**Plasmid isolation and Purification**

**Alkaline lysis method:**

* A typical isolation procedure by alkaline lysis have the following steps:  
  1. Harvesting of bacteria from culture.  
  2. Suspension of bacterial pellet in resuspension buffer.  
  3. Lysis of bacteria.  
  4. Neutralization of lysate.  
  5. Clearing of lysate.  
  6. Recovery of plasmid from cleared lysate.  
  7. Washing of plasmid DNA pellet.  
  8. Storage of Plasmid DNA.

**1-Harvesting of bacteria from culture:**

Generally bacterial cells containing the plasmid are grown in a liquid media. Therefore it is essential to separate the bacterial cells from the culture medium. by centrifugation. Centrifugation speed is optimized in such a way that it results in accumulation of all the bacterial cells in a form of pellet (pellet should be loose enough to be resuspended easily in resuspention buffer.)

**2-Suspension of bacterial pellet in resuspension buffer:**

-By using alkaline lysis solution I: [contains: glucose – tris PH=8 – EDTA PH =8]

Glucose is required to make the solution isotonic. EDTA chelate the divalent cations which are released upon bacterial lysis. Divalent cations are required for many enzymatic reactions.(EDTA action results in inactivation of many enzymes which may harm plasmid DNA.). Tris-Cl acts as a buffering agent.

**3-Lysis of bacteria:**

-By using alkaline lysis solution II: [contains Sodium dodecyl sulfate (SDS) and NaOH].

SDS is a detergent which solubilizes the phospholipid and denatures protein components of the cell membrane, leading to lysis and release of the cell contents. High alkaline condition due to NaOH denatures the plasmid and genomic DNA.

**4-Neutralization of lysate:**

-By using alkaline lysis solution III: [ contains potassium acetate and acetic acid]

Addition of neutralization solution (Acidic potassium acetate) bring the lysate pH back to normal, resulting in precipitation of protein and genomic DNA. Both plasmid and genomic DNA renatures upon addition of neutralization buffer. While plasmid DNA renatures in correct conformation due to its circular and covalent nature, therefore, remains in the solution, genomic DNA precipitates due to random asociation of both the strands. Sodium dodecyl sulfate (SDS) reacts with potassium acetate and form insoluble potassium dodecyl sulfate (KDS).

**\*Luria-Broth [LB] Medium:**

To 950 ml of deionize H2O add 10g Tryptone, 5g yeast extract, and 10g NaCl. Shake until the solution dissolve. Adjust PH to 7.0 with 5N NaCl. Adjust the volume to 1L with deionize H2O. Sterilize by autoclave for 20 minutes at 15 psi on liquid cycle.

**Protocol:**

1. Remove 1.5 ml aliquot of the culture to a microcentrifuge tube. Repeat for the second culture in to a second microcentrifuge tube.
2. Centrifuge at 4°C, maximum speed for 5 minutes in a microfuge.
3. After centrifugation, remove the medium by aspiration, leaving the bacterial pellet as dry as possible.
4. Resuspend each bacterial pellet in 100 µl of ice cold alkaline lysis solution I. vortex vigorously.
5. Add 200 µl of freshly prepared alkaline lysis solution II to each bacterial suspension. Invert the tube rapidly 5 times. Store the tubes on ice.
6. Add 150 µl ice cold alkaline lysis solution III to each microcentrifuge tube. Invert the tubes 3-5 times. Incubate the tubes on ice for 3-5 minutes.
7. Centrifuge the bacterial lysate at maximum speed for 2 minutes. Transfer the supernatant to a fresh new labeled tube.
8. On each tube, add 2 volumes of ethanol. Vortex and allow the tubes to stand at room temperature for 2 minutes.
9. Centrifuge at maximum speed for 5 minutes. Orient the microcentrifuge tubes so that the plastic hinges point outwards. The precipitate will collect on inside surface of the tube furthest from the center of rotation.
10. Remove the supernatant by gentle aspiration.
11. Stand the tubes in an inverted position over a paper towel to allow all fluid to drain away.
12. Add 20 µl of 70% ethanol; invert the closed tube several times. Centrifuge at maximum speed for 5 minutes.
13. Remove the supernatant by gentle aspiration.
14. Remove any beads of ethanol from the sides of the tube. Leave tube open at room tempreture untile residual ethanol has evaporated.

15.Dissolve the pellet in 25 µl sterile water or TE and vortex the solution gently for few seconds. The DNA can be stored at -20 °C.