EFFECT OF BORON CROSSLINKER AND VARIOUS BREAKERS ON THE FORMATION OF GUAR GUM FRACTURING FLUID RESIDUE



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INTRODUCTION

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Some additive can cause any residue after it's added to base fracturing fluid and can plug the pore throat and decreasing permeability in invaded zone. This research was conducted using compatibility test between Guar Gum based fracturing fluid and boron as crosslinker and three type of breaker. The types of breaker used include oxidizer, acid, and encapsulated breaker.

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Result and Discussion

RESULT AND DISCUSSION

This research is done in PT. Bukitapit Bumi Persana laboratory. The test procedures of residue concentration are:

1. Weight sample based on formulation
2. Mixing additive in mixing blender until done
3. Check viscosity of base gel based on specification
4. Added base gel with buffer, crosslink and breaker with on-fly condition in mixing blender
5. Put gel fracturing into water bath until break, see figure 1.
6. After break, filter the precipitate with HTHP Filter Press
7. Weight of the wet residue (Figure 2), dried in oven with temperature 105 ^{0}C
8. Weight of the dried residue in analytical balance

$$\% \text{ Residue} = \frac{\text{Weight of Dry Residue}}{\text{Weight of fracturing fluid}} \text{ x } 100\%$$

RESULT AND DISCUSSION

Table 1. Experiment Results with Oxidizer Breaker

Boron Crosslinker	Oxidizer Breaker	Weight of Sample (g)		% Dry Residue
		Wet Residue	Dry Residue	
0.2%	0.40%	12.65	0.59	12.29 %
0.4%	0.40%	14.68	1.52	31.67 %
0.6%	0.40%	15.29	2.69	56.04 %
Average				33.33 %

Table 2. Experiment Results with Acid Breaker

Boron Crosslinker	Oxidizer Breaker	Weight of Sample (g)		% Dry Residue
		Wet Residue	Dry Residue	
0.2%	0.80%	9.34	1.26	26.25 %
0.4%	0.80%	14.94	2.59	53.96 %
0.6%	0.80%	14.60	2.65	55.21 %
Average				45.14 %

Table 3. Experiment Results with Encapsulated Breaker

Boron Crosslinker	Oxidizer Breaker	Weight of Sample (g)		% Dry Residue
		Wet Residue	Dry Residue	
0.2%	0.20%	15.10	1.68	35.00 %
0.4%	0.20%	14.03	1.67	34.79 %
0.6%	0.20%	13.42	1.40	29.17 %
Average				32.99 %

RESULT AND DISCUSSION



Fig. 1. Aged fracturing fluid in water bath until break

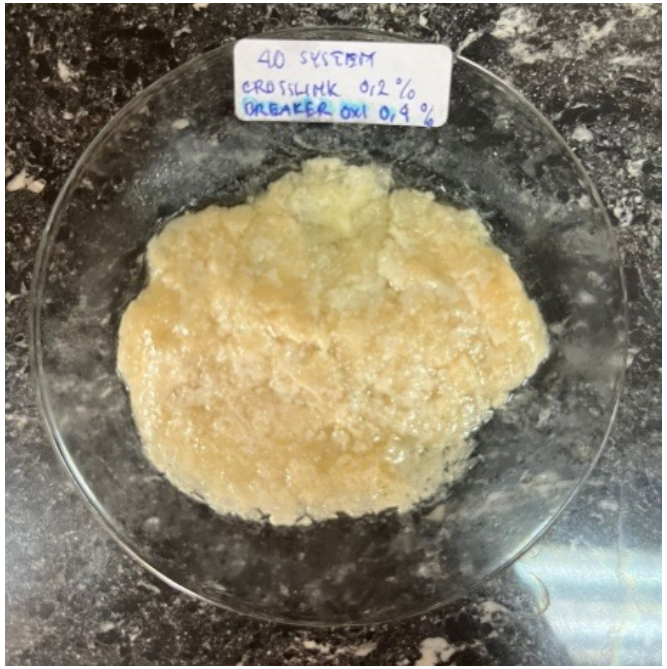


Fig. 2. Wet Residue of 40 system Guar Gum with 0.2% crosslinker and 0.4% oxidizer breaker

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CONCLUSION

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a. The experiment shows 40 systems Guar Gum fracturing fluid is compatible with 0.2% crosslink boron and 0.4% oxidizer breaker.

b. The increase in crosslink concentration indicates the amount of polymer content in the fracturing fluid is directly proportional to the amount of residue produced.

c. Encapsulated breaker has stable performance due to increasing concentration of boron crosslinker.

THANK YOU