① Quiz Two Practice Key Chem III Dr. Mahler

1) a) Conc. of O_2 in ppm? $d = \frac{1g}{mL}$ so 1 L of solution $= 1000 g = 10^6$ mg $= 10^9 \mu g = 10^{12}$ ng.

4 mg/L O_2 is 4 ppm (4 mg O_2 per 10^6 mg H_2O).

b) Henry's Law $S = kP$, so $P = \frac{S}{k}$

$$P = \frac{(4 \text{ mg}/4)}{(1.3 \times 10^{-3} \frac{mol}{4})(\frac{1}{atm})(\frac{3200 g}{mol})(\frac{1000 \text{ mg}}{g})} = 0.0961_5 \text{ atm}$$

$$= \boxed{0.096_6 \text{ atm}}$$

2) Raoult's Law $P_{solv} = X_{solv} P^{\circ}_{solv}$ Table 11.2, p 462
                        (solution) (pure)
has P_{H_2O} at 20°C $= 17.5$ torr.   Need X_{H_2O}

moles $MgF_2 = (8 \text{ mg})(\frac{1 g}{1000 \text{ mg}})(\frac{1 \text{ mol}}{62.30 g}) = 1.284 \times 10^{-4}$ mol MgF_2

moles $H_2O = (100 g)(\frac{1 \text{ mol}}{18.02 g}) = 5.4938$ mol

$$X_{H_2O} = \frac{5.4938 \text{ mol}}{(5.4938 \text{ mol} + 1.284 \times 10^{-4} \text{ mol})} = 0.9999 7686 \; (!)$$

$$P_{H_2O} = X_{H_2O} P^{\circ}_{H_2O} = (0.99997686)(17.5 \text{ torr}) = \boxed{17.5 \text{ torr}}$$

no change to sig fig limit.

3) Look up water: $k_f = 1.86 \frac{°C}{m}$, $k_b \; 0.512 \frac{°C}{m}$

FP↓ $\Delta T_f = (m)(k_f)(i)$ $C_{11}H_{22}O_{11}$ $i = 1$, NaCl $i = 2$

FP↓ $\Delta T_f = -(0.10 \text{ m})(1.86 \frac{°C}{m})(1) = \boxed{-0.186 °C}$ (change in f.p.)

(note new f.p. is 0.00°C + (−0.186°C) = −0.186°C)

For salt, NaCl $\Delta T_f = -0.818_4 °C = \boxed{-0.82 °C}$ (change in fp)

(Again new fp is old fp plus change = −0.82°C)