

**Oxy-fuel technology: An experimental investigations into oil shale combustion under oxy-fuel conditions**

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**Abstract:** Oil shale utilization has received much attention all over the world due to the rise of oil-prices; Jordan is one of the countries that have just started an intensive research for oil shale utilization. In this study the feasibility of oil shale combustion under oxy-fuel conditions was investigated using a 20 kW Once- Through reactor at a combustion temperature of 1200 C. To the investigators best knowledge, this is the first time that oxy-fuel technology is applied for oil shale combustion. So this study is considered a unique with respect to the conditions and the scale of the combustion experiments. Jordanian oil shale samples from El-Lajjun was used. Unstaged air-firing and oxy-fuel combustion were investigated to study oil shale combustion behaviour. It is found that direct combustion of oil shale under oxy-fuel conditions is feasible, 100% oil shale burnout was achieved for OF27 combustion as well as air-firing. In addition, the high S content in oil shale is a well known problem; our study aims to find if oxy-fuel conditions will affect SO<sub>2</sub> emissions as well as NO emissions. It is found that SO<sub>2</sub> emissions during oil shale combustion under oxy-fuel conditions is lower than air-firing by around 30%. In addition, NO<sub>x</sub> emission was also found to be lower and can be reduced efficiently by adopting staged combustion technology under oxy-fuel conditions as well as air-firing, however, the oxy-fuel investigations were carried out without flue gas recirculation.