

Review of: "Analytical Study and Amelioration of Plastic Pavement Material Quality"

Emmanuel Boakye¹

¹ Air University

Potential competing interests: No potential competing interests to declare.

Analytical Study and Amelioration of Plastic Pavement Material Quality

General: The paper discusses the effect of plastic addition on the mechanical properties of a plastic/sand composite. The research topic is interesting, and the idea for the study is good. The results are good but are not properly discussed.

Why the various blends of polymer/sand have different mechanical properties is not discussed. The results also need to be compared to typical pavement blocks made in Cameroon. The authors made mention of 2 types of polymer/sand pavement blocks but also need to compare to typical commercial blocks formed with Portland cement.

Please make the suggested corrections before the paper can be accepted. This paper is rejected; it can only be accepted after major revisions.

Analytical Study and Amelioration of Plastic Pavement Material Quality

1. "During this research, the effect of combining the two plastics mentioned above for the production of a single pavement was studied to determine the impact of their combined binding characteristics as well." **Fix language.**
2. "The formulation of the pavement samples for evaluating the binding characteristics of polypropylene (PP) in each pavement was defined as 10%, 15%, 20%, 25%, 30%, 35%, 40%, 45%, and 50%, and that of polyethylene terephthalate (PET) was defined as 10%, 15%, 20%, 25%, 30%, and 35% by weight of the total sample". **Rewrite**
3. "In the third phase, the effect of combining the two types of plastics as binding materials in a single pavement production was evaluated, and in this case, the formulations were: 10% PP plus 20% PET, 15% PP plus 15% PET, and 20% PP plus 10% PET, against 70% sand. Meaning of in the third phase?" **Fix language**
4. "30% PP as a binding material produced a 22.1 MPa strength that can withstand a load of 40 KN, and 25% PET produced a compressive strength of 14.1 MPa that can withstand a load of 22.4KN." **Fix language**

Experiments

1. "While polypropylene plastics included leads of water bottles and household utensils such as buckets with the same basic material properties and density of 0.90-0.91 g/cm³ ^[10] as well as a melting temperature of 130°C–175°C and the

chemical formula (C_3H_6)_n, Figure 1 presents the different plastic types. **Fix language**

2. **Temperature for drying the aggregates?**
3. **How was the grain size of aggregate determined?**
4. “The plastic contents used in each mixture were 0%, 5%, 10%, 15%, 20%, 25%, and 30% by weight of the plastic-sand mixture.” **Were these consistent with the contents listed above? What about 0%? I understand this is the control but is not listed above.**
5. **What is the sample size and thickness for the compressive test? Also, say something about what the 3-point bend test fixture is, including the model number.**
6. “Compressive strength, flexural strength, density, porosity, and water absorption tests were done following the standards EN19601-NFP15:45-DIN1164-PREN/ISO679, EN196/01-ASTMC349-DIW1164-PREN/ISO679, and EN7721-11.” Fix language
7. “Porosity was measured using the Archimedes principle method, where samples are weighed in the dry state and weighed again after steeping in water for between 3 and 7 days according to the standard EN7721-11.” **Fix language**
8. Porosity was measured using the Archimedes principle method, where samples are weighed in the dry state and weighed again after steeping in water for between 3 and 7 days according to the standard EN7721-11 **Fix language**
9. Compressive strength was evaluated on polypropylene (PP) samples with the formulations 1:9, 1.5:8.5, 2:82.5:7.5.5, 3:7, 3.5:6.5, 4:6, 4.5:5.5, 5:5 that lasted between 2 days and 7 days **Fix Language**

Results

1. **PP:sand ratio results for compressive strength and bend strength are not consistent. But the similar results for PP/PPT combination are consistent. Why? Explain.**
2. **Discuss the PTE/Sand compressive strength results.**
3. **Write density, for example, as 1.953 and not 1,953.**
4. “From the results obtained from the physical tests, we notice that the formulation of PET and sand with a ratio of 25% to 75% presents the best. The reason is that a good pavement needs to have fewer pores to prevent water from coming out of the yard, especially when used in swampy areas. This particular formulation also presents interesting mechanical properties.” **This is not reasonably discussed.**
5. “When compared to results obtained from existing pavements in Cameroon, we notice that pavements obtained from our formulations gave better values than those of the existing pavements in Cameroon. Figure 12 presents those results. From this conclusion, we can recommend pavements made using the formulations in this work to pavement producers in Cameroon.” **Why the difference?**
6. “During this research, the effect of combining the two plastics mentioned above for the production of a single pavement was studied to determine the impact of their combined binding characteristics as well.” **Fix language.**
7. “The formulation of the pavement samples for evaluating the binding characteristics of polypropylene (PP) in each pavement was defined as 10%, 15%, 20%, 25%, 30%, 35%, 40%, 45%, and 50%, and that of polyethylene terephthalate (PET) was defined as 10%, 15%, 20%, 25%, 30%, and 35% by weight of the total sample”. **Rewrite**
8. “In the third phase, the effect of combining the two types of plastics as binding materials in a single pavement

production was evaluated, and in this case, the formulations were: 10% PP plus 20% PET, 15% PP plus 15% PET, and 20% PP plus 10% PET, against 70% sand. Meaning of in the third phase?" **Fix language**

9. "30% PP as a binding material produced a 22.1 MPa strength that can withstand a load of 40 KN, and 25% PET produced a compressive strength of 14.1 MPa that can withstand a load of 22.4KN." **Fix language**

Experiments

1. "While polypropylene plastics included leads of water bottles and household utensils such as buckets with the same basic material properties and density of 0.90-0.91 g/cm³ ^[10] as well as a melting temperature of 130°C–175°C and the chemical formula (C₃H₆)_n, Figure 1 presents the different plastic types. **Fix language**
2. **Temperature for drying the aggregates?**
3. **How was the grain size of aggregate determined?**
4. "The plastic contents used in each mixture were 0%, 5%, 10%, 15%, 20%, 25%, and 30% by weight of the plastic-sand mixture." **Were these consistent with the contents listed above? What about 0%? I understand this is the control but is not listed above.**
5. **What is the sample size and thickness for the compressive test? Also, say something about what the 3-point bend test fixture is, including the model number.**
6. "Compressive strength, flexural strength, density, porosity, and water absorption tests were done following the standards EN19601-NFP15:45-DIN1164-PREN/ISO679, EN196/01-ASTMC349-DIW1164-PREN/ISO679, and EN7721-11." **Fix language**
7. "Porosity was measured using the Archimedes principle method, where samples are weighed in the dry state and weighed again after steeping in water for between 3 and 7 days according to the standard EN7721-11." **Fix language**
8. Porosity was measured using the Archimedes principle method, where samples are weighed in the dry state and weighed again after steeping in water for between 3 and 7 days according to the standard EN7721-11 **Fix language**
9. Compressive strength was evaluated on polypropylene (PP) samples with the formulations 1:9, 1.5:8.5, 2:8.5:7.5.5, 3:7, 3.5:6.5, 4:6, 4.5:5.5, 5:5 that lasted between 2 days and 7 days **Fix Language**

Results

1. **PP:sand ratio results for compressive strength and bend strength are not consistent. But the similar results for PP/PPT combination are consistent. Why? Explain.**
2. **Discuss the PTE/Sand compressive strength results.**
3. **Write density, for example, as 1.953 and not 1,953.**
4. "From the results obtained from the physical tests, we notice that the formulation of PET and sand with a ratio of 25% to 75% presents the best. The reason is that a good pavement needs to have fewer pores to prevent water from coming out of the yard, especially when used in swampy areas. This particular formulation also presents interesting mechanical properties." **This is not reasonably discussed.**
5. "When compared to results obtained from existing pavements in Cameroon, we notice that pavements obtained from our formulations gave better values than those of the existing pavements in Cameroon. Figure 12 presents those

results. From this conclusion, we can recommend pavements made using the formulations in this work to pavement producers in Cameroon. **"Why the difference? Discuss.**