

CLAIMS

1. A gas displacement assembly, comprising:  
a storage container;  
a pump that pumps a pressurized gas material into the storage container;  
a cooling chamber that houses a coolant and cools the gas material to a cryogenic temperature; and  
a coolant line that transports coolant through the cooling chamber.
2. The gas displacement assembly of claim 1, further comprising a gas line that transports the gas material through the pump and to the storage container.
3. The gas displacement assembly of claim 2, further comprising a reservoir located along the gas line that houses a supply of the gas material before the gas material reaches the pump.
4. The gas displacement assembly of claim 1, wherein the cooling chamber comprises a bath of the coolant and a coil that transports the gas material through the bath to cool the gas material to the cryogenic temperature.
5. The gas displacement assembly of claim 1, wherein the gas material is helium.
6. The gas displacement assembly of claim 1, wherein the gas material is argon.
7. The gas displacement assembly of claim 1, wherein the cooling chamber cools the gas material to a cryogenic temperature at which the gas material liquefies.

8. The gas displacement assembly of claim 1, wherein the cooling chamber cools the gas material to a cryogenic temperature before the gas material reaches the pump.

9. The gas displacement assembly of claim 1, further comprising a motor that drives the pump.

10. The gas displacement assembly of claim 9, wherein the motor is an electric motor.

11. The gas displacement assembly of claim 1, further comprising a cooling tower, wherein the pump transmits the gas material through the cooling tower before the gas material reaches the storage container to further cool the gas material.

12. A gas displacement pump assembly, comprising:  
a storage container;  
a pump that pumps a gas material into the storage container;  
a vessel housing a supply of coolant;  
a cooling chamber;  
a coolant line that transfers coolant from the vessel to the cooling chamber;  
a gas source; and  
a gas line that transmits a gas material from the gas source through the cooling chamber and to the pump;  
wherein the cooling chamber cools the gas material to a cryogenic temperature before the gas material reaches the pump.

13. The gas displacement pump assembly of claim 12, further comprising a cooling tower, wherein the pump transmits the gas material through the cooling tower before the gas material reaches the storage container.

14. The gas displacement pump assembly of claim 13, wherein the coolant line further transfers coolant to the cooling tower, after the coolant reaches the cooling chamber.

15. The gas displacement pump assembly of claim 12, further comprising a reservoir that houses a supply of the gas material before the gas material reaches the pump.

16. The gas displacement pump assembly of claim 12, wherein the coolant line further transfers the coolant back to the vessel, after the coolant reaches the cooling chamber.

17. A method of transferring a gas material into a storage container, comprising:  
providing the gas material;  
providing the storage container;  
providing a gas displacement pump assembly having a cooling chamber, a pump, a vessel housing a supply of coolant, and a coolant line, and a gas line;  
transmitting coolant from the vessel, and through the coolant line to the cooling chamber;  
transmitting the gas material through the gas line into the cooling chamber;  
cooling the gas material to a cryogenic temperature in the cooling chamber to generate a cooled gas material;  
transmitting the cooled gas material from the cooling chamber to the pump; and  
pumping the cooled gas material into the storage container.

18. The method of claim 17, wherein the cooling chamber comprises a bath of the coolant and a coil, the method further comprising transmitting the gas material through the coil to cool the gas material.

19. The method of claim 17, wherein the pump assembly further comprises a cooling tower, the method further comprising transmitting the gas material

through the cooling tower after pumping the cooled gas material and before the cooled gas material enters the storage container.

20. The method of claim 19, further comprising transmitting vaporized coolant from the cooling chamber to the cooling tower.