PS13 ① $M = \frac{\text{moles}}{\ell}$ $\frac{\frac{g}{mol}}{\ell}$

② $CaCl_2 \rightarrow Ca^{+2} + 2Cl^-$

$CaCl_2$ (x) 454g in 500mL

Ca^{+2} x

$2Cl^-$ 2x

[M?]

$\frac{454\text{g } CaCl_2}{0.5\ell} \left| \frac{1\text{ mole } CaCl_2}{110\text{g } CaCl_2} \right. =$

8.25M x2 → 16.5M

Jan 7-7:21 AM

③ 71% HNO_3, 3.18Kg soln $d_{soln} = \frac{1.42g}{mL}$

2.24ℓ soln [Find M] = $\frac{\text{moles } HNO_3}{\ell \text{ soln}}$ $\frac{35.7\text{ mole}}{2.24\ell} = 15.94M$

.71 (3.18Kg) = 2.25 Kg HNO_3

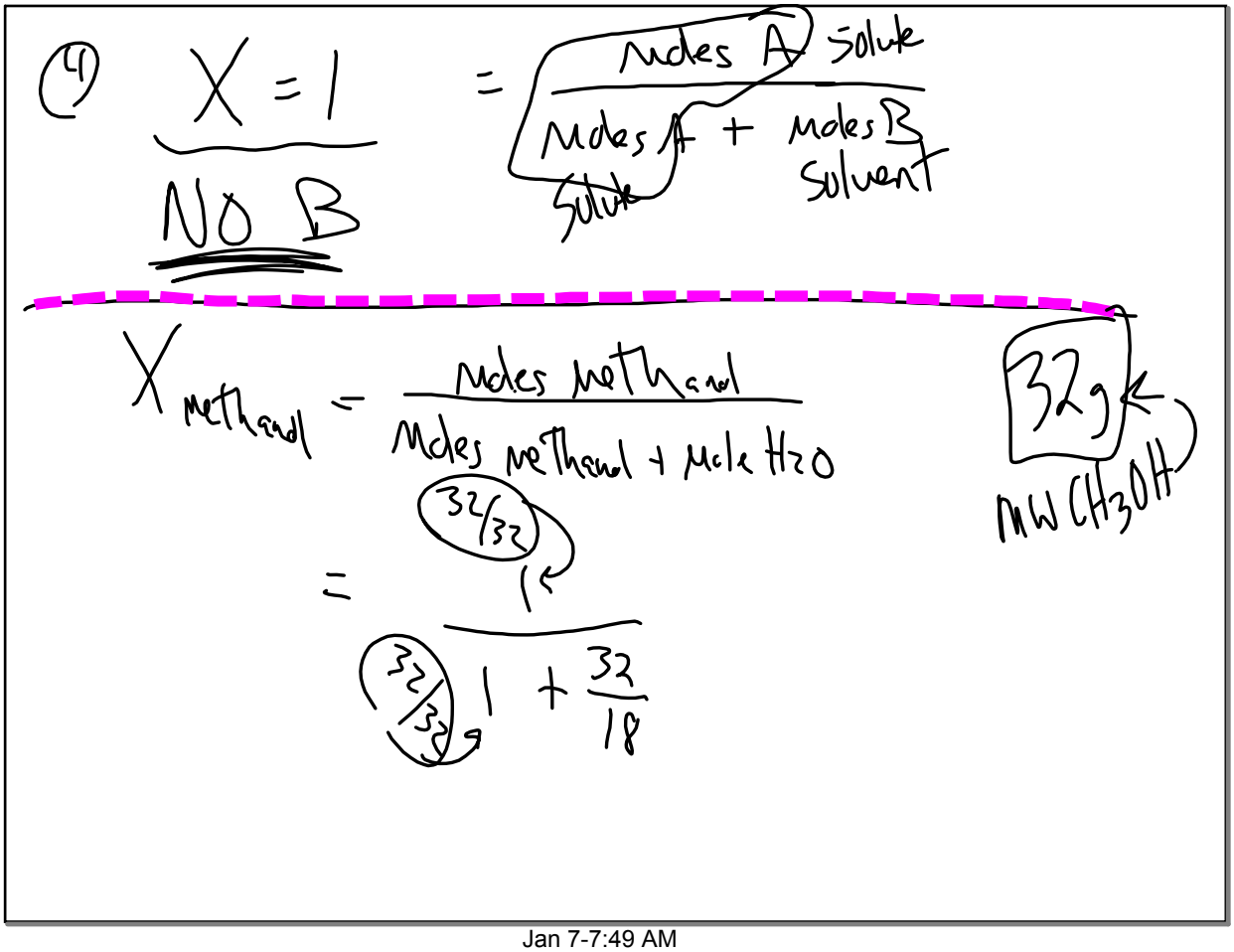
$\frac{2250\text{g } HNO_3}{63\text{g } HNO_3} \left| \frac{1\text{ mole } HNO_3}{63\text{g } HNO_3} \right. = 35.7\text{ mole } HNO_3$

$\frac{1\text{mL}}{1.42\text{g}} \left| \frac{3.18\times10^{3}\text{ g}}{} \right. = 2239\text{mL} = 2.239\ell$ (2.24ℓ)

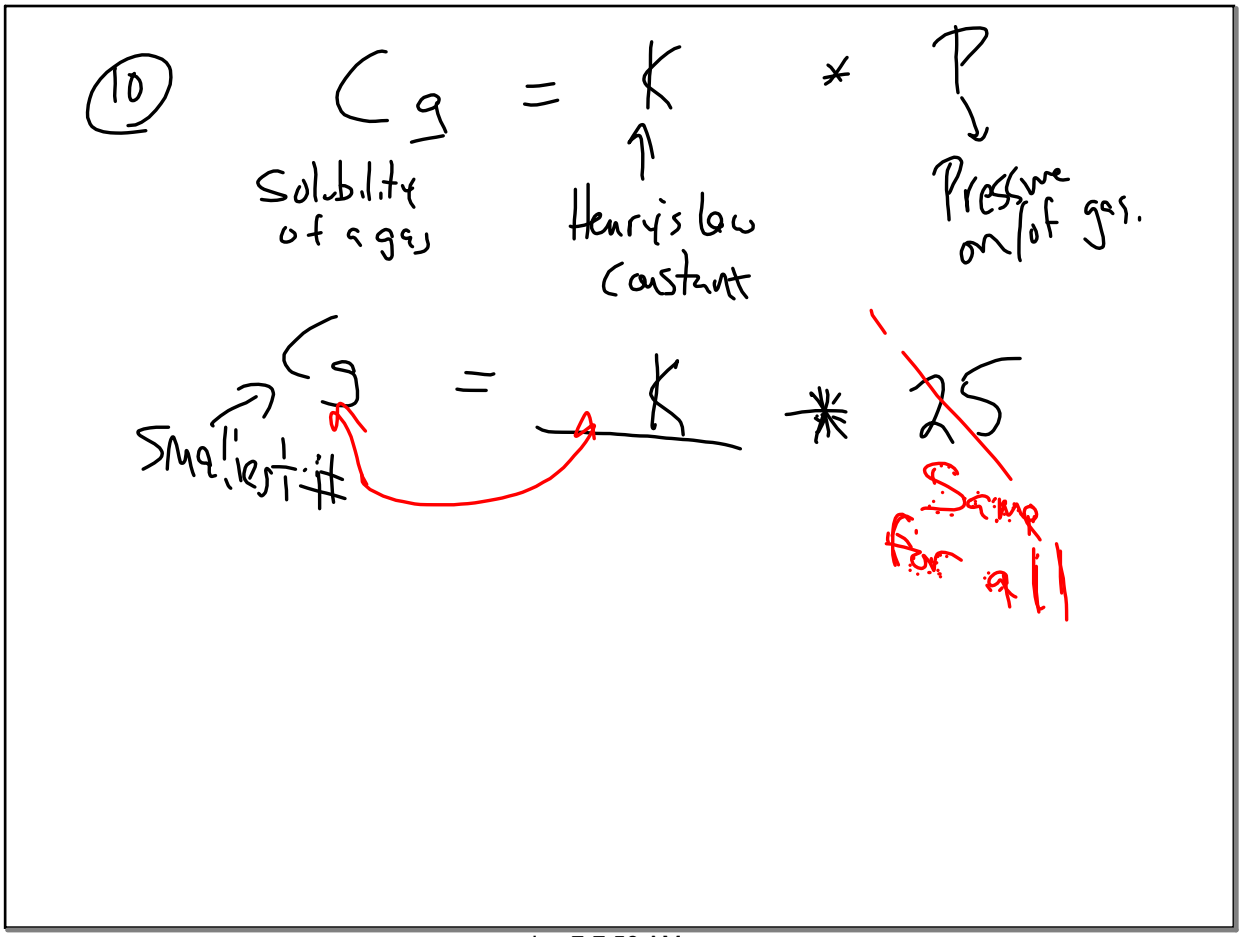
$1\times10^{-3}\ell$ K_3 g

density soln Mass soln

Jan 7-7:41 AM



Jan 7-7:49 AM



Jan 7-7:56 AM

(12) Find VP, 80°C 0.03 moles glucose / 100 g H_2O

$P^\circ_{H_2O\ 80^\circ C} = 355$ torr

$VP_{Soln} = X_{solvent} P^\circ_{pure\ solvent}$

$X = \frac{\text{moles } H_2O}{\text{moles } H_2O + \text{moles glucose}}$

$= \frac{5.56\ (\frac{100}{18})}{5.56 + 0.03}$

$X = 0.9946$

$0.9946\ (355)$

Jan 7-7:59 AM

(13) 1 m glucose $C_6H_{12}O_6$ 180 g/mole

Find BP ↑ of 1 m $Al_2(SO_4)_3$

$2Al^{+3} + 3SO_4^{-2}$ → 5 ions

BP = 100.51 °C, ΔT = 0.51

H_2O = 100 °C

$\Delta T = (K_b * m)\ i$

$0.51 = (K_b * 1)\ 1$

$K_b = 0.51$ (H_2O)

$\Delta T = (K_b * m)\ i$

$\Delta T = (0.51 * 1)\ 5$

$\Delta T = 2.55$

Jan 7-8:09 AM

(14) 125 mg Caff + 100 g cyclohex $\Delta T = 0.13\,K$ ↓

0.125 g

Find MW

$K_f = 20.1$

$\Delta T = (K_f * m)\, i$

$0.13 = (20.1 * m)\, 1$

$m = 0.0065\,m$ Caff

$m = \frac{0.0065 \text{ moles caff}}{\text{Kg cyclohex}}$

$\frac{0.0065 \text{ mole caff}}{1 \text{ Kg cyclohex}} \left| \frac{0.1 \text{ Kg cyclohex}}{} \right| =$

0.00065 mole caff.

$\frac{\text{moles}}{1} = \frac{g}{MW}$

$MW = \frac{g}{\text{mole}} = \frac{0.125\,g}{0.00065 \text{ mole}}$

$MW = 192.3\,g/\text{mole}$

Jan 7-8:17 AM

$\Delta T = (K * m)\, i$

$\frac{\text{Moles solute}}{\text{Kg Solvent}} \rightarrow \frac{\frac{g}{MW}\ \text{solute}}{\text{Kg Solvent}}$

$\Delta T = \left(K * \frac{\frac{\text{moles}}{MW}\ \text{solute}}{\text{Kg solvent}} \right) i$

$0.13 = \left(20.1 * \frac{\frac{0.125}{MW}}{0.1} \right) 1$

Jan 7-8:25 AM

(16) $PV = nRT$ $[\pi = MRT]$

0.25g cyt C, 50ml soln, 1.52 KPa, 25°C 298K.

0.05 l

Find MW (g/mole)

$\frac{1.52\ KPa}{101.35\ KPa} \frac{1\ atm}{} = 0.015\ atm$

$\frac{PV}{1} = \frac{g}{MW} RT$

$\frac{MW}{1} = \frac{gRT}{PV} = \frac{(0.25)(0.08206)(298)}{(0.015)(0.05\ l)} = 815.13\ g/mole$

Jan 7-8:28 AM

(15) Find FP, 3.5m, $K_f = 1.86$

$\Delta T = (K_f * m)i$

$\Delta T = (1.86 * 3.5)1 = 6.51$

Normal FP H_2O $= 0^\circ C - 6.51 = -6.51^\circ C$

Jan 7-8:32 AM

(18) $m = 1.8\,m = \frac{1.8 \text{ moles } CaCl_2}{Kg\ H_2O}$ Find g $CaCl_2$

$$\frac{1.8 \text{ mole } CaCl_2}{1 \text{ Kg } H_2O} \left| \frac{0.1 \text{ Kg}}{(100 g)} \right| \frac{110 g\ CaCl_2}{1 \text{ mole } CaCl_2} = 19.8 g \text{ for } CaCl_2$$

$1\,CaCl_2 \rightarrow 1\,Ca^{+2} + 2\,Cl^-$

$$\frac{19.8}{3} = 6.66 \text{ g/particle}$$

Jan 7-8:36 AM

(20) VP = Benzene Toluene

1.0 = X=0.65 X=0.35

$P^\circ = 94.6$ torr $P^\circ = 29.1$ torr

$VP = X_{solvent} P^\circ$

$= 0.65(94.6)$ $VP = 0.35(29.1)$

$= 61.5$ torr $+ 10.2$

$=$ 71.7 torr

Jan 7-8:40 AM

(21) $X_{H_2O} = ?$

6M glucose soln.

$$\frac{\text{Mole } H_2O}{\text{Mole } H_2O + \text{Mole sucr}}$$

$$\frac{55.6}{55.6 + 6}$$

$$\frac{6 \text{ Moles glucose}}{\text{Kg } H_2O}$$

$$\frac{1\text{Kg}}{1000\text{g } H_2O} \left| \frac{\text{mole } H_2O}{18\text{g } H_2O} \right. = 55.6 \text{ moles } H_2O$$

Jan 7-8:43 AM

p446 Flow chart

T P diagram

HW Exam 4 Fall 2017

Jan 7-8:46 AM