dialysis approach has been successfully used to generate tiny PNPs with a narrow size distribution (1) .A multi-tiered approach to preclinical characterization of nanomedicines involves physicochemical characterisation, sterility and pyrogenicity assessment, biodistribution, and toxicity characterization (12).d against a non-solventAkagi et al. used four organic solvents (DMSO, DMF, DMAc, and NMPy) to prepare PNPs from poly(?-glutamic acid) (PGGA)(3) They concluded that particles created with DMSO were smaller and had a narrower size dispersion than those prepared with NMPy.: The most prevalent supercritical fluid processing techniques include rapid expansion of supercritical solutions (RESS), the gas antisolvent process (GAS), the supercritical antisolvent process (SAS) and its different variations, and particles from gas-saturated solution (PGSS) processes (10).: In this regard, supercritical fluids (SCF) have emerged as an appealing alternative due to the use of environmentally benign technology, quick and reproducible scale up, good structural homogeneity control, and the creation of high purity nanomedicines(5) .Several experimental parameters might influence the shape and particle size distribution of the produced PNPs, including the sol-vent/non-solvent pair, dialysis MWCO, process temperature, polymer concentration, and solvent mixing speed [80].Typically, the polymer is dissolved in an organic solvent, inserted into the dialysis membrane, and dialyze : bASIC conditions include solvent miscibility and the presence of dilute polymer solutions.Jeong et al. employed a similar technique to create PLGA nanoparticles using DMAc, DMF, DMSO, and acetone as polymer solvents [82].: Supercritical carbon dioxide (scCO2) is the most commonly utilized SCF because it has mild critical conditions, is abundant, low-cost, non-flammable, non-toxic, and environmentally friendly(6).On the other hand, acetone produced bigger particles with an average size of 642 nm. This shift in particle size could be explained by differences in solvent viscosity, water miscibility, and polymer solubility.: supercritical fluid technologies The methods outlined in earlier sections require the use of organic solvents and surfactants, which are toxic to both the environment and physiological systems.In another study, Chronopoulou et al. investigated the effect of numerous experimental factors on the size and morphology of nanoparticles made from natural and synthetic polymers [80].Perrut and coworkers discussed the procedures employed to produce composite particles of poorly soluble active components (9).In addition, despite the availability of a variety of supercritical fluids, most polymers display low solubility or even non-solubility in supercritical fluids, which is the primary disadvantage of this technique.Although dialysis is a straightforward and frequent approach, the huge volume of counter dialyzing liquid may cause premature release of the nanoparticle payload due to the lengthy duration of the operation.For poly(methyl methacrylate) (PMMA) nanoparticles, a linear relationship between polymer content and nanosphere size was found.To tackle these challenges, research efforts have been dedicated toward developing ecologically friendly techniques for producing PNPs.In this approach, dialysis tubes or semipermeable membranes with an appropriate molecular weight cut-off (MWCO) serve as a physical barrier for the polymer(2) .3.