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**Project Title: Feasibility Study of the Determination of Flare Gas Percentage Composition to Generate Electricity**

<b>Department:</b>	Electrochemistry	<b>Employer:</b>	Research Assistant
<b>Project/Program Manager:</b>	Majid Ghahraman Afshar	<b>Executor:</b>	Seyed Ahmad Ahmadi
<b>Project Financial Code:</b>	210009	<b>Project Quality Code:</b>	PPCPN37
<b>Type of Project/Program:</b>	Quality Management in Lab	<b>Assistant:</b>	Research Assistant

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**Keywords:**

Flare gas, heavy hydrocarbons, environmental pollutants, gas chromatography, sour compounds measurement, Niroo Research Institute gas fuel laboratory

**Necessity of project:**

The lack of proper application of flare gas is the result of lack of full knowledge of the compounds, calculation of thermal value and full knowledge of the degradability of this gas from different processes. Therefore, accurate recognition of flare gas behavior will help to inhibit these energy carriers, generate added value by this gas and provide appropriate solutions for its removal.

**Abstract:**

Gas flaring refers to the combustion of associated gas generated during various processes including oil and gas recovery, petrochemical process and landfill gas extraction. The typical flare used in the oil and gas industry is composed of a boom or stack which collects the unwanted gases to be flared. Flare gas is composed of light hydrocarbons (C1-C6), CO<sub>2</sub>, CO, H<sub>2</sub>S, N<sub>2</sub> and H<sub>2</sub>O. There are three various solutions to get rid of flare gas included a) Direct injection to atmosphere. b) Burning (to be flared) and c) Recovering and applying in industry. Direct injection of flare gas to atmosphere lead to greenhouse effect. On the other, burning out the flare gas generates toxic gas likes NO<sub>x</sub>, SO<sub>x</sub> and VOC which leads to acidic rain and corrosion. One of the most useful application of flare gas is about interrogating flare gas to generate electricity. Therefore, it is necessary to have information on the chemical composition and its heat capacity.

There are several techniques to monitor flare gas including GC, GC-FID, GC-TCD, etc. All of those methodology needs to have a standard sample to qualify the flare composition specially the Sulphur compounds. Herein for the first time we propose GCMS to monitor flare gas in order to apply for electricity generation.

In this project we aim to study the possibility of using GCMS for flare detection. Additionally, all the equipment's and accessories which requires for such a measurement is also investigated. Finally, the methodology and all equipment's for such a measurement is introduced as a novel package of flare detection for electricity generation aim.

### **Project Objectives:**

In this project, for the first time, the feasibility of using gas chromatography device with general column equipped with mass spectrometer detector for measuring gas compounds along with oil fields (flare), especially sour compounds, is investigated. Due to the practical capabilities of mass detector, it is possible to identify different types of sour compounds of flare gas along with determining their amount by this method. In this research project, in addition to investigating the possibility of developing the test method for measuring sour gas flare compounds, the necessary equipment and safety requirements for this project are studied with the aim of developing the gas fuel laboratory.

### **Stages and methods of project:**

- Feasibility studies to determine the percentage of chemical compounds of flare gas for power generation
- Investigation of chemical compounds analysis methods of Flare gas
- Feasibility assessment of flare gas in laboratory

### **The most important results obtained from the project/project (technical outputs, patents, articles, books, technical reports, etc.):**

A technical report that will be published electronically in Niroo Research Institute's publishing system. One case is an internal scientific and research paper based on the obtained results.