



The Utilization of Mixed Waste of Plastics, Tires, and Crude Palm Oil (CPO) as Asphalt Alternatif

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ABSTRACT

Asphalt is the important component in the making of infrastructure and rehabilitation of road in particular on the surface layer. The use of asphalt as a road surface coating materials is increasingly rising in number, so its affect the availability of asphalt was limited. The problem is not in line with the limited supply of petroleum as a primary material for producing natural asphalt. To overcome that problem, it needs an alternative in the form of synthetic asphalt by using any waste materials. The waste materials for making asphalt in this research use the various compositions such as tires, plastic, CPO as mixture compound. The purpose of this research is to establish the exact composition of asphalt Alternatif in order be able to produce asphalt or Bitumen with the characteristics fulfill asphalt Pen 80/100. The methodology of this research is by varying the composition of materials in each mixed waste of bitumen sample. The parameters of mixed waste as bitumen to testing are penetration, ductility, softening point, flash point, and density based on SNI. The result of this research were the compositions of mxture waste are 30 grams tirese, 66 ml CPO, and 15 grams plastic obtained the value of the penetrations of 101,5 mm, flash point is 208°C, and density of 1,028 gr/ml, The ductility value of the mixed asphalt is 3,00 cm, and softening point at 97°C. All those parameters fulfill the standard.

Key Words : Asphalt, Bitumen, Tires, Plastics, CPO

I. INTRODUCTION

Asphalt is the carefully refined residue from the distillation process of selected crude oils. The primary use 70% of asphalt/bitumen is in road construction, where it is used as the glue or binder mixed with aggregate particles to create asphalt concrete. The terms *asphalt* and *bitumen* are often used interchangeably to mean both natural and manufactured forms of the substance. The asphalt product is often called bitumen, on geological terminology often prefers the term *bitumen*. Naturally occurring asphalt is sometimes specified by the term "crude bitumen". while the material obtained from the fractional distillation of crude oil boiling at 525 °C (977 °F) is sometimes referred to as "refined bitumen". The largest use of asphalt is for making asphalt concrete for road surfaces and accounts for approximately 85% of the asphalt consumed in Indonesia. Asphalt concrete pavement material is commonly composed of 5% asphalt or bitumen cement and 95% aggregates (stone, sand, and gravel). Due to its highly viscous nature, asphalt and bitumen cement must be heated so it can be mixed with the aggregates at the asphalt

mixing plant.

Although uncompetitive economically, asphalt or bitumen can be made from nonpetroleum-based renewable resources such as sugar, molasses and rice, corn and potato starches. Asphalt and bitumen can also be made from waste material by fractional distillation of used motor oils, which is sometimes disposed by burning or dumping into landfills; use of these results in premature cracking in colder climates, resulting in roads that need to be repaved more frequently. Nonpetroleum-based asphalt/bitumen binders can be made light-colored. Lighter-colored roads absorb less heat from solar radiation, and have less surface heat than darker surfaces, reducing their contribution to the heat effect. Wright Asphalt Products specializes in providing asphalt products processed from environmentally-friendly, the recyclable tire rubber, plastic and CPO. The asphalt products made from recycled tire-rubber, plastic and cpo can modified into asphalt cement, making it compatible with the latest technology and materials for pavement maintenance and construction

applications. Wright's entire line of asphalt products meet and/or exceed the minimum requirements for each state, making them a viable, cost-effective solution compared to competing products. We making asphalt products to last longer than conventional products and to be used with conventional equipment, which saves your time and money and saves the planet from excess waste. Our innovative, tire-rubber, plastic and CPO modified hot mix binders have been designed to meet or exceed Asphalt standards and can be incorporated into any hot mix system in use throughout the industry.

II. METHODOLOGY

Procedure :

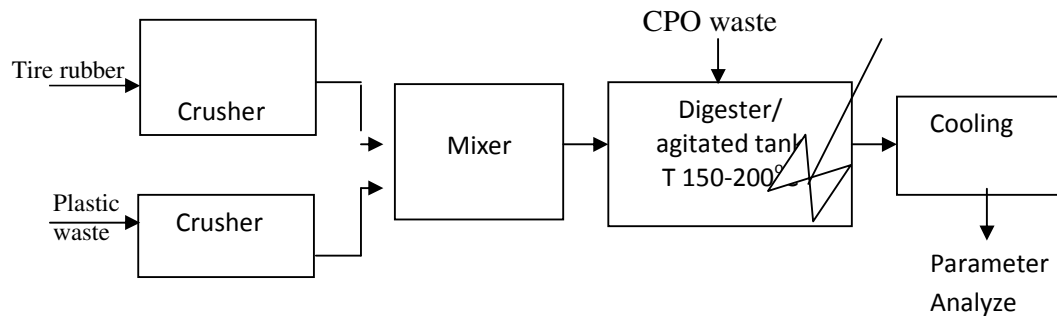


Fig. 1. Flow Diagram of Mixed waste of tire rubber, plastic and CPO as Asphalt or Bitumen

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III. RESULT AND DISCUSSION

The mixture of waste of tire rubber, plastic and PCO have blends in quickly and seamlessly into the bitumen by using a low shear mixer at 200 °C to create a very high quality of Polymer modified Bitumen. This research saving on expensive plant and that product can be made on site anywhere in the country, thereby softening/weakening the bitumen - this is very important when creating certain asphalt mixes where stiffer bitumens are required. An environmentally friendly for the roading industry. It is an 'earth friendly' alternative to petroleum-based products and considerably less hazardous. Bitumen is a polymer product which essentially works as a bridging agent between the water phase on the aggregate and the oil phase of the bitumen. It helps the bitumen to create a strong bond with the wet aggregate. This is particularly important for the roads where wet or damp chip is being spread onto hot bitumen that has just been sprayed onto the road.

Materials :

Material Used in these research are waste of tire rubber and Plastic and the waste of CPO are buying from industry in Palembang.

Equipments :

The equipment are use in these process are Crusher : size reduction of tire and plastic

Mixer: mix the waste of tire and plastic

Agitated tank, : for smelting the Bitumen

Stove : for heating the mixture of waste

Equipment for analysis The Bitumen product : penetration, density, ductility, flame temperature,

Asphalt also works as an adhesion agent to improve the bond between stone and bitumen to create stronger more durable asphalt mixes. Often referred to as the "bottom of the barrel," it is easy to overlook asphalt as one of the many products derived from a barrel of crude oil. In reality, there are many more applications for asphalt than just paving. Asphalt can also be used for roofing, batteries, automotive parts, and other materials used for building and construction.

As one of the asphalt bitumine producers in these research also offers specialty asphalts manufactured with polymer, ground tire rubber, PPA and warm mix modifiers. Asphalt including its different process and applications, has penetration factors are under standards. The Correlation of mixed bitumine of waste tire rubber, plastic and CPO with Penetration Factor, shown all of the composition were mixed has penetration factor are not standards. The mixed of waste of tire rubber, plastic and CPO can not allow the standard

of asphalt quality, the mixed bitumen is difficult to melting at 110°C.

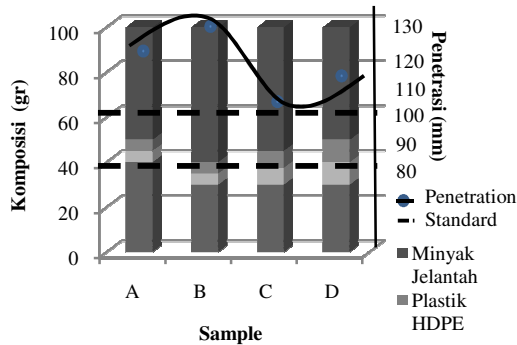


Fig 2. The Penetration factor of Bitumen product

The Dactility factor of bitumen could not be allowed the asphalt standard.

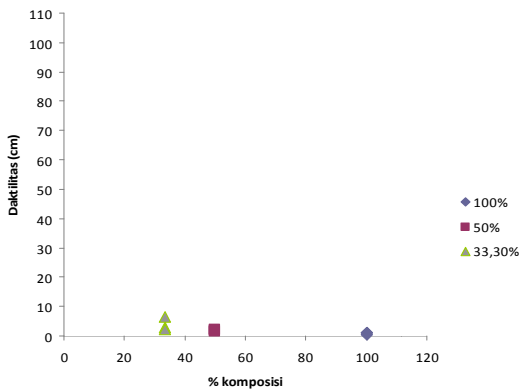


Fig.3. The Dactility of Bitumen in The Composition of Waste Mixing

The Flame temperature of Bitumen are >200°C, all of the mixed has flame temperature like as asphalt standard.

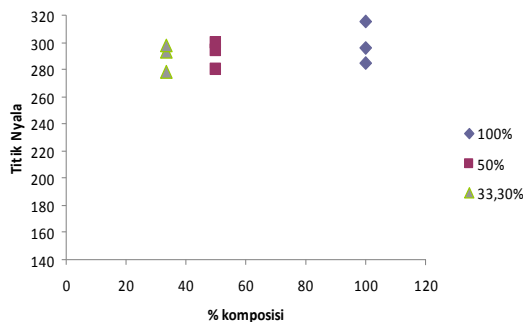


Fig.4. The Flame Temperatur of Bitumen in The Composition of Waste Mixing

The Density of mixed of waste contain CPO 33,3 g, plastik 15 gr, Ban 50 have good density is 1,03 gr/ml.

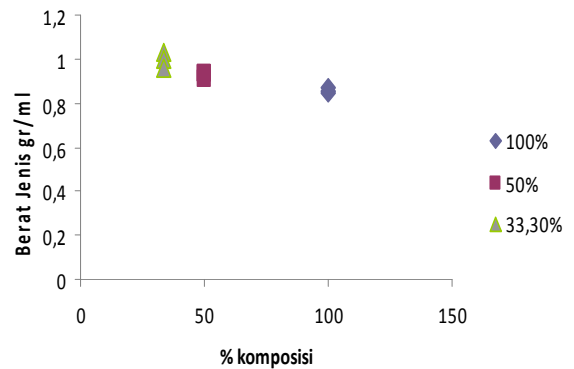


Fig.5. The Density of Bitumen in The Composition of Waste Mixing

IV. CONCLUSION

In these research to mixed the waste of tire rubber in weight 100 g, 50 g CPO and 33,3 g plastic has the penetration factors are under standard, The asphalt or bitumen are strength cannot boiled and the ductility of asphalt or bitumine not in standard too, thats only the flame temperatur and the Density of asphalt or bitumine has follow the standard are BP > 200°C: Density 1,03 gr/ml.

REFERENCES

_____,2007. Badan Litbang Kementerian pu.(pustaka.pu.go.id/new/resensi_buku.asp?start=201,diakses 26 Juli 2012)

_____,2010.*Chapter II(Pengertian Karet)*.Sumatera Utara:UniversitasSumateraUtara.(Online),(<http://repository.usu.ac.id/bitstream/123456789/282599/4/Chapter%20II.pdf>,diakses 13 Juni 2012)

_____,2010.*Jenis-Jenis Karet Alam dan Manfaatnya*.(Online),(<http://unionjavarubber.co.id/artikel/44-karet/82-jenis-jenis-karet-dan-manfaatnya>, di akses 20 Juni 2012)

Almaika,S.1983. *In Degradation And Stabilitation Of polyolefin*.University of London.

Anonim. 2010. *Kebutuhan Aspal Meningkat*.(<http://www.majalahtrust.com>, diakses 13 Mei 2012).

Anonim. 2010. *Permintaan Tidak Sesuai dengan Produsen Aspal* (<http://sultra.tripod.com>, diakses 13 Mei 2012)

B.K.Huat Bujang,2004.*Application of scrap tires as earth Reinforcement For Repair Of Tropical Residual*

Soil Slope, Department Of Civil Engineering,
University Malaysia. Selangor.
Email: bujang@eng.upm.my, EJGE

Chece.2012.*Aspal*. (<http://chece0404.blogspot.com/2011/10/aspal.html>, diakses 6 Juni 2012)

Dalimunthe,R, 1983.*Kandungan Lateks serta keterkaitannya Dengan Pembuatan Barang Jadi*. Medan.

Gachter M.,1990. *Plastic Addictives Handbook*. Third Edition. Munich: Hanser Publisher

Hafizullah, Ahmad.2011.“*Aspal Polimer*”, (*Online*), (<http://ahmadhafizullahritonga.blog.usu.ac.id/2011/02/18/176/> diakses 7April 2012)

Hafizullah, Ahmad.2011.*Aspal*, (*Online*),

(<http://ahmadhafizullahritonga.blog.usu.ac.id/2011/02/18/aspal-2/>, diakses 20 April 2012)