In this study, poly(methylmethacrylate)/n-hexadecane microcapsules were prepared using emulsion polymerization, and their applicability to textiles was studied. Two types of cross-linker, namely allyl methacrylate and ethyleneglycoldimethacrylate were used to produce unimodal microcapsule particle size distribution. The characterization of the microcapsules, including particle size and size distribution determination, morphology, and thermal properties was carried out. Mean particle size of microcapsules ranges from 0.22 mm to 1.05 mm. The content of n-hexadecane in microcapsules are between 29.04% and 61.42% and the melting enthalpies for these ratios are 68.89 J/g and 145.61 J/g, respectively. Prepared microcapsules using ethyleneglycoldimethacrylate cross-linker were added to woven fabrics by a conventional pad-cure method to develop textile materials with heat storage property. The enthalpies of microencapsulated PCM treated fabrics varied between 3.14 J/g and 10.02 J/g for various fabrics samples.