$Ni(NO_3)_2$ 1.5×10^{-6} M

Add solid Na_2CO_3, How much can we add before ppt forms? and what is the precipitate going to be?

For $NiCO_3$, $K_{SP} = 1.4 \times 10^{-7}$

$NiCO_3(s) \rightleftharpoons Ni^{2+}(aq) + CO_3^{2-}(aq)$ so $[CO_3^{2-}] = 9.3 \times 10^{-2}$ M at $Q = K_{SP}$

$K_{SP}: [Ni^{2+}][CO_3^{2-}] = (1.5 \times 10^{-6})[CO_3^{2-}]$

April 5, 2019 : Thermodynamics, pt 1 Chp. 19

Thermodynamics: capacity to produce heat (thermo) or do work (dynamic)
- Allows prediction of whether a reaction is spontaneous based on the relative energies of reactants and products

Spontaneous ~~reaction~~ processes: proceed without any outside assistance
- Processes spontaneous in 1 direction are nonspontaneous in reverse direction
- A spontaneous chemical reaction is product-favored

1st law of thermodynamics: energy ~~de~~ created nor destroyed
- CAN be transformed or transferred, net gain/loss of energy by system

$\Delta E = q + w$, ΔE: internal energy change
q: heat transfer (+ system gains/loses heat)
w: work (~~net gain/loss of energy by system~~) (work done on / work done by system)

Enthalpy (ΔH): heat lost or absorbed by a system during a constant-pressure process
↳ plays a role in spontaneity of process

some endothermic processes are spontaneous
Ex. $NH_4NO_3(s) + 26\ kJ \rightarrow NH_4NO_3(aq)$

Entropy: plays a role in whether a process is spontaneous or not
- $\Delta S_{universe} > 0$: entropy of universe increases in spontaneous pro
  - measure of the multiplicity associated with state of objects
- $S = k \ln W$ connection between # of microstates + entropy (W: # of microstates)
  - measure of how many microstates are associated w/ a particular macroscopic state

$S = k \log W = k \log(1) = 0$