One-fifth of the world will face severe water shortage by 2040 as climate change and a growing population pushes up demand. Recently, Qatar water resources are becoming strained and stressed as Qatar only gets seven inches of rain per year. Furthermore, World Resources Institute (WRI) ranked all the countries over the world according to the severity of water crisis and the Middle East was one of the worst regions. Nine countries were considered extremely susceptible and Qatar was ranked as a number 3, after Bahrain and Kuwait. While the country (Qatar) population is growing – as today, 2.5 million residents are forecast to multiply eightfold by 2050. Thermal processes produce more than 90% of desalinated water, where the desalination process is energy intensive, and affecting the environment. The scope of the present work is to develop a process to produce clean water at low operating conditions (temperature <45°C). This process is Forward Osmosis (FO) system working with a novel draw solution. Forward Osmosis (FO) has appeared as one of potential technologies to mitigate clean water and energy shortage. However, there are many challenges facing the development of FO technology, the main one is the suitable regeneration process for draw solutions, the exploration of new draw solution and its regeneration process is vital for future FO applications. The selection of suitable draw solution is critical and important to enhance FO efficiency. An acceptable draw solution should have high osmotic pressure, simple regeneration process, larger water solubility, and reasonable cost. The regeneration process for the draw solution is the bottleneck in FO system, which leads to a high-energy consumption. This process is based on the principle of using working fluid as a draw solution, which has a low boiling point, immiscible with water and highly miscible with alcoholic agent. The main restricting factor of this separation or the regenerating process is the mass ratio of the light hydrocarbon to the diluted draw solution feed. In this study, the effect of mass ratio of light hydrocarbon to the diluted draw solution feed on the quality of clean water was studied and the results can be seen in fig 1. This work is very relevant to the novel separation technologies program in Engineering Conferences International (ECI).