Write the chart that will help determine equilibrium [ ]s for the reaction $H_2(g) + I_2(g) \rightleftharpoons 2HI(g)$, given an initial [HI] of 7.5 mol/L.	<table><tr><td></td><td>$H_2(g)$</td><td>$I_2(g)$</td><td>HI(g)</td></tr><tr><td>Mole ratio</td><td>1</td><td>1</td><td>2</td></tr><tr><td>[Initial] (M)</td><td>0</td><td>0</td><td>7.5</td></tr><tr><td>[Change] (M)</td><td>+ x</td><td>+ x</td><td>- 2x</td></tr><tr><td>[Equilibrium] (M)</td><td>x</td><td>x</td><td>7.5 - 2x</td></tr></table>
What simplification is often helpful when solving Kc problems?	When Kc is very small we can often assume that changes in concentrations are negligible.
In the equation x(1-x), if x is very small, can we assume that x is negligible? Give the general rule.	Only the x in the brackets is considered negligible. General Rule: A small x can be ignored when adding or subtracting. A small x cannot be ignored when multiplying or dividing.
Demonstrate that a small x can be ignored in addition and subtraction but not in multiplication or division. Use x(0.3+2x) as an example.	Let's use x = 0.00001 as an example of a value for x that is small relative to 0.3. Solving for what's inside the brackets we get 0.3 + 2x = 0.30002 (which is very close to 0.3). However, x(0.3) = 0.00003 (which is very different than 0.3).

You should be able to solve problems similar to examples 14.7 - 14.10

11.3

Distinguish between molecular, ionic and net ionic equations.	Molecular: the typical way to write a reaction with compounds and their states. Ionic: similar to a molecular equation except that aqueous compounds are written as ions. Net ionic: similar to ionic except that unreacted chemicals are removed from the equation.
What conditions must be met in all types of chemical equations?	Materials balance (equal numbers of all atoms on left and right), Electrical balance (equal numbers of charges on left and right).
Write ionic and net ionic equations for $Cd(NO_3)_2(aq) + Na_2S(aq) \rightarrow CdS(s) + 2NaNO_3(aq)$	Ionic: $Cd^{2+}(aq) + 2NO_3^-(aq) + 2Na^+(aq) + S^{2-}(aq) \rightarrow CdS(s) + 2Na^+(aq) + 2NO_3^-(aq)$ Net ionic: $Cd^{2+}(aq) + S^{2-}(aq) \rightarrow CdS(s)$
How can the charge on an ion be determined?	The charge is equal to the valence of the ion. For ions that consist of one atom, the position on the periodic table is often instructive (e.g. Na is in group IA; it loses one electron to become 1+). Valences of polyatomic ions can be referenced on pg. 71. Also, if you know the charge on one ion you can figure out the charge on the other. For example, since $Na_2S(aq)$ is neutral and Na_2 becomes $2Na^+$, S must have a 2- charge.

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Write the balanced equation for the production of ammonia gas. Indicate if it is endo- or exothermic.	$N_2(g) + 3H_2(g) \rightleftharpoons 2NH_3(g)$ + heat Or $N_2(g) + 3H_2(g) \rightleftharpoons 2NH_3(g)$ $\Delta H° = -90$ kJ
Name the process used today to manufacture ammonia?	The Haber process or the Haber-Bosch process.
Under what conditions of temperature and pressure is this process carried out? Why?	High pressure (200 atm) and moderate temperature (400°C). High pressure shifts the equilibrium to the right. A high temperature actually favors the shift away from NH_3 formation. However a high temperature is needed to increase the reaction rate.
What other factors ensure a high yield of ammonia?	The presence of catalysts and the removal of NH_3 via condensation. (Removing NH_3 continuously shifts the equilibrium to the right, favoring the production of ammonia).
What principle does the Haber process demonstrate?	Le Chatelier's principle.