(1) $T = 30^\circ C = 303\,K$

$$\log p_w^* = 29.8605 + \frac{3152.2}{303} - 7.3037 \log(303)$$

$$+ \underbrace{2.4292 \times 10^{-9}(303)}_{\text{TYPICALLY NEGLIGIBLE}} + 1.809 \times 10^{-6}(303)^2$$

$\log p_w^* = 31.6$ mm Hg VAPOR PRESSURE

$$p_w = \frac{hr\, p_w^*}{100} = \frac{(65)(31.6)}{100} = \underline{20.5 \text{ mm Hg}}$$

C

(2) $2\,lbs. \times \frac{0.092\ lbs\ Q}{lbs} \times \frac{453.6\,g}{lb} \times \frac{mol}{82\,g} = 1.018\ mol\ Q\ (n_Q)$

$20' \times 16' \times 9' = 2880\,ft^3 \times \frac{1000L}{35.315\,ft^3} = 81552L$

$PV = nRT$ AIR: $(1\ atm)(81552L) = n(0.08206)(298K)$

$n_{AIR} = 3334.93\ mol$

mole fraction: $y_Q = \frac{n_Q}{n_{AIR} + n_Q} = \frac{1.018}{3334.93 + 1.018}$

$y_Q = 0.00031$

NOTE: I HAVE ASSUMED THAT "TOTAL" MATERIAL IN GAS IS AIR PLUS Q. ONE COULD ALSO ARGUE THAT 1atm & 81552L WAS AFTER Q VOLATILIZED.

C

(3) $$c_i = c_{liq}\frac{p_i}{H_i^*} = c_{liq}\frac{y_i P}{H_i^*}$$

WE DON'T KNOW WHAT P & c_{liq} ARE, BUT THEY ARE THE SAME FOR ALL 3 GASES BEING COMPARED. SO,

$$c_i \propto \frac{y_i}{H_i^*}$$

METHANE $$C_m \propto \frac{0.20}{41300} = 4.84\times10^{-6}$$

OXYGEN $$C_o \propto \frac{0.30}{43800} = 6.85\times10^{-6}$$ ← THE GREATEST VALUE OF THE THREE

NITROGEN $$C_N \propto \frac{0.50}{86500} = 5.78\times10^{-6}$$

NOTE: IF ONE WERE COMPARING THE 3 PURE GASES, METHANE WOULD BE MOST SOLUBLE.

B