6 "	45.6 "
50 per cent. D . . . . .				
60 per cent. H . . . . .	5.6	97.3 "	62.5 "	47.0 "
40 per cent. D . . . . .				
70 per cent. H . . . . .	6.2	110.5 "	66.3 "	48.7 "
30 per cent. D . . . . .				
80 per cent. H . . . . .	6.8	136.1 "	83.3 "	56.0 "
20 per cent. D . . . . .				

TABLE III.  
Refined Tars—Relation of Viscosity to Carbon Content.

Sample.	Free Carbon.	Melting Point.	Schutte Penetrometer at 80° F.	Engler, 100 c.c. at 212° F.	Float Test at 212° F.
1 . . . . .	1.4	110° F.	42.2 sec.	302 sec.	158 sec.
2 . . . . .	14.5	109° F.	80.1 "	298 "	192 "
3 . . . . .	39.6	112° F.	144.9 "	739 "	337 "

The prevention of corrosion of iron in acid waters with an electrolytic method is proposed by the United States Bureau of Mines, which has made experiments with iron submerged in sulphuric-acid solutions. The metal structure to be protected is to be made the cathode of the circuit; that is, current flows from the water to it. The current density and the actual current required for protection can be calculated from experimental data on the loss in weight of the metal when unprotected under the given conditions reproduced as near as possible. This loss in weight per hour per unit area, divided by the electrochemical equivalent (weight dissolved or deposited per ampere-hour) gives the current density to be employed. This multiplied by the actual area to be protected gives the actual current needed. For good protection, the anodes should be distributed so that the current may not return to the protected structure at one point only.

Interest is being shown at Washington in the great water power possibilities of the St. John River, running between the State of Maine and the Dominion of Canada. Oscar Fellows of Bangor, an official of the St. John River Commission, created by the United States Congress some years ago, but now defunct, told the International Joint Commission at Washington last December that the St. John River ranked close to the Niagara River for its power possibilities. The commission is consequently interested in the question whether or not the river may not be added to its jurisdiction. However, the Webster-Ashburton treaty of the 50's provided that no obstruction should be placed in the St. John River on either side. That prevents power development on the river. But it is expected that in due season Great Britain will be asked to negotiate a new treaty; since Maine and also New Brunswick would benefit from the power developed.