Investigation of Correlation Between Radon Concentration and Metals in Produced Water from Oilfield Activities

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Abstract : Naturally radiation exposure that present due to the cosmic ray or the naturel occurring radioactives materials(NORMs) that originated in the earth's crust and are present everywhere in the environment(1) , a significant concentration of NORMs reported in the produced water which comes out during the oil extraction process, so that the management of this produced water is a challenge for oil and gas companies which include either minimization of produced water which considered as the best way in the term of environment based in the fact that ,the lower water produced the lower cost in treating this water , recycling and reuse by reinjected produced water that fulfills some requirements to enhance oil recovery or disposal in the case that the produced water cannot be minimize or reuse. In the purpose of produced water management, the investigation of NORMs activity concentration present in it considered as the main step for more understanding of the radionuclide's distribution. Many studies reported the present of NORMs in produced water and investigated the correlation between Ra^{226} and the different metals present in produced water(2) including Cations and anions Na^{+}, Cl^{-}, $Fe^{(2+)}$, $Ca^{(2+)}$. and lead, nickel, zinc, cadmium, and copper commonly exist as heavy metal in oil and gas field produced water(3). However, there are no real interesting to investigate the correlation between Rn^{222} and the different metals exist in produced water. methods using, in first to measure the radon concentration activity in produced water samples is a RAD7 .RAD7 is a radiometer instrument based on the solid state detectors(4) which is a type of semi-conductor detector for alpha particles emitting from Rn and their progenies, in second the concentration of different metals presents in produced water measure using an atomic absorption spectrometry AAS. Then to investigate the correlation between the Rn^{222} concentration activity and the metals concentration in produced water a statistical method is Pearson correlation analysis which based in the correlation coefficient obtained between the Rn^{222} and metals. Such investigation is important to more understanding how the radionuclides act in produced water based on this correlation with metals , in first due to the fact that Rn^{222} decays through the sequence Po^{218}, Pb^{214}, Bi^{214}, Po^{214}, and Pb^{210}, those daughters are metals thus they will precipitate with metals present in produced water, secondly the short half-life of Rn^{222} (3.82 days) lead to faster precipitation of its progenies with metals in produced water.

Keywords : norms, radon concentration, produced water, heavy metals

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