Abstract-Gas hydrate is a crystalline solid compound form of water with hydrophobic gas at certain conditions (pressure and temperature). The hydrogen bond in water molecules constructs a framework as a host that entraps gas molecules (guest). Gas hydrate can be applied to many industries such as gas separation, cool storage, food concentration and desalination. Hydrate route looks a promising alternative technology compared to the conventional process, by utilizing a proper gas host, which can be held within water cavities composed by hydrogen-bonded water molecules. In this study the selected host gas was Refrigerant R134a, the work consists of an experimental and theoretical investigation dealing with hydrate formation for the ternary system (water, refrigerant gas, salt) at different initial pressures, the salts were NaCl, KBr and NaF. Method of isochoric pressure search method was used to measure the pressure and temperature for hydrate formation and conduction the three phases of (hydrate-liquid-vapour). The measurements were performed with pressure range (0.1 - 0.4) MPa and the temperatures about (275.2 – 283)K at the concentrations of (0.09, 0.17 and 0.26)mol/kg for each salt. The kinetics of R134a clathrate formation for ternary systems (R134a, water and salt) at various types and concentrations of salts. Many objective functions were obtained from the kinetic model for hydrate formation, such as the amount of gas consumed, the growth rate, and the conversion of the water to hydrate. The results showed the effect of the initial pressure on the gas consumed, the rate of growth and water to hydrate conversion, that when the initial pressure increase the moles of R134a gas consumed was increased due to the increased driving force of hydrate formation, also other functions were increased. While the increasing in the concentration of salt for all types will be decreased gas consumed, whereas water to hydrate conversion, the growth rate is slightly decreased. And from the results noticed the presence of different salts in the ternary systems have an effect on the thermodynamics inhibition of refrigerant hydrates and the inhibition increases with the presence of NaCl salt in the ternary system more than other types of salt and also increases with increase the concentration of salt.

Keywords- Gas clathrate, refrigerant gust, kinetics, thermodynamics inhibition, ternary systems, salts.