15.14 (a) $[Na^+] = \frac{7.1\ g\ Na_2CO_3}{0.100\ L} \times \frac{1\ mol\ Na_2CO_3}{106\ g\ Na_2CO_3} \times \frac{2\ mol\ Na^+}{1\ mol\ Na_2CO_3} = 1.3\ M\ Na^+$

$[CO_3^{2-}] = \frac{7.1\ g\ Na_2CO_3}{0.1\ L} \times \frac{1\ mol\ Na_2CO_3}{106\ g\ Na_2CO_3} \times \frac{1\ mol\ CO_3^{2-}}{1\ mol\ Na_2CO_3} = 0.67\ M\ CO_3^{-2}$

(b) $K_{sp} = [Na^+]^2[CO_3^{2-}] = (1.34)^2(0.67) = 1.2$

15.16 (a) heat must be a reactant if the equilibrium constant increases with increasing temperature so the reaction is endothermic.

(b) change in entropy is positive - if it's not exothermic, then entropy increasing must be the driving force

15.24 Set up the equilibrium chart:

	$AgCl \rightleftharpoons$	Ag^+	$+ Cl^-$
st		0.1	0
ch		$+x$	$+x$
eq		$0.1+x$	x

$K_{sp} = [Ag^+][Cl^-] = 1.8\times10^{-18}$

$= (0.1+x)(x) \approx 0.1x$

$x \approx 1.8\times10^{-9}\ M = [Cl^-]$

$[Ag^+] = 0.1\ M$

Compare this to AgCl solution alone:

$K_{sp} = [Ag^+][Cl^-] = 1.8\times10^{-18} = x^2$

$x = [Ag^+] = [Cl^-] = 1.3\times10^{-5}\ M$

15.25 start w/ unmixed solutions of NaCl + Na_2CrO_4

$[Cl^-] = \frac{0.100\ M\ Cl^- \times 0.050\ L}{0.100\ L} = 5.00\times10^{-2}\ M$

$[CrO_4^{2-}] = \frac{0.05\ M\ Na_2CrO_4 \times 0.050\ L}{0.100\ L} = 2.5\times10^{-2}\ M$

(a) which solid precips first?

$K_{sp}(AgCl) = [Ag^+][Cl^-]$ $[Ag^+] = \frac{K_{sp}}{[Cl^-]} = \frac{1.8\times10^{-10}}{5.00\times10^{-2}} = 3.6\times10^{-9}\ M$

$K_{sp}(Ag_2CrO_4) = [Ag^+]^2[CrO_4^{2-}] = 1.1\times10^{-12}$ so $[Ag^+]^2 = \frac{K_{sp}}{[CrO_4^{2-}]}$

$= \sqrt{\frac{K_{sp}}{[CrO_4^{2-}]}} = \sqrt{\frac{1.1\times10^{-12}}{2.5\times10^{-2}}}$

$= 6.6\times10^{-6}\ M$

AgCl precips 1st even though K_{sp} is larger.