Algerian oil as a new source of carbon is used to prepare the carbon nanospheres (CNSs) by pyrolysis method. A mixture of crude oil and FeCl3.6H2O solution as catalyst was injected into the reaction furnace to produce CNSs in an inert atmosphere, followed by multi step purification to remove different impurities. The carbon nanospheres have been characterized by scanning electron microscopy (SEM), energy dispersive X-rays spectroscopy (EDAX), X-ray diffraction(XRD), Raman spectroscopy and FTIRspectrum. The SEM image reveals that these CNSs have smooth surfaces and uniform particles with a diameter lower than 500 nm. the XRD and Raman studies shows that the graphitization degree of CNSs is not high , while the EDAX analysis shows that more than 98 % of the CNSs is carbon, FTIR proved the presence of new functions after samples treatment such as acid function. This study reports the optimization of various process parameters such as, temperature of reaction (860-940°C), process Time (90-150min)and mass ratio catalyst/Crude oil (0.83 10-3-2.4810-3 g/g) for increasing the Yield of CNSs. A MODDE 6.0 experimental design was employed for the optimization of synthesis of crude oil to ensure high production of carbon nanospheres in a low catalyst concentration and high temperature for a short length of time. The analysis of variance showed a high coefficient of determination value (R2 = 0.965) and Maximum CNSs production was predicted and experimentally validated, the optimized process conditions were identified to be reaction temperature of 900°C, duration synthesis of 113min and mass ratio catalyst /crude oil of 0.8 10-3 g/g with a yield of 13.23%