1. Blend water and nutrients to make a medium for the bacteria to grow in.
2. Heat up the growth medium to kill any living things that may contaminate the bioreactor.
3. Compress incoming air to same pressure as bioreactor.
4. Filter incoming air, removing contaminants.
5. Fermenter / bioreactor. E Coli are grown, then induced using lactose to produce mussel foot protein.
6. Storage tank.
7. Cool bioreactor contents down for more efficient centrifugation.
9. Re-suspend cells in lysis buffer.
10. Lyse cells, breaking them up and giving access to their contents.
11. Cool down cell remains mixture.
13. Re-suspend mixture in 25% acetic acid.
15. Centrifuge out non-acetic acid soluble materials. Mostly non-mussel foot proteins are lost here.
16. pH change increases efficiency of the affinity column.
17. Affinity column. Our protein has a tag on it, which binds to the substance in the column. Other materials flow through and the column can then be washed with an elution buffer (mostly urea) to release the protein of interest.
18. Cool down mixture once again, as membrane adsorption operates at 10 degrees Celsius.
19. Cool down input 5% acetic acid mixture.
20. Membrane adsorption. Fluids flow past a membrane to which some key components bind to the membrane, removing them from the solution.
21. Freeze drying removes excess water from the solution.
22. Tyrosinase reaction where the amino acid tyrosine is hydroxylated to DOPA in the adhesion proteins. DOPA is the main reason that these proteins are sticky.
23. Diafiltration uses dialysis to separate molecules. Small molecules can diffuse through the membrane while larger ones can not fit through the pores.
24. Centrifuge again to remove water and other non-protein lightweights.
25. Final product in acetic acid is stored here temporarily.