

CHAPTER 23

**ECONOMIC, ENVIRONMENTAL, AND SOCIETAL ISSUES IN MATERIALS SCIENCE AND
ENGINEERING**

QUESTION ANSWER

23.D1 The three materials that are used for beverage containers are glass, aluminum, and the polymer poly(ethylene terephthalate) (designated as PET or sometimes PETE). Currently, the most commonly used of these three materials is the PET. Its optical clarity is excellent, it is significantly lighter than glass, PET has high burst and impact strengths and is shatter-proof, it is inexpensive to produce, has high gas permeation resistance, is easily fabricated (by blow-molding), and PET containers are safer (there is no breakage as with glass and no cuts result from pull-tabs as with the Al cans). There are virtually no incineration and landfill problems with PET, although, PET is relatively nondegradable. On the down side, PET containers are nonrefillable, but even so, they require less energy to produce per filled unit volume than either aluminum or glass. Also, they can be recycled.

Glass containers are refillable and recyclable, are very impermeable to the passage of gases and liquids, and are more expensive to produce and fabricate into bottles than is PET. However, glass bottles are nonbiodegradable and can be dangerous when they break.

Aluminum beverage containers are nonrefillable and nonbiodegradable, but recyclable, and are also light in weight. Again, they are more expensive to produce than are PET bottles.