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Paper Title: Experimental investigation of effect of silver nanoparticles on dissociation of methane hydrate

Abstract: Natural gas hydrate is an important energy source and has potential for gas storage and transportation[1]. Stability of hydrate is an important parameter for transportation[2]. In this study the effects of silver nanoparticles on dissociation rate of methane hydrate were investigated. Deionized water was used as the base fluid and different concentrations (12.5, 25, 37.5, 50 ppm) of silver nanoparticles were dispersed in water in presence of trisodium citrate as dispersant. 25 ml of nanofluid or pure water was loaded into the cell and then the temperature lower to 275.15 K followed by gas injection into the cell then the mixing was started. After hydrate formation and reaching to steady state situation, the temperature decreased to 272.15 in order to freeze the hydrate and its water content. After reaching to a constant pressure at 272.15 K then the offloading valve was opened and the gas inside the cell was evacuated completely. Dissociation started after evacuation of gas and the pressure inside the cell increased gradually. Figure 1 shows the dissociation mol percentage during the dissociation process. At the concentration of 50 ppm silver nanoparticles, dissociation percent was about 90% after 600 min. Since the size of hydrate particles formed in presence of nanoparticles were smaller than those formed with pure water, so the dissociation rate of hydrate in presence of nanofluid were higher than the pure water. Also the higher gas content inside the hydrate caused a bigger driving force between the gas inside the cell and gas in the hydrate. The sample 37.5 ppm nanosilver was more stable than the pure water. The hydrate dissociation rates just at the beginning of dissociation are shown in Table 1. The initial rate of the dissociation at concentration of 25 ppm nanoparticles was about 9 times higher than the pure water.

Keywords: Hydrate, Silver nanoparticles, Dissociation

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Paper Title: Application of G4 dendrimer coated iron oxide nanoparticles in magnetic hyperthermia

Abstract: Introduction: Recently,hyperthermia has been increasingly applied in the cancer treatment since it has favorable advantages compared with other treatments including chemotherapy and radiotherapy. Iron oxide magnetic nanoparticles are used in magnetic bioseperation,clinical diagnosis and therapy including MRI and magnetic hyperthermia thanks to their very low toxicity and good biocompatibility. The polyamidoamine (PAMAM) dendrimer coated iron oxide magnetic nanoparticles(MNPs) have internal cavities makes them suitable for application in multidisciplinary cancer treatments. Dendrimers are a group of highly branched spherical polymers that are synthesized with structural equaling traditional biomolecules including DNA and RNA and are denoted as "artificial proteins". In this study,we assessed G4 PAMAM coated Fe3O4 NPs (PAMAM@Fe3O4) in magnetic hyperthermia. Method and materials: Fe3O4 MNPs were synthesized by coprecipitation of Fe3+ and Fe2+ solution followed by surface modification with PAMAM dendrimers. The morphology and properties of obtained nanoparticles were characterized by XRD,FT-IR,TEM and DLS. The PAMAM@Fe3O4 NPs displayed relatively high magneto-temperature response which could be applied to hyperthermia therapy. The chronic and acute in toxicity vivo and in vitro was assessed as well as hemolysis. Results The size of nanoparticles was about 10 nm and the result of DLS shown 108nm hydrodynamic size. The outcomes revealed that these MNPs appear to be the promising materials for local hyperthermia and as we predicted,the toxicity of PAMAM @ Fe3O4 NPs was negligible. The temperature increase measured in magnetic hyperthermia was performed in two frequency of 200 and 300kHz and intensity of 12 kA/m. The introduced SAR increased with increasing frequency and NPs concentration. The renal and hepatic factors in blood as well as blood proteins did not change significantly in selected NPs concentrations used in chronic and acute toxicity in bulb-c mice. The highest amount of Hemolysis in NPs concentration of 1 mg/ml was only 8 percent. Discussion There are some studies focused on PAMAM @Fe3O4 NPs as an MRI contrast agent or a vehicle for drug delivery. Considering to suitable magnetization properties of these NPs,we decided to investigate them in magnetic hyperthermia. For clinical use of produced NPs,they must be toxic as low as possible. Our results shown that PAMAM @ Fe3O4 NPs were very low toxic in cancer and normal cell lines and this is due to dendrimer coating of NPs and PEGylation. Because of dendrimers superior properties in MRI and drug delivery,they can be suitable candidate to consider as an appropriate coating for magnetite NPs using in magnetic hyperthermia. More hyperthermia studies with PAMAM @Fe3O4 NPs are needed to elucidate this subject.

Keywords: Magnetic hyperthermia,dendrimer,magnetite,nanoparticles

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Paper Title: Effect of stabilizer and drug concentration on size of PLGA-paclitaxel nanoparticles

Abstract: Cancer is a major fatal morbidity worldwide, and is anticipated all new cancerous cases will reach 22 million by 2030. chemotherapy is the first treatment line of cancer. Paclitaxel is used as a chemotherapy drug for treatment of most solid tumors. Despite high potential, its clinical uses are limited due to low solubility in aqueous solvents and major side effects. In order to overcome to this limitations, PLGA nanoparticles can be used for delivery of Paclitaxel. PLGA is biocompatible and biodegradable co-polymers to carry a high amount of therapeutic agent.. The aim of this work is to investigated the effect of stabilizer and drug concentration on size of PLGA-paclitaxel nanoparticles. We synthesized Paclitaxel loaded PLGA nanoparticles via both nano-precipitation and emulsion method and characterized their size using DLS and SEM.

Keywords: Key words: stabilizer, polymer, PLGA, paclitaxel, nanoparticle size