

UNITED STATES PATENT OFFICE

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STORING ACETYLENE

No Drawing. Application filed September 29, 1930, Serial No. 485,338, and in Great Britain November 28, 1929.

This invention relates to the storing of acetylene under pressure in cylinders or receptacles filled with solid absorbent material impregnated with an acetylene solvent. Hitherto the solvent used for this purpose has been acetone, but the use of this substance is associated with certain disadvantages arising from its ready volatility. It has also been proposed to employ a solution of benzophenone in solvents such as amyl alcohol, acetic acid, acetone, methyl alcohol and ethyl alcohol.

According to the present invention acetylene is stored under pressure in cylinders or receptacles containing a suitable absorbent, such as kieselguhr, kapok, or the like, impregnated with a solvent for acetylene which is a relatively non-volatile ether, ester, or mixed ether-ester, of a polyhydric alcohol, or mixture of two or more of such substances, together if desired with other relatively non-volatile solvents for acetylene. It is to be understood that the terms ether, ester, and mixed ether-ester include partly etherified or esterified polyhydric alcohols.

The boiling points of the solvents used may range from 150° C. upwards, but in some cases solvents of lower boiling-point may be used. Typical solvents suitable for use according to the invention are the following:

(1) Ethers

35	Glycol di-ethyl ether (boiling point 190° C.)	CH ₂ .O.C ₂ H ₅ CH ₂ .O.C ₂ H ₅ CH ₂ .O.C ₂ H ₅
40	Glycerol tri-ethyl ether (boiling point 186° C.)	CH.O.C ₂ H ₅ CH ₂ .O.C ₂ H ₅

(2) Esters

45	Glycol di-acetate (boiling point 185° C.)	CH ₂ .O.CO.CH ₃ CH ₂ .O.CO.CH ₃ CH ₂ .O.CO.CH ₃
50	Glycerol tri-acetate (tri-acetin) (boiling point 259° C.)	CH.O.CO.CH ₃ CH ₂ .O.CO.CH ₃

(3) Ether-esters

	β -ethoxyethyl acetate (boiling point 153° C.)	CH ₂ .O.C ₂ H ₅ CH ₂ .O.CO.CH ₃ 55 CH ₂ .O.C ₂ H ₅
	$\beta\gamma$ -diethoxy-n-propyl acetate (boiling point 210° C.)	CH.O.C ₂ H ₅ CH ₂ .O.CO.CH ₃ 60

(4) Partly esterified polyhydric alcohols

	Glycol mono-acetate (boiling point 182° C.)	CH ₂ OH CH ₂ .O.CO.CH ₃ 65 CH ₂ .O.CO.CH ₃
	Glycerol di-acetate (di-acetin) (boiling point 260° C.)	CH.O.CO.CH ₃ CH ₂ OH. 70

(5) Partly etherified polyhydric alcohols

	Glycol mono-ethyl ether (boiling point 134° C.)	CH ₂ .O.C ₂ H ₅ CH ₂ .OH. 75 CH ₂ .O.C ₂ H ₅
	Glycerol di-ethyl ether (boiling point 190° C.)	CH.O.C ₂ H ₅ CH ₂ .O.H. 80

The solvents of which those enumerated above are typical are characterized by their low vapor pressure at the ordinary temperature. Thus β -ethoxyethyl acetate has a vapor pressure at 20° C. of 7.0 mm. of mercury, and glycerol di-ethyl ether a vapor pressure of 3.5 mm. at the same temperature. Glycerol di-acetate has a vapor pressure of about 3 mm. at the ordinary temperature and $\beta\gamma$ -diethoxy-n-propyl acetate a vapor pressure of about 4 mm. Compared with relatively volatile solvents (of which acetone, the vapour pressure of which at 20° C. is 180 mm., is typical) therefore, the solvents specified bring important advantages in that the loss of solvent on discharging a cylinder is minimized and the gas obtained is not appreciably contaminated by the vapors of the solvent liquid. Further the cylinders may be more

completely discharged than in the case of an acetone filling. Thus in the case of a cylinder of 40 litres capacity the loss of acetone on discharging from 15 atmospheres superpressure to 2 atmospheres superpressure is about 50-60 c. c. per cubic metre of discharged gas, while on discharging from 2 atmospheres superpressure to 1 atmosphere superpressure, 100 gm. of acetone are carried away and a further 200 gm. on emptying the cylinder to zero superpressure. With acetone filled cylinders, therefore, it is inadvisable to discharge completely, whereas with cylinders filled with the above-mentioned solvents no such precautions are necessary. An additional advantage consequent upon the use of solvents of low vapor pressure is the fact that an accidental rise of temperature is not so detrimental as in the case of acetone, as the solvent remains largely unvaporized and retains the bulk of the acetylene in solution, thereby diminishing the risk of explosion; also the total pressure developed on a rise of temperature is smaller than with acetone.

As is usual in acetylene storage technique the gas should be dried before contact with the solvent; preferably it should be passed over calcium chloride before and after compression. The usual pressures may be employed, namely 10-30 atmospheres. The amount of acetylene dissolved in most cases compares favorably with that taken up by the usual volatile solvents; thus the solubility of acetylene in cellosolve acetate is roughly 90 per cent. of that in acetone at the same temperature.

As many apparent and widely different embodiments of this invention may be made without departing from the spirit thereof, it is to be understood that I do not limit myself to the foregoing examples or descriptions except as indicated in the following claims:

I claim:

1. The method of storing acetylene which comprises dissolving acetylene in material comprising a solid absorbent impregnated with a relatively non-volatile derivative of a polyhydric alcohol.

2. The method of storing acetylene which comprises dissolving acetylene in material comprising a solid absorbent impregnated with a relatively non-volatile derivative of a polyhydric alcohol having a boiling point above 150° C.

3. Means for storing acetylene under pressure comprising a receptacle containing a solid absorbent impregnated with a solvent for acetylene which is a relatively non-volatile ether, ester or mixed ether-ester of a polyhydric alcohol.

4. Means for storing acetylene as claimed in claim 3 in which the solvent has a boiling point above 150° C.

5. Means for storing acetylene as claimed

in claim 3 in which the solvent is β -ethoxyethyl acetate.

6. Means for storing acetylene as claimed in claim 3, in which the solvent is glycerol di-acetate.

7. Means for storing acetylene as claimed in claim 3 in which the solvent is $\beta\gamma$ -diethoxyn-propyl acetate.

8. In combination a receptacle capable of being closed and of withstanding internal pressure, a packing of solid absorbent impregnated with a solvent for acetylene as defined in claim 3, and acetylene initially dissolved in the solvent under pressure.

In testimony whereof, I affix my signature.

FRANK ROFFEY.