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THE INFLAMMABILITY LIMITS OF COAL GAS WITH AIR AND A VAPORIZING LIQUID EXTINGUISHING AGENT

by

E. H. Coleman and P. S. Tonkin

Summary

The inflammability limits of coal gas in air with addition of methyl bromide, chlorobromomethane and carbon tetrachloride have been measured in the standard apparatus. Peak values were obtained with methyl bromide and chlorobromomethane, but not with carbon tetrachloride, which was not sufficiently volatile. Small additions of carbon tetrachloride increased the upper limit.

Introduction

Experiments are being made on the composition of the gases produced when vaporizing liquid extinguishing agents are applied to fires. The combustible used is coal gas and it was considered desirable to determine the standard inflammability limits of coal gas and air with these agents.

Experimental

Materials The coal gas had the composition given below. The carbon tetrachloride was of A.R. quality and the methyl bromide was a commercial pure product. The chlorobromomethane was obtained from a commercial source and was described as pure. The peak value of this compound was also determined for n-hexane and the results agreed with previously determined figures.

Table 1

Composition of Town Gas
(per cent by volume)

CO_2	2·8	H_2	43·6
CO	24·0	O_2	1·1
C_nH_{2n}	2·3	N_2	8·7
C_nH_{2n+2}	17·5		

Apparatus

The limits were measured in the Coward and Jones standard apparatus using the static method (2).

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Results

The results are given in Table 2 below and the limits have been plotted in figure 1. The peak values for n-hexane have been included for comparison.

Table 2

Peak values and limiting safe mixtures of coal gas with carbon tetrachloride, chlorobromomethane, and methyl bromide

Extinguishing agent	B.P. °C	Limiting safe mixtures (per cent by volume)		Peak values (per cent by volume)			
		With air	With town gas	With town gas		With n-hexane	
				gas	agent	hexane	agent
Carbon tetrachloride CCl_4	76·7	*39	*76	*11	*35	3·2	9·7
Chlorobromomethane CH_2ClBr	69·0	12	60	9·5	11·5	2·45	6·35
Methyl bromide CH_3Br.	4·6	10	56	8·8	9·8	2·1	7·05

*Data obtained by extrapolation.

Discussion

Because of the relatively low volatality of carbon tetrachloride it was not possible to introduce enough vapour at room temperature to measure the peak directly, and a value was obtained by extrapolation. The extrapolated values appear to be approximately 35 per cent (vol) of carbon tetrachloride and 11 per cent town gas. Small additions of carbon tetrachloride to the upper limit mixtures of coal gas increased the limit slightly from 33 per cent to 33·6 per cent. All of the peak values are higher than those obtained for n-hexane, although the efficiencies as extinguishers are of the same order. The difference between the values for n-hexane and town gas is smaller for the more efficient inhibitors e.g. for the town gas peak the carbon tetrachloride value is 3·5 times the peak value for hexane, whereas with chlorobromomethane the factor is 1·8 and with methyl bromide only 1·4.

References

1. F.C. Note 35/October 1950.

2. F.R. Note 1/1951.

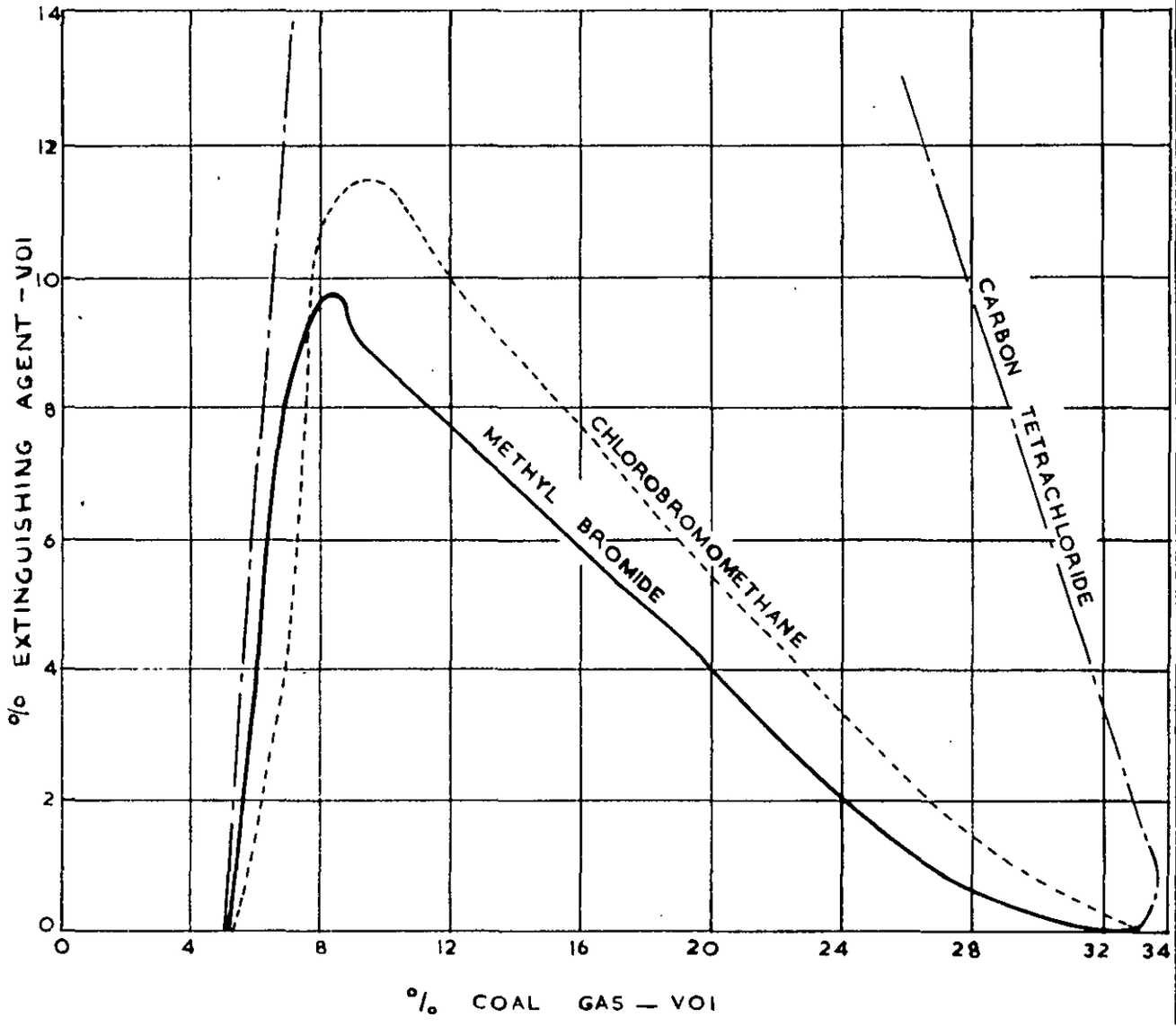

FIG.I. INFLAMMABILITY LIMITS OF COAL GAS WITH AIR AND ADDITIONS OF EXTINGUISHING AGENTS.