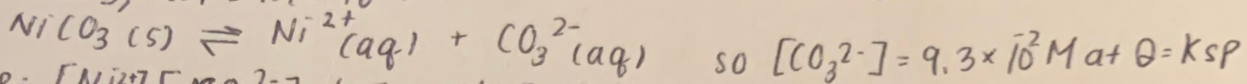


$\text{Ni}(\text{NO}_3)_2$ $1.5 \times 10^{-6} \text{ M}$

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

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



$$K_{sp} = [\text{Ni}^{2+}][\text{CO}_3^{2-}] = (1.5 \times 10^{-6})[\text{CO}_3^{2-}]$$

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 ~~is~~ 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)

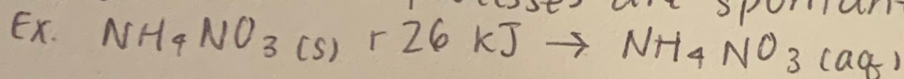
w : work (net gain/loss of energy by system)

Enthalpy (ΔH): heat lost or absorbed by a system during a constant-pressure process

(work done on / work done by system)

→ plays a role in spontaneity of process

some endothermic processes are spontaneous



Entropy: plays a role in whether a process is spontaneous or not

($\Delta S_{\text{universe}} > 0$: entropy of universe increases in spontaneous process)

→ measure of the multiplicity associated with state of objects

w : # of microstates

($S = k \ln W$ connection between # of microstates + entropy)

→ measure of how many microstates are associated w/ a particular macroscopic state

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