International Journal of Application or Innovation in Engineering & Management (IJAIEM)
Web Site: www.ijaiem.org Email: editor@ijaiem.org
Volume 6, Issue 3, March 2017 **ISSN 2319 - 4847**

Experimental Test On Bitumen With Addition Of 35% Of Plastic Fibre

T.Subramani[1], A.Anbuchezian[2]

[1]Professor & Dean, Department of Civil Engineering, VMKV Engineering College, Vinayaka Missions University, Salem, India

[2] Professor & Head, Department of Civil Engineering, Annapoorana Engineering College, Salem, India.

ABSTRACT

Bitumen is a semi strong or very gooey fluid which is gotten from the petroleum refinery handle and furthermore in common store or as a segment of actually happening black-top. It is dark or chestnut in shading, have glue and water proofing property. Bitumen has distinctive awesome qualities, for instance, stick, adaptable, thickness these properties are get change on account of developing. Maturing allude to change on bitumen properties after some time, which is brought about by outer condition. Bitumen has diverse incredible qualities, for instance, stick, flexible, thickness these properties are get change on account of maturing. This maturing causes different effects on mechanical and compound properties of bitumen. At the point when bitumen is straightforwardly reached with oxygen for long time, the particles of bitumen contact with oxygen and bitumen get to be distinctly weak and hard. These impacts likewise cause consequences for shading the bitumen get to be distinctly dim chestnut or dark to dim. This change is normally alluded to as oxidative solidifying or age solidifying. This type of maturing happens all the more habitually in hotter climatic or amid warm seasons, bringing on more established asphalts to split more easily. The principle maturing system is an irreversible one, described by substance changes of the fastener, which thusly affects the rheological properties.

Keywords: Experimental Test, Bitumen, Plastic Fibre, petroleum

1.INTRODUCTION

Bitumen is made from raw petroleum. Bitumen is gotten as the last buildup in partial refining of unrefined petroleum. Rough petroleum is a blend of hydrocarbons of various sub-atomic weights. In the petroleum refineries the individual segments like LPG, naphtha, Kerosene, Diesel and so on are isolated through the procedure of partial refining. The heaviest material got from the fragmentary refining procedure is further treated and mixed to make diverse evaluations of clearing evaluation bitumen.The genuine bitumen yield can be controlled by selecting the fitting unrefined as well as by receiving shifting procedures in the refinery.The decision of process would rely on upon the accessibility of appropriate crude, demand of the final results and aggregate business reasonability of the entire refining process.

1.1 Objective

- To study the effect of aging on softening point of bitumen samples.
- To study the effect of aging on viscosity of bitumen samples.
- To study the effect of aging on Rheological properties of bitumen samples.
- To compare the effect of aging on bitumen samples.

2.LITERATURE REVIEW

In year 1978 Craus et al. evaluated the influence that the type of filler had on durability of bituminous mixers. In year 1990, C. P. Valkering et al. have showed that elastic return in modified polymer bitumen using SBS has high than neat bitumen. In year1998 Petersen et al. had carried out research work, using RTFOT named thin film accelerated aging test, Strained to enumerate how the addition of filler might benefit the reduction of hardening by age and improve the properties of flow at low temperatures. In year 2002, Chen et al. the effect of different quantity of SBS of bitumen has been considered and come to this result that rheology characters of bitumen by increasing SBS range will be improved. In year 2003, Mehraz et al. carried out experiments to study the effects of three different rubber concentrations (3%, 9%, and 15%). According to this study after a rolling thin film oven test, the unmodified bitumen showed an improvements of about 1.5 times in G* value, and in rubberized , the samples with 3% and 9% rubber showed an

increase of about 2.5 times, the sample with 15% rubber showed an increase of about 1.5 times compared to their original unaged values. Further research works are also carried out using different filler materials are following. Mahrez, Karim (2003) Carried out research work on "Rheological evaluation of aging properties of rubber crumb modified bitumen." Used 80/100 penetration grade bitumen and CR as filler. Carried out DSR method for properties of aged and unaged bitumen binder. Carried out TFOT, RTFOT and PAV tests for aging.

3. METHODOLOGY

Figure.1. shows the Methodology adopted in this study

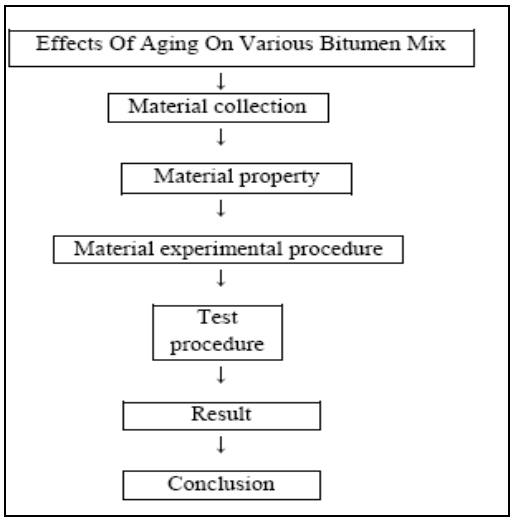

Figure.1. Methodology

4.TEST FOR BITUMEN

There are many bitumen properties which can be tested. All these tests replicate the actual field conditions in different ways. Different types of standard tests (Table.1) conducted on it are briefly described below:

4.1 Viscosity Test

Thickness at 135OC is a reasonable marker of the capacity of bitumen to coat the totals appropriately. So as to get best covering the consistency must be ideal. Excessively thick bitumen would bring about lacking and non-uniform covering of the totals. Low consistency would again bring about insufficient covering as the bitumen will have a tendency to drain. In this manner consistency at 1350C is a genuine impression of the nature of bond that is probably going to be shaped with the total. Different testing supplies like Capillary Viscometer, Cup Viscometer, Tar Viscometer, and so on can be utilized for testing the viscosity. Viscosity at 60OC is a decent marker of the resistance of bitumen to softening/streaming out and about. It is thought to be trade test for Softening Point test. A few details have supplanted softening point test with Viscosity at 60OC. In any case, at many spots both the tests are done as both the tests are exact and have their own particular limitations. At the application temperature, this trademark significantly inuences the quality of coming about clearing blends. Low or high thickness amid compaction or blending has been seen to bring about lower solidness values. At high consistency, it opposes the compactive effort and along these lines coming about blend is heterogeneous, consequently low solidness values.

Table.1: Viscosity Testing Observation And Result

SAMPLE NO	SI.NO	TIME REQUIRED FOR FLOW OF 50 ML		ENGLER SPECIFIC VISCOSITY	AVERAGE ENGLER SPECIFIC VISCOSITY
		LIQUID ASPHALT	DISTILLED WATER		
		(sec)	(sec)	(^oE)	
SAMPLE A	1	49.09	11.28	4.35	4.535
	2	48.66	10.30	4.72	
SAMPLE B	1	47.23	11.01	4.28	4.4
	2	46.88	10.35	4.52	

4.2 Softening Point Of Bitumen

4.2.1 Softening Point

The softening point is characterized as the mean of the temperatures at which the bitumen circles diminish and droop downwards a separation of 25 mm under the heaviness of a steel ball.

4.2.2 Scope & Significance

This strategy is valuable in deciding the consistency of bitumen as one component in building up the consistency of shipments or wellsprings of supply.

Softening point is the temperature at which the bituminous covers have an equivalent consistency (i.e. the consistency of the considerable number of evaluations will be same at the softening point e.g. on the off chance that two examples have softening purposes of 40 °C and 80 °C separately, both will have a similar consistency at their softening point.

- The test gives a thought of the temperature at which the bituminous materials achieve a specific thickness.
- Bitumen with higher softening point might be favored in hotter spots.
- Softening point ought to be higher than the most sultry day temperature, which is expected around there generally

bitumen may adequately diminish and bring about draining and advancement of trenches.

4.2.3Apparatus

Ball

A steel ball, 9.53 mm (3/8") in diameter, weighing between 3.45 and 3.55 grams.

Ball Centering Guide

A guide for centering the ball and made of brass.

Holder

The rings shall be supported on a brass ring holder.Rings shall be supported in a horizontal position with the bottoms of the rings 25 mm above the upper surface of the bottom plate and a distance of at least 13 mm and not more than 19 mm between the bottom plate and the bottom of the bath.The thermometer shall be suspended so that the bottom of the bulb is level with the bottom of the rings and within 13 mm of the rings but not touching them.

Brass Pouring Plate

A flat, smooth brass plate approximately 75 by 50 mm that has been treated to prevent the bituminous material from adhering to it. A suitable treatment is to coat the plate just before use with a thin layer of a mixture of glycerin and dextrin, talc, or china clay.

Bath

A glass vessel, capable of being heated, not less than 85 mm in diameter and not less than 120 mm in depth from the bottom of the flare.

5. OBSERVATIONS & RESULTS

Softening Point Of Samples given in Table.2

Table.2: Softening Point Of Samples

SI.NO	SOFTENING POINT (^{O}C)	MEAN (^{O}C)
SAMPLE A	46.4^{O}C	46.9^{O}C
	47.4^{O}C	
SAMPLE B	48.3^{O}C	48.8^{O}C
	49.3^{O}C	

5.3 CALIFORNIA BEARING RATIO (CBR) TEST

This test was utilized to evaluate the quality of the normal and bitumen-balanced out soil tests. The test includes compaction of the examples in the CBR molds at the ideal dampness content decided from the compaction tests. The plunger of the CBR machine was made to infiltrate the compacted soil at a rate of 1mm every moment. The infiltration of the plunger was measured by a dial gage and readings of the connected constrain were perused at interims of 0.25 mm to an aggregate entrance not surpassing 7.5 mm. The CBR was ascertained as appeared in condition 5. The test system is definite in BS 1377. California Bearing Ratio Test Results Given in Table.3.

Table.3: California Bearing Ratio Test Results

PENETRATION (IN)	PROVING RING DIAL READING	PISTON LOAD (KN)	AREA OF PISTON (M^2)	PENETRATION STRESS (KN/M^2)
0	0	0	0	0
0.025	14.50	1.30	0.001935	671.83
0.05	38.6	3.6	0.001935	1860.46
0.075	67.2	6.2	0.001935	3204.13
0.1	99.06	8.9	0.001935	4599.48
0.125	118.9	10.6	0.001935	5478.03
0.15	128.4	11.7	0.001935	6046.51
0.175	136.6	12.6	0.001935	6511.62
0.2	148.7	13.5	0.001935	6976.74

6.CONCLUSION

Based on the Samples studies reported above, several conclusions can be drawn as Follows:

- When compared the bitumen samples of softening point values in RTFOT, and the amount of oxidation products in RTFOT aged binder is higher than that in High-Shear aged binder;
- Compared with conventional empirical tests (penetration test and R&B SP test), the DSR test is more sensitive to the component changes within bitumen;
- Ageing procedures can significantly affect the bitumen ageing mechanism. A study combining rheological simulation of the bitumen behaviour in different ageing procedures, chemical tests for bitumen component changes and DSR rheological tests is strongly recommended;

References

[1] Sadam Hade Hussein, Kamal Nasharuddin Bin Mustapha, Zakaria Che Muda,Salmia Beddu, Verification For Modeling of Ultimate Load For Lightweight Palm Oil Clinker Reinforced Concrete Beams with Web Openings Using Response Surface Methodology. International Journal of Civil Engineering and Technology, 3(2), 2012, pp.229–240.

[2] T.Subramani, P.Ramasamy , " Thermal Conductivity Of Fibre Filled With Ferrocement Sandwich Panels" , International Journal of Application or Innovation in Engineering & Management (IJAIEM) , Volume 5, Issue 5, pp. 204-215 , 2016 .

[3] T.Subramani, P.Sakthivel , " Experimental Investigation On Flyash Based Geopolymer Bricks" , International Journal of Application or Innovation in Engineering & Management (IJAIEM) , Volume 5, Issue 5, pp. 216-227 , 2016 .

[4] T.Subramani, S.R.Rajiv , " Improving Construction Efficiency And Productivity Of Industry Using SPSS" , International Journal of Application or Innovation in Engineering & Management (IJAIEM) , Volume 5, Issue 5, pp. 239-250 , 2016 .

[5] T.Subramani, R.Siva, "Experimental Study On Flexural And Impact Behavior Of Ferrocement Slabs" International Journal of Application or Innovation in Engineering & Management (IJAIEM), Volume 5, Issue 5, pp. 228-238 , 2016 .

[6] T.Subramani, A.Anbuvel , " Experimental Behaviour Of Reinforced Concrete Beams With Coconut Shell As Coarse Aggregate" International Journal of Application or Innovation in Engineering & Management (IJAIEM) , Volume 5, Issue 5, pp. 067-075 , 2016 .
[7] T.Subramani, K.S.Ramesh , " Experimental Study On Partial Replacement Of Cement With Fly Ash And Complete Replacement Of Sand With M sand" , International Journal of Application or Innovation in Engineering & Management (IJAIEM) , Volume 4, Issue 5 , pp. 313-322 , 2015
[8] T.Subramani, G.Shanmugam , " Experimental Investigation Of Using Papercrete And Recycled Aggregate As A Coarse Aggregate " , International Journal of Application or Innovation in Engineering & Management (IJAIEM) , Volume 4, Issue 5, pp. 323-332 , May 2015
[9] T.Subramani, S.Kumaran , " Experimental Investigation Of Using Concrete Waste And Brick Waste As A Coarse Aggregate " , International Journal of Application or Innovation in Engineering & Management (IJAIEM) , Volume 4, Issue 5, pp. 294-303 , 2015
[10] T.Subramani, G.Ravi**,** "Experimental Investigation Of Coarse Aggregate With Steel Slag In Concrete", IOSR Journal of Engineering, Volume 5,Issue 5, Version 3, pp64-73, 2015
[11] T.Subramani, A.Mumtaj , " Experimental Investigation Of Partial Replacement Of Sand With Glass Fibre" , International Journal of Application or Innovation in Engineering & Management (IJAIEM) , Volume 4, Issue 5, pp. 254-263 , 2015
[12] T.Subramani, S.B.Sankar Ram Experimental Study on Concrete Using Cement With Glass Powder, IOSR Journal of Engineering,Volume 5 , Issue 5, Version 3, pp43-53, 2015
[13] T.Subramani, C.Sumathi , " Experimental Investigation Of Partial Replacement Of Cement With Fly Ash And Sand With Bottom Ash And Glass Used In Concrete" , International Journal of Application or Innovation in Engineering & Management (IJAIEM) , Volume 4, Issue 5, pp. 245-253 , 2015
[14] T.Subramani, B.Suresh , " Experimental Investigation Of Using Ceramic Waste As A Coarse Aggregate Making A Light Weight Concrete " , International Journal of Application or Innovation in Engineering & Management (IJAIEM) , Volume 4, Issue 5, pp. 153-162 , 2015
[15] T.Subramani, M.Prabhakaran , " Experimental Study On Bagasse Ash In Concrete" , International Journal of Application or Innovation in Engineering & Management (IJAIEM) , Volume 4, Issue 5, pp. 163-172 , 2015
[16] T.Subramani, V.K.Pugal , " Experimental Study On Plastic Waste As A Coarse Aggregate For Structural Concrete" , International Journal of Application or Innovation in Engineering & Management (IJAIEM) , Volume 4, Issue 5, pp.144-152 2015
[17] T.Subramani, V.Angappan , " Experimental Investigation Of Papercrete Concrete" , International Journal of Application or Innovation in Engineering & Management (IJAIEM) , Volume 4, Issue 5, pp. 134-143 , 2015
[18] T.Subramani, D.Latha , " Experimental Study On Recycled Industrial Waste Used In Concrete" , International Journal of Application or Innovation in Engineering & Management (IJAIEM) , Volume 4, Issue 5, pp. 113-122 , 2015
[19] Subramani.T, Senthilkumar.T, Jayalakshmi.J, "Analysis Of Admixtures And Their Effects Of Silica Fumes, Metakaolin And Pfa On The Air Content",International Journal of Modern Engineering Research, Volume 4, Issue 6 (Version 4), pp 28-36, 2014.

AUTHOR

Prof. Dr.T.Subramani Working as a Professor and Dean of Civil Engineering in VMKV Engineering College, Vinayaka Missions University, Salem, TamilNadu, India. Having more than 27 years of Teaching experience in Various Engineering Colleges. He is a Chartered Civil Engineer and Approved Valuer for many banks. Chairman and Member in Board of Studies of Civil Engineering branch. Question paper setter and Valuer for UG and PG Courses of Civil Engineering in number of Universities. Life Fellow in Institution of Engineers (India) and Institution of Valuers. Life member in number of Technical Societies and Educational bodies. Guided more than 400 students in UG projects and 250 students in PG projects. He is a reviewer for number of International Journals and published 164 International Journal Publications and presented more than 25 papers in International Conferences.

Dr.A.Anbuchezian completed his B.E. Degree in the branch of Civil Engineering in IRTT, Erode, Bharathiyar University and M.E-Structural Engineering, GCE, Periyar University. He also completed his **Ph.D. in** of Civil Engineering in Vinayaka Missions University. Having more than 20 years of Teaching experience in Various Engineering Colleges. Currently he is working as a Professor and Head of the Department of Civil Engineering in Annapoorana Engineering College, Salem, TamilNadu. He is also holding the additional responsibility of Dean – Academic (Non Circuit branches) in Annapoorana Engineering College, Salem, TamilNadu. He published 14 International Journal Publications and presented more than 5 papers in International Conferences