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$C_p = 78e^{-0.46t}$ $C_p = C_p^\circ e^{-kt}$ $\Rightarrow k = 0.46\ h^{-1}$

a. $t_{\frac{1}{2}} = \frac{0.693}{k} = \frac{0.693}{0.46h^{-1}} = 1.51\ h$

b. 4mg ⟶ 1kg
? ⟶ 75 kg $\Rightarrow D_B^\circ$ (Dose) = 300 mg = 300 000 mcg

$V_D = \frac{D_B^\circ}{C_p^\circ} = \frac{300\,000\ mcg}{78\ mcg/mL} = 3846.2\ mL = 3.85\ L$

c. At t = 4h: $C_p = 78e^{-0.46(4)} = 12.4\ mcg/mL$

d. At t = 4h: $V_D = \frac{D_B}{C_p} \Rightarrow D_B = C_p V_D = 12.4\ mcg/mL \times 3846.2\ mL$
$= 47692.88\ mcg$
$= 47.7\ mg$

e. This drug mainly occupies the plasma since $V_D = 3.85\ L$ is approximately equal to plasma volume.

$\frac{3.85\ kg}{75\ kg} \times 100 = 5.13\%$ of body weight

f. $C_p = 78e^{-0.46t}$
$2 = 78e^{-0.46t} \Rightarrow e^{-0.46t} = \frac{2}{78} \Rightarrow -0.46t = \ln\left(\frac{2}{78}\right) \Rightarrow t = 7.96h$

The next dose should be administered after approximately 8 h.