2015, 7

Points 2, 2

(a) Heat the Al: q = n c ΔT = (1.00 mol)(24 J/mol K)(933 - 298 K) = 15240 J = 15.24 kJ

Melt the Al: q = mols (ΔH_{fusion}) = (1.00 mol)(10.7 kJ/mol) = 10.7 kJ

Total energy is the sum of the two processes = 25.9 kJ

(b) Energy required for extraction is 1675 kJ per 2 mols of Al, i.e., (1675/2) = 837 kJ per mole. Recycling uses less energy per mole of Al than extraction.