

Chapter 22

① Three 100 mL extractions is more effective, but takes longer.

③ EDTA is charged (ion) and is therefore very soluble in water (polar solvent). 8-hydroxyquinoline forms a neutral complex that is more soluble in organic solvents

⑦ a. $4.0 = \frac{[S]_{CHCl_3}}{[S]_{aq}} \Rightarrow [S]_{CHCl_3} = 4.0(0.020M) = \boxed{0.080M}$

b. mol of S in $CHCl_3 = \frac{(0.080M)(10.0mL)}{(0.020M)(80.0mL)} = \boxed{0.5}$

⑧ $\left(\frac{80.0mL}{80.0mL + (4.0)(10.0mL)} \right)^6 = \boxed{0.088}$ or 8.8% remaining in the aqueous phase

1 - C

16 2 - D

3 - A

4 - E

5 - B

17 The larger the partition coefficient, the longer amount of time the solute is associated with the stationary phase. This is time that it is not moving through the column, and therefore, it takes longer for elution to occur.

19 a. cross section of column = $\left(\frac{0.461 \text{ cm}}{2}\right)^2 \times \pi = 0.167 \text{ cm}^2$
 cross section occupied by mobile phase = $(0.167)(0.39) = 0.0651 \text{ cm}^2$
 linear velocity = $\frac{1.13 \text{ cm}^3/\text{min}}{0.0651 \text{ cm}^2} = \boxed{17.4 \text{ cm/min}}$

b. volume of mobile phase in column = $0.0651 \text{ cm}^2 \times 10.3 \text{ cm} = 0.671 \text{ cm}^3$
 $\frac{0.671 \text{ cm}^3}{1.13 \text{ cm}^3/\text{min}} = \boxed{0.593 \text{ min}}$

c. $10.0 = \frac{t_r - 0.593}{0.593}$
 $5.93 = t_r - 0.593$
 $t_r = \boxed{6.52 \text{ min}}$

22 a. $k' = \frac{9.0 - 3.0}{3.0} = \boxed{2.0}$

b. $\frac{3.0}{9.0} = \boxed{0.33}$ or 33%

c. $K = k' \left(\frac{V_m}{V_s}\right) = 2 \left(\frac{V_m}{0.10 V_s}\right) = \boxed{20}$