

What is claimed is:

1. A system for recovering olefins from a vent stream comprising:
an absorber; and
a stripper; where the absorber and the stripper are in a recycle loop; and where the absorber is operative to treat a vent stream with a solvent to remove more than 99 wt% of a halogenated by-product contained in the vent stream and to recover 90 to 95 wt% of olefin molecules present in the vent stream; and where the stripper is operative to remove more than 99 wt% of the halogenated by-products present in the solvent; and where the solvent is recycled to the absorber.
2. The system of Claim 1, further comprising a heat exchanger that lies downstream of the absorber and upstream of the stripper; where the heat exchanger is operative to transfer heat from a halogen concentrated stream discharged from the absorber to a solvent rich stream discharged from the stripper.
3. The system of Claim 1, where the absorber functions at a lower pressure than a pressure in the vent stream.
4. The system of Claim 1, further comprising a condenser and a reboiler, where the condenser and the reboiler are located downstream of the stripper and are operative to discharge a liquid stream and a gaseous stream respectively to an incinerator; where the liquid stream and the gaseous stream together contain a substantial portion of the halogenated by-products present in the vent stream.
5. The system of Claim 1, where the system is operative to convert the vent stream comprising 90 to 95 wt% of olefin molecules, 5 to 7 wt% of alkanes and 1.0×10^{-2} to 2×10^{-2} wt% of the halogenated by-product, based on the total weight of the vent stream, to produce an olefin rich stream 214 that comprises 90 to 95 wt% of olefin molecules, 5 to 7 wt% of alkanes and 1.0×10^{-4} to 2×10^{-4} wt% of the halogenated by-product, based on a total weight of the olefin rich stream.
6. The system of Claim 1, where the olefin molecule comprises ethylene and where the halogenated by-product is pentafluoro-benzene.

7. The system of Claim 1, where the solvent comprises toluene, diesel, isoparaffinic solvents or a combination thereof.
8. A method comprising:
- charging a vent stream that comprises 90 to 95 wt% of olefin molecules, 5 to 7 wt% of alkanes and 1.0×10^{-2} to 2×10^{-2} wt% of a halogenated by-product, based on the total weight of the vent stream to an absorber;
 - discharging from the absorber an olefin rich stream that comprises 90 to 95 wt% of olefin molecules, 5 to 7 wt% of alkanes and 1.0×10^{-4} to 2×10^{-4} wt% of the halogenated by-product, based on a total weight of the olefin rich stream;
 - charging a stripper with a halogen concentrated stream received from the absorber;
 - discharging from the stripper a solvent rich stream that is recycled to the absorber;
 - and
 - discharging from the stripper to an incinerator a waste stream that contains a substantial portion of the halogenated by-products present in the vent stream.
9. The method of Claim 8, further comprising transferring heat from the halogen concentrated stream to the solvent rich stream.
10. A composition comprising:
- an olefin rich stream that comprises:
 - 90 to 95 wt% of olefin molecules;
 - 5 to 7 wt% of alkanes; and
 - 1.0×10^{-4} to 2×10^{-4} wt% of the halogenated by-product, based on a total weight of the olefin rich stream.
11. The composition of Claim 10, where the olefin molecules comprise ethylene and where the halogenated by-product is pentafluoro-benzene.