20.1 | Sensitivity $= k_A = 0.4065$ $\quad (S_A = k_A C_A + S_R$ or $y = mx+b)$

↳ slope from lin reg.

20.2 | $\text{LLOD} = \frac{3\sigma_B}{m} \left(\frac{3s_B}{m} \text{ actually}\right) = \frac{3(0.3294)}{0.4065} = 2.431 \text{ mg L}^{-1}$

20.3 | $\text{LLOQ} = \frac{10 s_B}{m} = \frac{10(0.3294)}{0.4065} = 8.103 \text{ mg L}^{-1}$

20.4 | ULOQ = intersection of two lines

$$0.4065x + 4.4365 = 0.07176x + 20.90095$$

$$0.33474x = 16.4645$$

looks OK from plot!

$$x = 49.1858 \text{ mg L}^{-1} = \boxed{49.19 \text{ mg L}^{-1}}$$

21.1 | $\text{Conc} = \frac{S_A - S_{Reag}}{k_A} = \frac{(\text{mean}(122.1, 124.8, 123.8) - 4.4365)}{0.4065}$

$$= \frac{(123.567 - 4.4365)}{0.4065} = \boxed{293.1 \text{ mg L}^{-1}}$$

21.2 |

$$s_{C_A} = \frac{s_r}{b_1} \sqrt{\frac{1}{m} + \frac{1}{n} + \frac{(\bar{S}_{samp} - \bar{S}_{STD})^2}{(b_1)^2 \sum_{i=1}^{n} (C_{STD} - \bar{C}_{STD})^2}} \quad ; \quad CI = t\, s_{C_A}$$

given: $s_r = 0.4855$ $\quad b_1 = 0.4065$ (slope)

$m = 5$ (# STDS)

$n = 3$ (# sample reps) $\quad \sum_{i=1}^{5} (C_{STD} - \bar{C}_{STD})^2 = 555.4$

need: $(\bar{S}_{samp} - \bar{S}_{STD})^2 = \left[\text{mean}(122.1, 124.8, 123.8) - \text{mean}\begin{pmatrix}10.61, 15.58, 20.01\\ 22.69, 24.61\end{pmatrix}\right]^2$

$$1.239\times10^5$$

$$\cancel{= 1.0997\times10^4}$$

$$s_{C_A} = \left(\frac{0.4855}{0.4065}\right) \sqrt{\frac{1}{5} + \frac{1}{3} + \frac{1.0997\times10^4}{(0.4065)^2 (555.4)}} = 43.89 \text{ mg L}^{-1}$$

→ DOF = n − 2 = 5 − 2 = 3

$$CI = t\, s_{C_A} = (3.182)(13.10) = \cancel{41.69}\ 139.7 \text{ mg/L}$$

$\boxed{\text{Answer: } 293.1 \pm 139.7 \text{ mg/L}}$