ANALYSIS OF BITUMEN WITH LDPE AND PVC DUST USED IN FLEXIBLE PAVEMENT

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ABSTRACT

Bitumen *is a binding material mostly used in construction projects like road surfacing, airports, parking lots etc. This is primarily because of their excellent binding characteristics and water proofing property. It has adhesive properties and is soluble in carbon disulphide.To fulfill the objectives of this study, first of all waste plastic like as sanchi milk pouch waste polythene was collected in shredded form (<2.50mm) from local tea stall in bhopal. And waste pvc dust was collected from govindpura industrial area. after a total of 04 (Four) modified binders and mixes are prepared with 2.5%, 5%, 7.5% and 10% waste plastic and pvc dust respectively content to perform the test of penetration, ductility, softening point, Marshall stability test. After performing these test and find the rheological or engineering properties of modified bitumen then Marshall Specimens were prepared with these binders and Marshall Tests were performed accordingly. The performances of modified bituminous mixes are evaluated by determining stability, flow, density and void in the mixes.*

Keyword: *-:Bitumen, pvc dust, waste polythene, LDPE etc.*

1. INTRODUCTION

The blending of polymer with bitumen is a difficult task. Compatibility is the first and main problem that we must face when we trying to modify bituminous rheology by adding polymer to it. Blending depends on the compatibility (Baker, 1998) of polymer and bitumen to each other. There are generally considered to be three basic processes which may utilize recycled plastic (Polymer) and PVC Dust in the production of different types of asphalt concrete pavements. These processes are known as the Dry Process, the Terminal Blend Process, and the Wet Process. In this study bitumen mixed with PVC dust and waste plastic. the success of blending of a polymer with particular

1.1 TESTING

In this step material bitumen, LDPE , PVC dust are taking for sample preparation according to requrement of sample preparation .Such as Bitumen 200 gm for each sample ,LDPE 2.5% ,5%,7% ,10% of bitumen and PVC dust 2.5% ,5%,7% ,10% of bitumen and these material are mixing and sample are prepare

S.No.	Bitumen(gm)	LDPE(gm)	PVC dust(gm)
1	190	5	5
2	180	10	10
3	170	15	15
4	160	20	20

Chart -1 Quantity used in testing

Based on above chart 3 sample are prapared for each combination and test are perform on these sample after that result are discuss below

Penetration test

Ductility test

Softening test

2. PENETRATION TEST

Penetration test of Bitumen determines the hardness or softness of bitumen by measuring the depth in millimeter to which a standard loaded needle will penetrate vertically in five seconds while the temperature of the bitumen sample is maintained at 25°C

Chart -2 Penetration test value

S.No.	Sample No.	Quantity of Bitumen(gm)	Quantity of LDPE(gm)	Quantity of PVC(gm)	Penetration Value(mm)	Avarage value(mm)
1	1	190	5	5	56	54
2	2	190	5	5	52	
3	3	190	5	5	54	
4	4	180	10	10	47.8	48
5	5	180	10	10	48.4	
6	6	180	10	10	48.5	
7	7	170	15	15	42.1	43.3
8	8	170	15	15	43.8	
9	9	170	15	15	43.3	
10	10	160	20	20	35.8	36.2
11	11	160	20	20	36.1	
12	12	160	20	20	36.7	

3. DUCTILITY TEST

In this test take 200 gm bitumen and it is replace by 2.5%,5%,7.5%and 10 % of LDPE and pvc dust and calculation given below

Chart 3 - Ductility test value

S.No.	Sample No.	Quantity of Bitumen (gm)	Quantity of LDPE (gm)	Quantity of PVC (gm)	Penetration Value (mm)	Avarage value(mm)	Final Avarage value (mm)
1	1	190	5	5	71.4	71.63	71.98
					71.6		
					71.9		
2	2	190	5	5	72.2	72	
					71.1		
					72.1		
3	3	190	5	5	71.9	72.33	
					72.5		
					72.6		

S.No.	Sample No.	Quantity of Bitumen (gm)	Quantity of LDPE (gm)	Quantity of PVC (gm)	Penetration Value (mm)	Avarage value(mm)	Final Avarage value (mm)
1	4	180	10	10	60.3	61.06	61.28
					61.2		
					61.7		
2	5	180	10	10	60.5	61.23	
					61.5		
					61.7		
3	6	180	10	10	61.1	61.56	
					61.7		
					61.9		

S.No.	Sample No.	Quantity of Bitumen (gm)	Quantity of LDPE (gm)	Quantity of PVC (gm)	Penetration Value (mm)	Avarage value(mm)	Final Avarage value (mm)
1	7	170	15	15	51.2	52.3	51.14
					51.9		
					51.6		
2	8	170	15	15	51.4	52.1	
					52.2		
					52.8		
3	9	170	15	15	51.8	52.4	
					52.5		
					52.9		

S.No.	Sample No.	Quantity of Bitumen (gm)	Quantity of LDPE (gm)	Quantity of PVC (gm)	Penetration Value (mm)	Avarage value(mm)	Final Avarage value (mm)
1	10	160	20	20	36.2	37.06	37.20
					37.2		
					37.8		
2	11	160	20	20	37	37.43	
					37.5		
					37.8		
3	12	160	20	20	36.4	37.13	
					37.1		
					37.9		

4.SOFTENING POINT TEST

In this test take 200 gm bitumen and it is replace by 2.5%,5%,7.5%and 10 % of LDPE and pvc dust and calculation given below

Chart 4 - Softening point value

S.No.	Sample No.	Quantity of Bitumen(gm)	Quantity of LDPE(gm)	Quantity of PVC(gm)	Penetration Value(mm)	Avarage value(mm)
1	1	190	5	5	56.2	57
					58.1	
2	2	190	5	5	56.4	
					57.	
3	3	190	5	5	57.1	
					58	
4	4	180	10	10	61.8	62.13
					62.7	
5	5	180	10	10	61	
					61.7	
6	6	180	10	10	62.4	
					63.2	
7	7	170	15	15	67.6	68
					68.1	
8	8	170	15	15	61.8	
					68.2	
9	9	170	15	15	67.3	
					68.5	
10	10	160	20	20	70.3	71.2
					71.6	

11	11	160	20	20	71.2 72	
12	12	160	20	20	70.2 71.9	

5. CONCLUSIONS

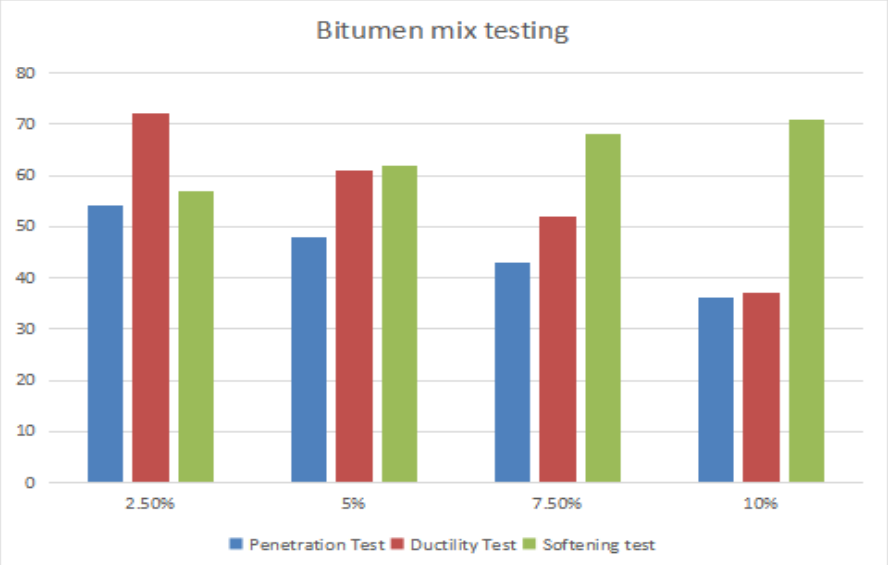

Fig.1 Comparative analysis of various test

Considering these factors we can assure that we can obtain a more stable and durable mix for the pavements by polymer modifications. This small investigation not only utilizes beneficially, the waste non-degradable plastics but also provides us an improved pavement with better strength and longer life period. And sample with 5 % replacement give the most accurate data and durability so that most accurate sample and combination is with 5% LDPE and 5% Pvc dust in given sample.

6. REFERENCES

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