Table 1 Mix proportions of polymer concrete

<table>
<thead>
<tr>
<th>Polymer concrete type</th>
<th>Polyester binder (kg/m³)</th>
<th>Filler (kg/m³)</th>
<th>Sand (kg/m³)</th>
<th>Coarse aggregate (kg/m³)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ortho-PC</td>
<td>146</td>
<td>116</td>
<td>711</td>
<td>750</td>
</tr>
<tr>
<td>Iso-PC</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2.3 Specimen Preparation

Orthophthalic and Isophthalic-based polymer concrete (Ortho-PC and Iso-PC) were prepared strictly according to Japanese Industrial Standard, JIS A 1181 [16]. A total of 72 specimens with dimension of 100 mm x 100 mm x 100 mm size were prepared. The specimens were left at room temperature of 30 ± 2°C for an hour and then oven-dried as a form of post-curing to complete the curing process. The specimens were cured at 30°C, 50°C and 70°C and at different curing period - 1, 3, 6, 16 and 24 hours. Temperature of oven was controlled by modern digital thermostat. Compression test was conducted by using a compression machine with capacity of 200 kN and loading rate of 6 kN/s. All specimens were tested according to design of curing temperature and period. The compressive strength was obtained from the average of three specimens for each condition. The region of density characteristic (upper and lower limit region) can be calculated from basic statistic as stated in Equation 1 and Equation 2.

\[
\rho_{\text{upper limit}} = \rho_{\text{avg}} + (1.64 \times SD) \quad (1)
\]
\[
\rho_{\text{lower limit}} = \rho_{\text{avg}} - (1.64 \times SD) \quad (2)
\]

2.4 Morphology

After all specimens were tested, miniature specimens (only Iso-PC with desirable curing temperature) were taken to investigate their morphology properties by using Scanning Electron Microscope (SEM). Fractured miniature specimens were immersed into acetone for 24 hours before it was observed under SEM to completely cease the polymerization process of polymer concrete.

3.0 RESULTS AND DISCUSSION

3.1 Apparent Density

Apparent density is the weight per unit volume of a material including the void inherent in the tested material. This is the compulsory parameter before the specimens are tested to gauge the consistency of concrete production. Figure 2 and Figure 3 show the apparent density of polymer concrete for all 72 specimens produced at different curing temperature and period. The average apparent density was 2250.82 kg/m³ and the standard deviation (SD) was 24.28.

Even though the polymer concrete had different maturity, the apparent density for Ortho-PC and Iso-PC had similar apparent density of 2250 kg/m³. Most specimens had its apparent density fallen within the region of apparent density characteristics (within upper and lower region). Effect of curing temperature and period were insignificant to the apparent density of polymer concrete.

3.2 Compressive Strength

Figure 4 shows the compressive strength of all Ortho-PC and Iso-PC. Results indicated that compressive strength and curing period had non-linear relationship in which the compressive strength had gradually increased with increasing curing period and getting constant at specific curing period. At an initial curing period of one hour, the compressive strength was negligible. However, after being cured for up to 16 hours, the compressive strength progressively reached approximately about 50 MPa for Ortho-PC and 60 MPa for Iso-PC. These outcomes clearly demonstrated that the highest compressive