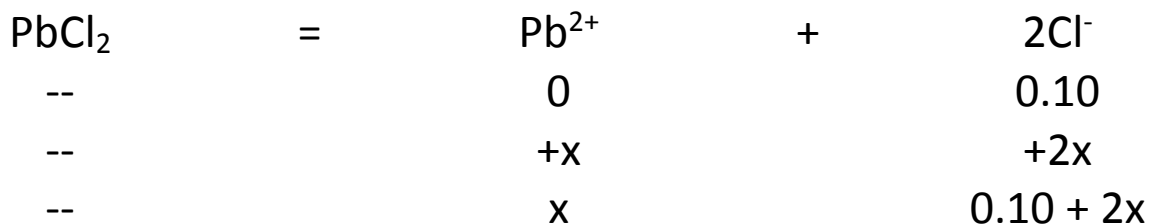


Solution of a Cubic Equation by Successive Approximation.

What is the solubility of PbCl_2 in 0.10 M NaCl?



$$(0.10 + 2x)^2 x = 1.7e-5$$

Assume that $2x = 0$,

We have $x = 1.7e-3$

Plug back into original eqn.

$$[0.10 + 2(1.7e-3)]^2 1.7e-3 = 1.8e-5 \neq 1.7e-5$$

Won't really consider this possibility in Chem 253 but consider:

***So back to the cubic equation.

To simplify consider that solve for x:

$$x = 1.7e-5 / (0.10 + 2x)^2$$

now let $2x = 0$

$$x_1 = 1.7e-5 / (0.10 + 2(0))^2 = 1.7e-3$$

plug x_1 back into $2x$

1st iteration

$$x_2 = 1.7e-5 / (0.10 + 2(1.7e-3))^2 = 1.59e-3$$

2nd iteration

$$x_3 = 1.7e-5 / (0.10 + 2(1.59e-3))^2 = 1.60e-3$$

3rd iteration

so we can get x from the cubic eqn from Newton's "Method of Successive Approximation"

$2x = 0$ fails as $K_{sp} > 1e-6$ semi-soluble salts