



**POLYTRADE**

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04/01/2011

# Carbofen® 6060

Asphalt Emulsifier

## GENERALITIES

Carbofen 6060 is derived from a natural resin that has been especially modified to form an emulsifier that can be used to produce high quality anionic asphalt emulsions. The resin comes from special resinous parts of the Brazilian pine tree, *Araucaria angustifolia*, which is a renewable natural resource. Carbofen 6060, which has a chemical composition similar to the oxidized Gum Rosin, also performs well in waterproofing products, roofing, sealants, adhesives, coatings and many other uses.

Following are advantages of using soaps of Carbofen 6060 as an emulsifier for making asphalt emulsions:

- High quality asphalt emulsions can be readily made;
- SS and MS type asphalt emulsions prepared from them mix well with aggregate;
- The viscosity of the asphalt emulsions are well within specification compliance;
- The emulsifiers have excellent solubility in water;
- The use of preservatives after neutralizing may be dispensed with;
- The formulations are cost effective.

## SPECIFICATIONS

Acid Number, ASTM D-465 (mg KOH/g)	80 - 100
Softening point, ASTM E-28 (B&R °C)	100 - 120

## SOLUBILITY

Soluble in acetone, ethanol and ethyl acetate.  
Insoluble in petroleum ether and water.

## PROCEDURE

Asphalt emulsions are prepared from the sodium/potassium soaps of Carbofen 6060. These soaps are used to make slow set (SS) and medium set (MS) emulsions.

Preparation of Carbofen 6060 Emulsifier Solutions:  
Place 50% of the water to be used into the soap tank and add the appropriate amount of sodium hydroxide with stirring (see the Table 1). The stirrer should be off-set so that sufficient shear is obtained to get good mixing while the Carbofen 6060 is being added. Heat the caustic solution to 85-90 °C (185-195 °F) then slowly add the Carbofen 6060 with stirring for 30 to 45 minutes. The finished pH should not be below 11.5. Add the remaining water and adjust to the desired temperature for production of the emulsion, typically 40-50° C (105-125° F).

**Table 1** – Formulation for a Typical Carbofen 6060 Soap Solution, weight percent.

Product	Weight %
Carbofen 6060	1 - 3%
Caustic Soda (NaOH) 99%	0.2 - 0.58%
Water	Complete 100%

Note: When potassium hydroxide is used, the % of caustic must be adjusted to reflect the difference in molecular weights between NaOH and KOH dividing the amount of NaOH by its molecular weight and then multiplying by KOH molecular weight, that are 40.0 and 56.1 respectively.

The amount of emulsifier may be adjusted as desired. For SS type emulsions, the required emulsifier in the soap solution should be about 2.7 - 3.0%. and for MS type emulsions, the required emulsifier should be between 1.5 - 2.6%.

If the soap solution is prepared properly there should not be any undissolved emulsifier.

Heat the emulsion base asphalt up to 130-140 °C (270-285 °F) and recirculate. Heat the Carbofen 6060 soap solution to 40-50 °C (105-125 °F) and recirculate. Follow the plant operation instructions.

Note: the temperatures of the asphalt and soap solution may vary beyond the limits shown here as long as the temperature of the finished emulsion is at least 5 °C (48 °F) below the boiling point of water at the altitude at which the emulsion is produced.

Following is shown the range of the formulation ingredients, the exact values of which will depend on the type of emulsion being prepared and the source of the asphalt:

**Table 2** – Formulation for the asphalt emulsion.

Product	Weight %
Carbofen 6060 solution	43% - 30%
Asphalt	57% - 70%

## IMPORTANT

The amount of Carbofen 6060 in the soap solution will depend upon the source of the asphalt and the type of emulsion to be produced. The exact formulation can be determined with laboratory evaluation.

For medium-setting emulsions, it may be necessary to use an excess of 0.2 % sodium hydroxide (NaOH) in preparing the Carbofen 6060 soap. Mixing the finished emulsion by aeration should be avoided as it may cause foaming.



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## **Carbofen<sup>®</sup> 6060**

**Asphalt Emulsifier**

**PACKAGING**

Powder product in paper bags of 25 kg – 55 lb.  
Big Bags of 840 kg – 1900 lb.

**PRODUCT INFORMATION AND SAFETY**

Read our Material Safety Data Sheet (MSDS).



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**COMPLEMENTARY INFORMATION**

**Formula 1** – Temperature for unloaded emulsion.

The temperature of the emulsion exiting the mill may be calculated by the following formula:

P<sub>A</sub>= % asphalt;

T<sub>A</sub>= temperature of the asphalt;

T<sub>S</sub>= temperature of the soap solution;

T<sub>E</sub>= temperature of the emulsion;

And assuming that the specific heats of the asphalt and soap solution are 0.5 and 1 respectively.

$$T_E = \frac{T_A \cdot P_A \cdot 0.5 + T_S \cdot (100 - P_A)}{(100 - P_A) + P_A \cdot 0.5}$$

**Formula 2** – Volume Correction for emulsion.

For an emulsion designated by ASTM as group 0, specific weight at 60°F higher than 0.966, the volume variation by temperature may be calculated by following formula:

T<sub>E</sub>= Temperature of the emulsion, from 50°F to 185°F;

V<sub>TE</sub>= Volume of the emulsion at unloading temperature or emulsion temperature;

V<sub>60°F</sub>= Volume of the emulsion at 60°F.

$$V_{60°F} = V_{TE} \cdot (-2.500E - 04 \cdot T_E + 1.015)$$

**Formula 3** – Concentration for caustic soda different of 99%.

For a concentration of caustic soda (NaOH) different of 99% the new percentages may be calculated by the following formula:

N<sub>W%</sub>= New weight percent;

O<sub>W%</sub>= Old weight percent, 0.20 to 0.58%;

N<sub>C%</sub>= New concentration of caustic soda, for example: 50%, N<sub>C%</sub>=50.

$$N_{W\%} = \frac{99 \cdot O_{W\%}}{N_{C\%}}$$

Then, the new table 1 will be:

**Table 3** – Formulation for caustic soda concentration different of 99%.

Product	Weight %
Carbofen 6060	1 - 3%
Caustic Soda (NaOH) N <sub>C%</sub> aq.	N <sub>W%</sub>
Water	Complete 100%

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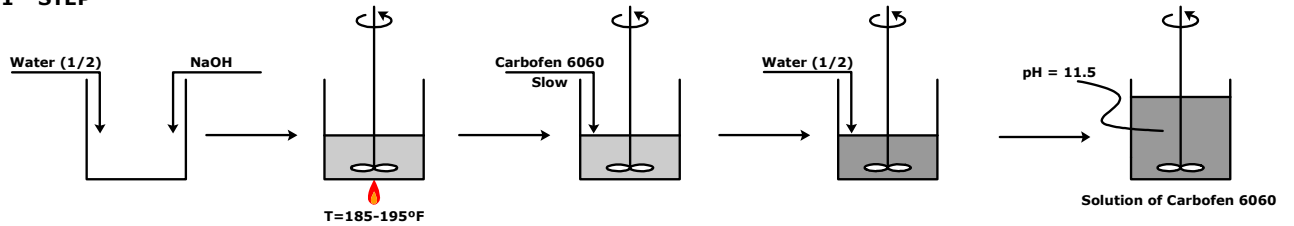
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**Table 4** – Simplified model. (We recommend that you read first the procedure contained in page 1)

**1<sup>ST</sup> STEP**



**2<sup>ND</sup> STEP**

