



# The Effect of Thixotropic Agents in Prevention of Gas Migration through Cement Slurries



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## Introduction

Gas migration through cement slurries is one of the well completion major challenges. A few psi pressure increment to blow out are consequences of gas invasion which result in financial and environmental damages in addition to the risk of fatal incidents. Gas invasion through cements occurs when the fluid bearing formation has a higher hydrostatic pressure than the slurry column.

## Aim

In this study, the effect of a liquid thixotropic agent on several parameters including critical hydration time, cement transition time and gel strength development of slurries are investigated using an experimental approach as a case study.

## Materials & Methods

In this study, one of the main cement system pressure decay with time mechanism assumptions is the gel strength development of the slurry. Gel strength property helps the cement to support the hydrostatic load. In this scenario, hydrostatic pressure reduction can be calculated at any point in time by formula 1

$$Pr = Gs \cdot L / 300(D-d)$$

1.

Where:

Pr: Pressure reduction due to gel strength (psi)

Gs: Gel strength of the cement at the point in time (lb/100 sq.ft)

L: Measured length of the cement column above the given location (ft)

D: diameter of the hole (in)

d: diameter of the pipe (in)

## Results & Discussion

By addition of only 0.6 gr of thixotropic agent to a slurry composed of an anti gas migration agent, cement transition time was reduced 250 minutes and critical hydration time was also decreased 175 minutes. Also, filtration volume was reduced about 17 ml. Shorter wait on cement (WOC) time was another result of a gel strength-modifying agent utilization in the slurry formulation.

## Conclusion

In conclusion, thixotropic agents could be used as supplementary additives for slurries which contain filtration control or anti gas migration additives. A modified gel strength profile, lower filtration, shorter cement transition and critical hydration time are all effects of slurry formulation optimization with gel strength-modifying agents. The cement resistance against gas migration could be significantly improved this way

Table 1- Slurry Compositions and test results

Slurry	Composition	Density (Pcf)	Filtration (ml/30 mins)	Thickening time (minutes)	Mixing time (seconds)
1	Class G cement + Anti gas migration + Fresh water	115	22	230	20
2	Class G cement + Anti gas migration + Fresh water + Retarder + Dispersant + Gel strength modifying agent	115	5.3	138	25

