Thermal Characterizations and Melting Point Depression of Copolymers of Ethylene, Vinyl Acetate, and Carbon Monoxide and their Blends in CO_2 at High Pressures

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The melting and crystallization behavior of a series of copolymers of ethylene, vinyl acetate, and carbon monoxide was investigated in ambient atmosphere and in compressed CO_2. The measurements were made in a high-pressure variable-volume view-cell equipped with photodetectors to monitor the transmitted light intensity through a polymer film sandwiched between two sapphire windows as a function of temperature and pressure. Initial evaluations were done at ambient conditions in air and compared with the results obtained by Differential Scanning Calorimetry. In determinations of the melting and crystallization in CO_2, different experimental procedures are possible. In the isochoric mode, the cell is filled with carbon dioxide to a certain pressure at ambient temperature, and then the cell is heated to target temperature at a controlled rate while recording the transmitted light intensity. Along with the rise in temperature, the system pressure also increases. The P/T conditions where the transmitted light intensity shows variation that can be associated with melting or crystallization is then identified. In the isothermal mode, the system temperature is held constant, but the CO_2 pressure is increased with the aid of movable piston. Carbon dioxide pressures up to 250 bar has been explored. TGA evaluations were carried out to ensure that the polymers were not degraded at the temperatures involved.