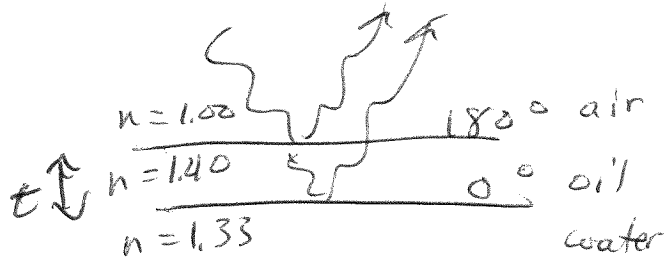
Ch. 3 Prob. 40

$t = 120\,nm$

$n = 1.40$



top reflected wave shifted by ~~180°~~ 180°

Bottom reflected wave shifted by 0°

∴ to get waves into phase the bottom wave needs to travel ½λ to fall an addition 180° behind.

so $\Delta l = \frac{1}{2}\lambda$

As the wave travels into the oil and back out, ~~it~~ it travels a distance of 2t.

The wave travels in oil and will move slower. It effectively makes the distance larger.

∴ $\Delta l = 2tn$

so $2tn = \frac{1}{2}\lambda$

solve for λ gives

$\lambda = 4tn = 4(120\,nm)(1.40) = \boxed{672\,nm}$

This falls in the range of red.