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The chemical engineering department of LaTEP has been working for many years on the problem of sulphur deposition especially in natural gas network [1, 2]. The solid sulphur appears immediately downstream of a pressure reduction facility. One of the hypotheses proposed to explain the solid formation, based on a thermodynamic approach, is the desublimation of sulphur. During gas expansion, both pressure and temperature decrease. Consequently the gas may become over saturated in sulphur. Because we are below the temperature of sulphur triple point, part of the gaseous sulphur can be transformed into solid particles. Thus, it is important to obtain solubility data of sulphur in natural gases. Methane is the major natural gas component. So, it is of importance to measure solubility of elemental sulphur in $CH_4$. In this paper experimental measurements up to a pressure and temperature of 30 MPA and 363.15 K are presented.

The principle of the experimental pilot can be resumed following three steps: saturation of the gas with sulphur, trap of all the dissolved gaseous sulphur and finally quantification. Although the principle is simple, experimental difficulties occur at the three steps. A variable volume equilibrium cell is used to saturate the gas with sulphur. Since sulphur solubility value is weak in gas transport conditions, the volume of the cell is necessarily big (0.5 Litre). The pressure of the equilibrium cell is held constant thanks to a piston during the trapping step. An original gaseous sulphur trapping method was developed. It is based on the reactive absorption of the gaseous sulphur with solvent. Indeed, the gas bubbles into a liquid solution which traps gaseous sulphur. Finally, the solution which contains a standard is analysed by gas chromatography and sulphur is quantified. The total volume of the gas withdrawn is determined by a position transducer placed on the autoclave. Then, the sulphur solubility value is calculated.

[1] J.-P. Serin et al., The Journal of Supercritical Fluids, 53, 1-3, 2010, p. 12-16.
[2] P. Cézac et al., The Journal of Supercritical Fluids, 44, 2, 2008, p. 115-122.