

✓ c1) +10 points (poll)

✓ c2) +10 points (poll)

✓ c3) $K_{sp} = 1.7 \times 10^{-5}$ $PbCl_2$ Have a solution in which $[Pb^{2+}] = 10^{-2} M$ and $[Cl^-] = 10^{-2} M$

$$Q_{sp} = [Pb^{2+}] [Cl^-]^2$$

$$Q_{sp} = [10^{-2}] [10^{-2}]^2 = 10^{-6}$$

$$Q_{sp} < K_{sp}$$

I. 1) Bottle at $0^\circ C$ did not freeze when opened
 Bottle at $-5^\circ C$ did freeze when opened

$$2) a) P_{CO_2} = \frac{C_{CO_2}}{K} \quad K_H = 0.117 M \text{ atm}^{-1} \quad K_f = 1.86^\circ C m^{-1}$$

c4) +10 points (poll)

The molar conc of CO_2 gas under 2
 atm CO_2 pressure is

$$- \boxed{.234 M} \quad C = .234 M$$

c) Freezing point depression

molarity \rightarrow molality

$$\frac{.234 \text{ Mol}}{\text{liter soln}} \Bigg| \frac{1 \text{ liter}}{1 \text{ kg solution}} = \frac{.234 \text{ mol}}{K}$$

$$\text{mass } CO_2 = 10.296 \text{ g } CO_2$$

$$1000 - 10.296 = 989$$

c) +10 points (poll)

New freezing point of club soda?

$$\Delta T = i K_f m$$

$$\boxed{-.44}$$

$$i = 1$$

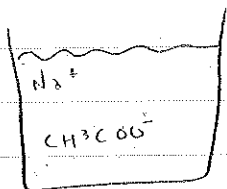
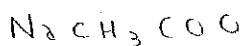
$$m = .24$$

$$K_f = 1.86$$

$$\frac{.234}{.989} = .24$$

$$.234$$

$$\Delta H_{\text{solution}} = \Delta H_{\text{lattice}} + \Delta H_{\text{solution}}$$



"feels cold"

$$\Delta S \quad +$$

$$\Delta G \quad -$$

$$\Delta H \quad +$$

(6) +10 points (part)

The signs for ΔG , ΔS and ΔH for this solution are

$- , + , +$

ΔG - b/c dissolved spontaneously
entropy \uparrow b/c it was all dispersed
enthalpy \uparrow b/c lattice energy $>$ solution b/c
endothermic

(7) +10 points (part)

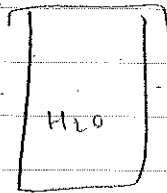
In the 2.0 molar sodium acetate solution,
value of Q is

-400 and $Q > K_{sp}$ so it will
precipitate

-when it crystallizes it warms up \therefore exothermic

III.

VP = 25 Torr



VP = ?



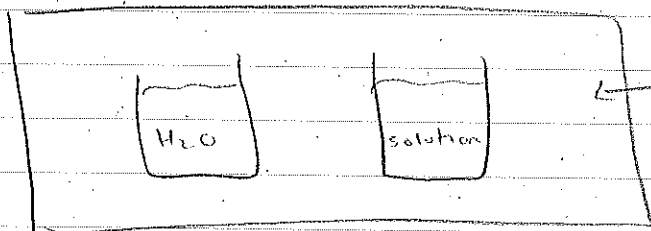
(2)

$$P_{\text{solution}} = X_{\text{solvent}} P^{\circ}_{\text{solvent}}$$

lower free energy = solution

lower vapor pressure = solution

(3)



← sealed container
initial no vt in container

what will happen?

- pure water evaporate faster
b/c higher VP

+10 points (poll)

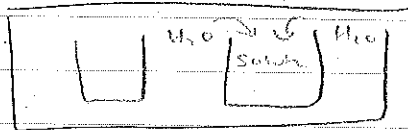
c8) Vapor pressure of 3M solution is

24.86 torr

- Vapor pressure lowering

$$\Delta VP = X_{\text{solute}} P^{\circ} \quad \text{or} \quad VP_{\text{solution}} = X_{\text{solvent}} P^{\circ}$$

- water will move to lower free energy



$PbCO_3$

how much lead dissolves out of battery?

- add common ion

- convert concn to molarity

15 mg Pb^{2+} = ? molar

1L

$$K_{sp} = 7.4 \times 10^{-13} \Rightarrow [Pb^{2+}] [CO_3^{2-}]$$