Thermal comfort using microencapsulated phase change materials (MPCMs) in innovative textile products are widely investigated for its highly added value and processes related to microcapsule application to textiles is rapidly increasing to get the optimum performance. This study focused on the preparation, characterization, and determination of thermal properties of microencapsulated n-hexadecane with poly (methyl methacrylate-co-methacrylic acid) (PMMA-co-MA) to be used in textiles with heat storage property. n-hexadecane core- poly(methylmethacrylate-co- methacrylic acid) (PMMA-co-MA) shell microcapsules were prepared with 1, 5, and 10% MA contend to make the outer surface functional. In this study, ethylene glycol dimethacrylate was used to be cross-linker for produce unimodal microcapsule particle size distribution. Microcapsules were synthesized by emulsion polymerization method, and the particle size, particle size distribution, shape, and thermal storage/release properties of the synthesized microcapsules were analyzed using Fourier-transform infrared spectroscopy (FT-IR), scanning electron microscopy (SEM), particule sizer instrument (PSD), differential scanning calorimetry (DSC), and thermal gravimetric analysis (TGA) techniques. The average melting and freezing temperatures of the microencapsulated n-hexadecane were 16.9 and 15.2 °C respectively as the average of latent heats of melting and crystallization were 90.9 and -92.4 J/g respectively. Besides produced microcapsules are resistant to degradation up to 100 °C.