Reading 1/31

① 1 drop: $PE_1 = MgH \Rightarrow$ N drops $\sum_{i=1}^{N} PE_i = NMgH$

Energy goes to heating up water $\Delta T = 1.00\,K$

$\Rightarrow NMgH = M c_{water} \Delta T$

$\Rightarrow N = \frac{c_{water}\Delta T}{gH} = \frac{(4190)(1.00)}{(9.8)(1)} \approx \boxed{430}$

This is not very efficient!

② (a) $c_{ethyl\ alc} = 2400\ J/kg\,K$ vs. $c_{water} = 4190\ J/kg\,K$

Overall the (iron + copper) transfers energy to the liquid and so the water temp. will increase

$Q = mc\Delta T$ is almost* the same for ethyl alcohol vs water; since $c_{water} > c_{alc}$, $\Delta T_{water} < \Delta T_{alc}$

So $T_{f\,water} \in (20°C, 26°C)$

* assuming T_f is not that different

(b) Take final eq. & replace $(M_e, c_e) \to (M_w, c_w)$

$$T_f = \frac{120 M_i c_i - 50 M_c c_c + 20 M_w c_w}{M_i c_i + M_c c_c + M_w c_w} = \boxed{23.5°C}$$