

# **First Experiment 'three-phase flow'**

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Displacement sequence:

1. Injecting brine solution.
2. Absolute permeability was measured before injecting gas and oil.

First Experiment			
Dynamic Viscosity (solution 15wt% KI)	$\mu$	0.83	mPa.s
Length	L	60.72	mm
Diameter	D	12.70	mm
Permeability	K	1.02	D

3. Injecting water, oil and gas simultaneously.
4. During 4 steps (2 – 5) the phase fractions were kept constant and the total flowrate was increased.

Flooding Step	Fraction			Flowrate, ml/min		
	Gas	Oil	Water	Gas	Oil	Water
1	0	0	1	0	0	0.1
2	0.5	0.25	0.25	0.05	0.025	0.025
3				0.1	0.05	0.05
4				0.2	0.1	0.1
5				0.4	0.2	0.2

Doubling the flow rate has led to an increase in pressure drop from 30 kPa to 60 kPa (30 kPa is very high), as shown in Figure 1a. At the total flowrate 0.4 ml/min, we can see a stable pressure drop (20 kPa) during the first 8 hours, and increasing the flowrate to 0.8 ml/min makes a sharp increase in pressure drop, which clearly can be indicated by comparing Figure 1c and 1d. The reason for a three-fold increase in pressure drop from 20 kPa to 60 kPa at the total flowrate 0.4 ml/min still is unknown.

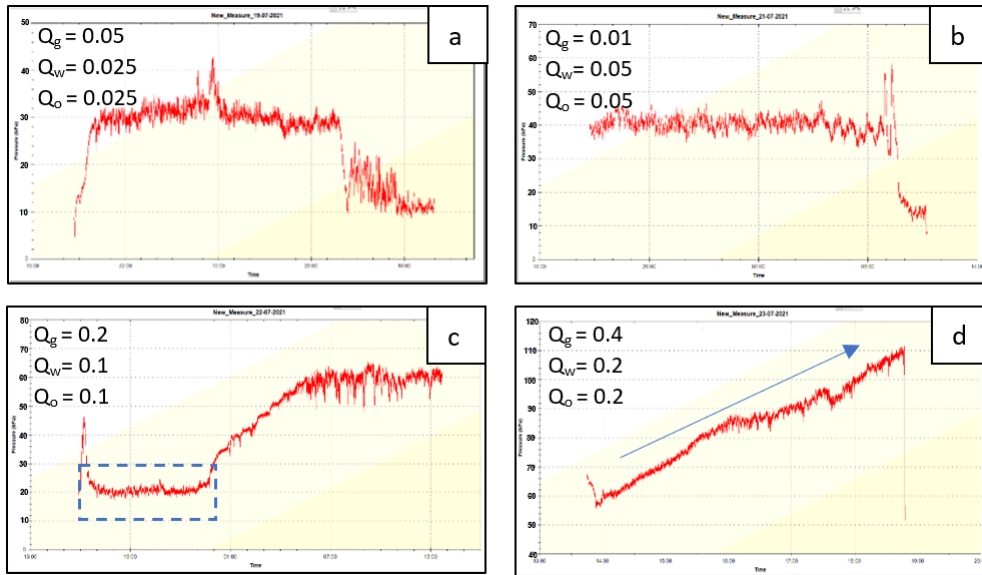


Figure 1: Pressure drop at different total flowrates during injecting gas, oil and water simultaneously.