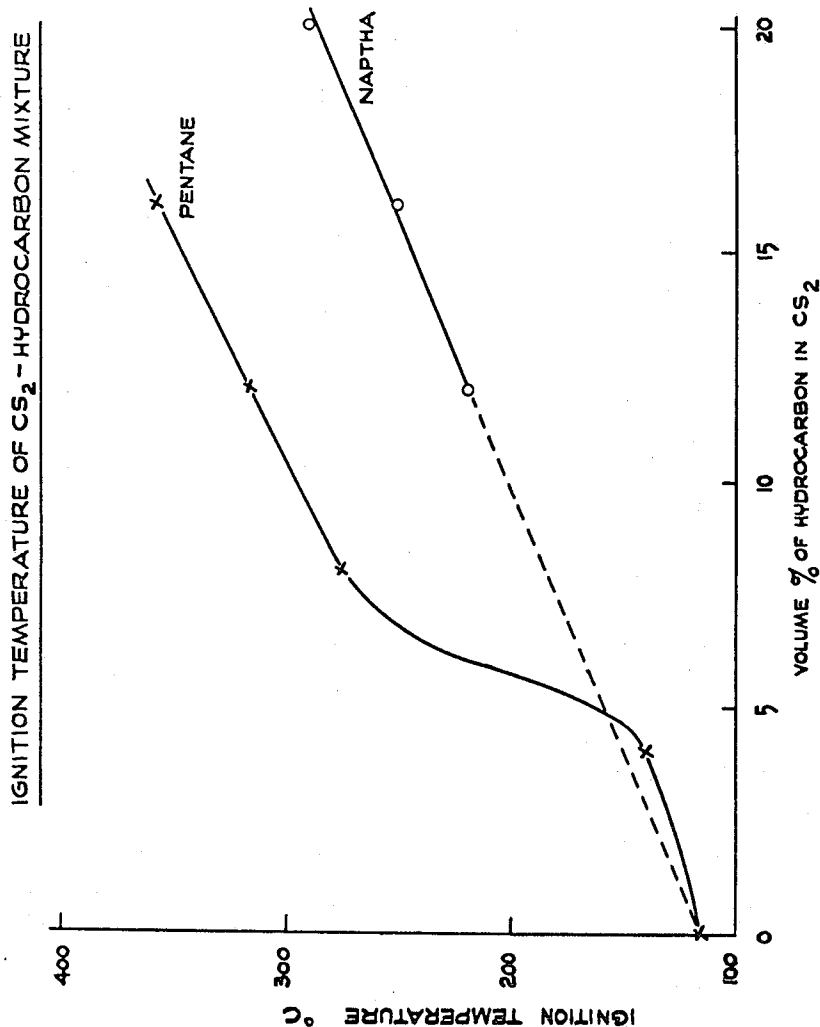


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METHOD FOR CLEANING OIL AND GAS WELLS EMPLOYING CARBON
DISULFIDE-PENTANE MIXTURES
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**METHOD FOR CLEANING OIL AND GAS WELLS
EMPLOYING CARBON DISULFIDE-PENTANE
MIXTURES**

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39,139/64

2 Claims. (Cl. 252—8.55)

ABSTRACT OF THE DISCLOSURE

The use of a mixture of 92% to 84% by volume of carbon disulfide and 8% to 16% by volume of pentane for cleaning oil and gas wells, particularly for removal of wax and sulfur deposits therein. The addition of 8% to 16% by volume of pentane to the carbon disulfide raises the ignition temperature of the carbon disulfide and thereby reduces the fire hazard of the same.

This invention relates to a composition adapted for the cleaning of oil wells and the like.

Oil wells and gas wells, after a certain period of production, are known to show a decrease of flow owing to the formation of deposits of wax and/or sulphur. It is known to remove this material with carbon disulphide but it has been found that there is a considerable fire hazard when this solvent is used. In view of this hazard and of the large amount of carbon disulphide required for this operation, there has been reluctance to use this solvent.

It is an object of this invention to provide a dewaxing and desulphurizing solvent of lower flammability. A further object of this invention is to provide a dewaxing and desulphurizing solvent in which the diluent does not substantially decrease the solvent power of the composition.

Additional objects will appear hereinafter.

The cleaning composition of this invention comprises a mixture of carbon disulphide and petroleum pentane containing from 8% to 16% by volume of the pentane. It has been found that carbon disulphide-pentane mixtures in this range have an ignition temperature between 280° and 360° C., in comparison to the 120° C. ignition temperature of carbon disulphide. These compositions possess satisfactory solvent power for the waxes and sulphur found in oil and gas wells.

By "petroleum pentane" is meant the commercial product containing approximately 90% of n-pentane. This is the saturated C₅ hydrocarbon cut in petroleum refining. Pure n-pentane is, of course, equally effective as an ingredient of this composition. The boiling range of said petroleum pentane lies within the range 34.5°–38° C.

The cleaning composition of this invention is prepared by mixing the carbon disulphide with the petroleum pentane using normal mixing procedures.

The novel composition of this invention is employed by pumping it down the oil or gas well and allowing it to

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remain within the well until the wax and sulphur has been dissolved. The solvent is then removed from the well.

In measuring the flammability of carbon disulphide and carbon disulphide mixtures, the ignition temperature at which the vapour mixed with air will ignite on a hot surface is used as a standard. A method suitable for this determination is procedure ASTM D-287-55. This measurement is to be distinguished from the flash point which is the temperature at which ignition occurs with an open flame.

It has been found that mixtures of carbon disulphide and petroleum pentane possess much lower flammability characteristics than mixtures of carbon disulphide with hydrocarbons of higher boiling point and, surprisingly, mixtures of carbon disulphide and chlorinated hydrocarbons. For example, the mixture of carbon disulphide and petroleum pentane containing 8% by volume of the pentane has a much higher ignition temperature than compositions of carbon disulphide and similar proportions of naphtha, or chlorinated hydrocarbons. This is true although naphtha contains components of higher boiling point than petroleum pentane. It is not known why this composition of carbon disulphide and petroleum pentane has this unexpected increase in ignition temperature, particularly in comparison with analogous mixtures of carbon disulphide and chlorinated hydrocarbons.

This invention is additionally illustrated by the following examples, but it is to be understood that its scope is not to be limited to the embodiments shown therein.

Example 1

A series of solutions was made up containing carbon disulphide and petroleum pentane containing 4%, 8%, 12% and 16% by volume of petroleum pentane. The ignition temperature of these mixtures and of carbon disulphide were determined using the procedure described by Scott, Jones and Scott, Analytical Chemistry, 20(3), 1948, 238. These results are shown in Table I.

TABLE I

Mixture	Increasing Temperature, ° C.		Decreasing Temperature, ° C.		Result, ° C.
	No Ignition	Ignition	No Ignition	Ignition	
CS ₂	108	118	112	121	115
CS ₂ -96/pentane 4.....	135	138	142	140	139
CS ₂ -92/pentane 8.....	268	270	280	292	277
CS ₂ -88/pentane 12.....	310	315	324	327	317
CS ₂ -84/pentane 16.....	353	355	358	361	357

The solvent power of these compositions was measured on samples of wax of the type found in oil wells and the solvent power was found to be satisfactory.

As a comparison with the carbon disulphide/petroleum pentane mixtures, the ignition temperatures were determined on an analogous range of mixtures of carbon disulphide and petroleum naphtha. The results are shown in Table II.

TABLE II

Mixture, percent by Volume	Ignition Temperature, ° C.	
	Minimum Temperature For Ignition	Maximum Temperature For Ignition
CS ₂	110	126
CS ₂ -88/naphtha-12.....	212	258
CS ₂ -84/naphtha-16.....	245	257
CS ₂ -80/naphtha-20.....	280	290

A comparison of the ignition temperature of these two types of mixtures are shown in the drawing. The values plotted are averages. It can be seen that there is a range of carbon disulphide/petroleum pentane mixtures which have an unexpected increase in ignition temperature.

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Example 2

A series of compositions was made up containing carbon disulphide and carbon tetrachloride in various proportions. The ignition temperatures of these compositions and of carbon disulphide were measured using the procedure employed in Example 1. The results are shown in Table III.

TABLE III

Carbon Disulphide, percent by volume	Carbon Tetrachloride, percent by volume	Ignition Temperature, °C.
100	0	115
95	5	150
90	10	185
85	15	175
80	20	170
70	30	175
60	40	180
50	50	205
40	60	215

It can be seen that the addition of carbon tetrachloride to carbon disulphide has surprisingly little effect in changing the ignition temperature. Following the initial rise the ignition temperature is roughly constant for compositions containing from 5% to 40% by volume carbon tetrachloride.

Example 3

A series of compositions comprising binary mixtures of carbon disulphide with methylene chloride, trichloroethylene and perchloroethylene was made up in various proportions. The ignition temperatures of these compositions were measured using the procedure employed in Example 1. The results are shown in Table IV.

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TABLE IV

Percent Carbon Disulphide, by volume	Additive	Percent Additive, by volume	Ignition Temp., °C.
60.....	Methylene chloride.....	40	200
60.....	Trichloroethylene.....	40	235
80.....	Perchloroethylene.....	20	186
50.....	do.....	50	197
30.....	do.....	70	218

It can be seen that the addition of methylene chloride, trichloroethylene or perchloroethylene was not effective in increasing the ignition temperatures of mixtures with carbon disulphide.

What I claim is:

1. A composition for cleaning oil or gas wells consisting essentially of from 92% to 84% by volume of carbon disulphide and from 8% to 16% by volume of pentane selected from the group consisting of petroleum pentane and 100% n-pentane.

2. A method for cleaning an oil or gas well which comprises introducing the composition defined by claim 1 into the well, leaving the composition in the well for a period of time sufficient for the solution of wax and sulphur therein, and removing the composition from the well.

References Cited

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