

11.D2 (a) Compositionally, the metallic glass materials are rather complex; several compositions are as follows: $\text{Fe}_{80}\text{B}_{20}$, $\text{Fe}_{72}\text{Cr}_8\text{P}_{13}\text{C}_7$, $\text{Fe}_{67}\text{Co}_{18}\text{B}_{14}\text{Si}$, $\text{Pd}_{77.5}\text{Cu}_{6.0}\text{Si}_{16.5}$, and $\text{Fe}_{40}\text{Ni}_{38}\text{Mo}_4\text{B}_{18}$.

(b) These materials are exceptionally strong and tough, extremely corrosion resistant, and are easily magnetized.

(c) Principal drawbacks for these materials are 1) complicated and exotic fabrication techniques are required; and 2) inasmuch as very rapid cooling rates are required, at least one dimension of the material must be small--i.e., they are normally produced in ribbon form.

(d) Potential uses include transformer cores, magnetic amplifiers, heads for magnetic tape players, reinforcements for pressure vessels and tires, shields for electromagnetic interference, security tapes for library books.

(e) Production techniques include centrifuge melt spinning, planar-flow casting, rapid pressure application, arc melt spinning.