CLAIMS

1. A process for separating light gas(es) from bromine or chlorine, comprising:

(a) providing a feed of a halogen ~~containing~~ and one or more light gas(es) to a distillation column or flash vaporizer;

(b) operating the distillation column or flash vaporizer to separate the feed into (i) a first liquid containing ~~a major amount of~~ more halogen ~~and no more~~ than ~~a minor amount of~~ light gas(es), and (ii) a first vapor containing ~~a major amount of~~ more light gas(es) ~~and no more~~ than ~~a minor amount of~~ halogen; and

(c) providing the first vapor to a chemical scrubber to recover halogen from the first vapor.

2. A process as recited in claim 1, further comprising providing the first liquid to a distillation column or flash vaporizer to separate the first liquid into (i) a second liquid containing ~~a major amount of~~ more halogen ~~and no more~~ than ~~a minor amount of~~ light gas(es), and (ii) a second vapor containing ~~a major amount of~~ more light gas(es) ~~and no more~~ than ~~a minor amount of~~ halogen; and

(c) providing the second vapor to a chemical scrubber to recover the halogen from the second vapor.

3. A process as recited in claim 1, wherein the halogen is bromine.

4. A process as recited in claim 1, wherein the halogen is chlorine.

5. A process as recited in claim 1, wherein the light gas(es) comprise nitrogen.

6. A process as recited in claim 1, wherein the light gas(es) comprise nitrogen and one or more of additional gases selected from the group consisting of carbon dioxide and a C_1 - C_4 hydrocarbons.

7. A process as recited in claim 1, wherein the chemical scrubber comprises a bed of a supported or unsupported ~~chemical~~ halogen scavenger.

8. A process as recited in claim ~~1~~7, wherein the halogen scavenger comprises a material selected from the group consisting of CuBr, CuCl, $FeBr_2$, $FeCl_2$, AuCl, AuBr, InBr, InCl, FeO, Cu_2O, Hg_2Br_2, Cu, Ag, Au, Hg, Pt, Pd, Ru, Rh, Fe, Os, Ir and mixtures thereof.

9. A process as recited in claim ~~1~~7, wherein the halogen scavenger comprises CuBr.

10. A process as recited in claim ~~1~~7, wherein the halogen scavenger is supported on a material selected from the group consisting of metal oxides, metal carbides, metal nitrides, carbon, clay, and mixtures thereof.

11. A process as recited in claim ~~1~~7, wherein the halogen scavenger is supported on a material selected from the group consisting of Al_2O_3, SiO_2, ZrO_2, TiO_2, WO_3, CaO, MgO, Cr_2O, SiC, Mo_4C, TiN, W_2N, carbon, zeolite, vermiculite, and mixtures thereof.

12. A process as recited in claim 1, further comprising heating the chemical scrubber-to release halogen therefrom.

13. A process as recited in claim 1, wherein the chemical scrubber is a solid and sorbs the halogen through a chemical reaction with the halogen.