

What is emulsification in oil & gas?

Emulsification refers to the emulsions formation process. The water-in-oil emulsion is a challenge in the petroleum industry and some spill workers call it as "chocolate mousse" or "mousse" (Fingas and Fieldhouse,2003). Emulsification is the second challenge facing the oil and gas industry,after evaporation.

What is emulsification with low-energy methods?

The Basic Mechanisms The emulsification with low-energy methods uses the internal chemical energy of the dispersion system to form fine emulsions,and the energy consumption is 3-5 orders lower than that with the high-energy methods.

Can a gas-assisted coflow step-emulsification method produce a single emulsion?

In the present work,we propose a gas-assisted coflow step-emulsification (SE) method to first generate precursor hollow-core double emulsions,which subsequently produce small,single emulsions of the disperse phase upon dissolution of the encapsulated gas cores.

Which emulsification membrane has a lower energy consumption density?

SILAM has a lower energy consumption density among these emulsification membranes,which is  $\sim 33\text{--}49.5 \text{ kJ m}^{-3}$  (Supplementary Equations 6 and 7),while the energy consumption density of commonly used Shirasu porous glass (SPG) membranes,ceramics and thin film membranes is as high as  $\sim 3.53 \times 10^2 \text{--}2.29 \times 10^5 \text{ kJ m}^{-3}$ .

Can a PCM emulsion be used in a storage tank?

Delgado et al. [ 118] experimentally studied a PCM emulsion in the storage tank. The low-cost paraffin as the PCM was derived from the petroleum refining process, and PCM emulsions with an average droplet size of 1 mm had a phase change temperature range in  $30\text{--}50 \text{ }^\circ\text{C}$ , which was confined in a 46 L storage tank ( Figure 10 ).

How is emulsification used in upstream oil production?

Emulsification is commonly used in upstream petroleum industries,especially in pipeline flow. In addition,the percentage of produced water increases towards the end life of wells (Lim et al.,2015). Fig. 3 shows the general picture of upstream equipment for crude oil production. Fig. 3. Upstream equipment for crude oil production (Wang,2005).

In addition, the benefits of using storage devices for achieving high renewable energy (RE) contribution to the total energy supply are also paramount. The present study provides a detailed review on the utilization of pump-hydro storage (PHS) related to the RE-based stand-alone and grid-connected HESs.

This method includes spontaneous emulsification, phase inversion composition, phase inversion temperature,

microemulsion dilution and D phase emulsification. Low energy method involves use of mere stirring at a slower rate (1600 rpm) leading to less energy consumption. In principle, low energy method is classified as isothermal and thermal method.

2.2. Experimental setup. A syringe pump (Harvard Apparatus, PHD ULTRA 4400 I/W PROG, USA) is used to inject the dispersed phase through the membrane using a stainless-steel syringe as shown in the schematic diagram of the process in Fig. 1. The flat sheet membrane had an active surface of  $2.9 \times 10^{-4} \text{ m}^2$  and it was enclosed in a plexi-glass emulsification ...

Results showed that pump consumption of nano-emulsion was significantly lower than that of water under same heat storage capacity. The emulsion prepared by D-phase emulsification method was used by Morimoto et al. [41] to evaluate thermal properties of sample and focused on exploring viscosity and other flow characteristics of sample.

W/O emulsion occurs due to several reasons, and the existence of water is considered as the central aspect of this formation; other reasons, including surface chokes, agitation, turbulence, and mixing energy in downhole wellbores, pumps, pipes, and valves help form emulsion in oil and gas industry (Lim et al., 2015). In addition, emulsion in ...

Emulsions and two-phase liquid-liquid flows are present in almost all technical and industrial processes. These fluids are dispersions of at least two immiscible liquids, one of which is dispersed in the other Zhu et al. (2019a). There are two main types of emulsions, namely single and multiple emulsions (Sweeta Akbari and Nour, 2018). The single emulsions are ...

In the separation tank, the emulsion enters a gas-separation chamber or gas boot where a momentum change causes separation of gas from the emulsion. Gas boots can be as simple as the piece of pipe shown in Fig. 3.15, or they can contain more-elaborate nozzles, packing, or baffles to help separate the gas. If there is much gas in the well stream ...

In 2020, the world's installed pumped hydroelectric storage capacity reached 159.5 GW and 9000 GWh in energy storage, which makes it the most widely used storage technology [9]; however, to cope with global warming [10], its use still needs to double by 2050. This technology is essential to accelerating energy transition and complementing and ...

The need for efficient demulsification process to treat emulsions in the petroleum industry is well acknowledged. For decades, numerous researches have been conducted to examine mechanisms of emulsification and demulsification. Untreated emulsion has both technical and commercial implications in the industry, especially in terms of treatment ...

A novel energy regeneration system based on cylinders and a rectifier valve for emulsion pump tests is presented and studied. The overall structure and working principles of this system are ...

How to pump emulsified explosives with maximum safety . However, this explosive requires special pumping conditions. For example, the Employer's Liability Insurance Association regulations (BGV) for solid uniform explosives and volatile oils stipulate that the pumps should prevent dangerous stressing of the substance or segregation of the emulsion.

About two thirds of net global annual power capacity additions are solar and wind. Pumped hydro energy storage (PHES) comprises about 96% of global storage power capacity and 99% of global storage energy volume. ...

Liquid-infused porous membranes (LPMs) have emerged recently due to the enrichment of interfacial properties in a broad range of applications, including separation 1,2, gas capture 3,4, soft ...

Phase change emulsion, similar to the MPCM slurry, is a novel two-phase fluid composed of PCM particles as a dispersed phase and water as a continuous phase. ... Guo KH, Shu BF, Yang WJ (1996) Advances and applications of gas hydrate thermal energy storage technology. In: Proceedings of 1st Trabzon international energy & environment symposium ...

The system selected for the study is the Argentine Storage System, composed mainly by the pumped energy storage technology and the natural gas storage system through pipelines. Five scenarios are studied. According to the obtained results, pumped storage system constitutes a reserve of 0.4% of the total generated power.

CO<sub>2</sub> hydrate, as a kind of gas hydrate, is an ice-like crystalline compound that seals CO<sub>2</sub> in water under high pressure and low temperature conditions and has received wide concern in gas capture ...

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