# JURIS

| RA Number & Name | | Date | Signed by: |
|---|---|---|---|
| **RA 3720** | Food, Drug, Cosmetics and Devices Act | June 22, 1963 | Ferdinand Marcos |
| **RA 5921** | Philippine Pharmacy Law | June 23, 1969 | Ferdinand Marcos |
| **RA 6425** | Dangerous Drugs Act of 1972 | March 30, 1972 | |
| **RA 6675** | Generics Act on 1988 | September 13,1988 | Fidel Ramos |
| **RA 7432** | Senior Citizens Act | February 7,1992 | Corazon Aquino |
| **RA 7394** | Consumer Act of the Philippines | April 13, 1992 | |
| **RA 7581** | Price Act | May 27,1992 | |
| **RA 7876** | Senior Citizen Center Act of the Philippines | February 14, 1995 | |
| **RA 8172** | Salt Iodization Nationwide Act | December 29, 1995 | Fidel Ramos |
| **RA 8203** | Special Law on Counterfeit Drugs | September 4, 19Num96 | Fidel Ramos |
| **RA 8293** | Intellectual Property Code | | |
| **RA 8424** | Tax Reform Act of 1997 | | |
| **RA 8432** | Traditional and Alternative Medicine Act | December 9,1997 | Fidel Ramos |
| **RA 8981** | PRC Modernization Act of 2000 | December 5, 2000 | |
| **RA 9165** | Comprehensive Dangerous Drugs Act of 2002 | June 7, 2002 | Gloria Arroyo |
| **RA 9257** | Expanded Senior Citizen's Act of 2003 | February 26, 2003 | Gloria Arroyo |
| **RA 9211** | Tobacco Regulation Act of 2003 | June 23, 2003 | Gloria Arroyo |
| **RA 9334** | Increase tax on alcohol | July 26,2004 | |
| **RA 9502** | Universally Accesible Cheaper and Quality Medicines Act of of 2008 | June 6, 2008 | Gloria Arroyo |
| **RA 9711** | Food & Drug Administration Act of 2009 | August 18,2009 | Gloria Arroyo |
| **RA 9994** | Expanded Senior Citizen's Act of 2010 | February 15, 2010 | |
| **RA 10351** | Restructing Excise Tax on Alcohol & Tobacco Products | July 23, 2012 | |
| **RA 10623** | Amended RA 7581 (Price Act) | July 23, 2912 | |
| **RA 10640** | Anti-Drug Campaign | July 22, 2013 | |
| **RA 10645** | PhilHealth Benefits for Senior Citizens | July 28,2014 | |
| **RA 10912** | Continuing Professional Development Act of 2016 | July 27, 2015 | |
| **RA 10918** | Philippine Pharmacy Act | July 21, 2016 | Benigno Aquino |

# PHYSICAL PHARMACY

| **Hydrogen-Lipophilic Balance** | $HLB = \frac{H}{L}$ | **Standard Conditions** | | **Ideal Gas Law** | | $PV = nRT$ |
|---|---|---|---|---|---|---|
| **A**nti-foaming | 1-3 | Temp | Kelvin (K) 273 + ºC | P | Pressure | atm |
| **W**ater in **o**il | 4-6 | Pressure | ATM (atmosphere) | V | Volume | L |
| **We**tting agents | 7-9 | 1 atm | 760 mmHg/ (torr) /76 cm Hg | n | Moles | $\frac{grams}{MW}$ |
| **O**il in **w**ater | 8-18 | | $1.01325 \times 10^6$ dynes/cm$^2$ | R | Universal Gas Constant | $0.08205 \frac{L \cdot atm}{n \cdot K}$ |
| **D**etergents | 13-16 | | $1.01325 \times 10^5$ N/m$^2$ or Pascal | T | Temperature | K |
| **S**olubilizer | 5-20 | | 1.01325 bar | **Density** | $\frac{mass}{volume}$ | $\frac{g}{mL}$ / $\frac{g}{L}$ |

| | **Constant** | **Formula** | | **Non-Ideal Gas Law**<br>**a** = correction for **pressure**<br>**b** = correction for **volume** | $\left[P - \frac{n2a}{V2}\right][V - nb] = nRT$ |
|---|---|---|---|---|---|
| Boyle's Law | Temperature | $P_1V_1 = P_2V_2$ | | | |
| Charles' Law | Pressure | $\frac{T1}{T2} = \frac{V1}{V2}$ | $\frac{T1}{T2} = \frac{V1}{V2}$ | **Clausius-Clapeyron Equation** | $log\left(\frac{P2}{P1}\right) = \frac{\Delta Hr\ (T2 - T1)}{2.303\ RT1T2}$ |
| Gay-Lusaac's | Volume | $\frac{P1}{T1} = \frac{P2}{T2}$ | $\frac{P1}{T1} = \frac{P2}{T2}$ | P: Pressure | Atm / mmHg |
| Avogadro's Law | | $\frac{V1}{V2} = \frac{N1}{N2}$ | | T: Temperature | K |
| Combined Gas Law | | $\frac{P1V1}{T1} = \frac{P2V2}{T2}$ | | R: Gas Constant | **SI** 8.314 Joules/n-K<br>**Non-SI** 1.987 Cal/n-K |
| **Dalton's Law of Partial Pressure** | | $P_T = P_1 + P_2 + P_3 \ldots\ P_{(n)}$ | | $\Delta Hr$: Latent Heat of Vaporization | J/n |
| **Raoult's Law** | $\Delta Vp = P_I^o - P_I$ | $\Delta Vp = X_{solute} \cdot P_I^o$ | $P_I = X_{solvent} \cdot P_I^o$ | **Specific gravity** | $\frac{\rho\ substance}{\rho\ standard}$ |

| Stokes Law | | | VOLUME | | $pKa = -logKa$ | $pKa + pKb = 14$ |
|---|---|---|---|---|---|---|
| V | Volume | $pKb = -logKb$ | | Vg = Vp + intraparticular space | $pKb = -logKb$ | |
| d | diameter | | True Volume (Vp) | Vb = Vp + Intra- + Inter- | **Weak Acid** | $pH = pKa + log\frac{[Sa]}{[Wa]}$ |
| $\rho s$ | Density-solid | | | Vb = Vg + interparticular space | **Weak Base** | $pH = pKa + log\frac{[Ba]}{[Sa]}$ |
| $\rho o$ | Density medium | $d = \sqrt{\frac{18n \cdot V}{(\rho s - \rho o)g}}$ | Intraparticular porosity | $\frac{Vg - Vp}{Vg}\ x\ 100$ | **Buffer Capacity / Index / Efficiency Value** | |
| $g$ | Gravity | | Interparticular porosity | $\frac{Vb - Vg}{Vb}\ x\ 100$ | $\frac{\Delta N}{\Delta pH} = \frac{Change\ in\ Normality}{Change\ in\ pH}$ | |
| $n$ | viscosity | | Total porosity | $\frac{Vb - Vp}{Vb}\ x\ 100$ | **Newtons Law of Flow** | |
| **COMPRESSIBILITY** | | | **Fluidity** | $\tan\theta = \frac{h}{r}$ | $N = \frac{F\ \rightarrow shear\ stress}{G\ \rightarrow\ rate\ of\ shear}$ | |
| **Carr's Index** | $CI = \frac{Vo - Vf}{Vo}\ x\ 100$ | | **Solubility** | $\frac{amt.of\ solute\ (g)}{volume\ of\ solvent\ (L)}$ | **Kinetic Viscosity** | Unit: Stokes |
| 0 = Vo = Vf | Not compressible | | **Molar solubility** | $\frac{amt.of\ solute\ (moles)}{volume\ of\ solution\ (L)}$ | $\frac{absolute\ viscosity}{Density}$ | |
| 1-99 = Vo > Vf | compressible | | **Molarity** | $\frac{mole}{L}$ | **Retrieve Viscosity** | No unit |
| 100 = Vf = O | Not possible | | **Molality** | $\frac{moles\ of\ solute}{kg\ solvent}$ | $\frac{absolute\ viscosity}{viscosity\ of\ water}$ | |
| **Hausner's Ratio** | $HR = \frac{Vo}{Vf}$ | | **Boiling Point Elevation** | | Kb ($H_2O$) = 0.52˚C/molal | |
| I = Vo = Vf | Not compressible | | ΔTb = Tbsoln-Tbº | ΔTb = mKb | ΔTb = imKb - electrolyte | |
| > 1 = Vo>Vf | Compressible | | **Freezing Point Depression** | | Kf ($H_2O$) = 1.86˚C/molal | |
| <1 = Vo = Vf | Not possible | | ΔTf = Tfº-soln | ΔTb = mKf | ΔKf = imKf - electrolyte | |

## Class I – add solute

### D Method

$$\frac{\frac{MW}{10}}{-1.86(i)} = \frac{\%}{-0.52}$$

**Strong electrolyte** $i = 2$

**Weak electrolyte**

| # ions | $i$ (80%) |
|---|---|
| 2 | 1.8 |
| 3 | 2.6 |
| 4 | 3.4 |
| 5 | 4.2 |

**Non electrolyte** $i = 1$

### E Method

Old

$$Evalue = 17\ \frac{Liso\ Drug}{MW\ Drug}$$

New

$$Evalue = \frac{MW\ NaCl}{iNaCl}\ x\ \frac{Liso\ Drug}{MW\ Drug}$$

| | | Liso |
|---|---|---|
| Non-elect | Sucrose, Urea, Glycerin | 1.9 |
| Weak elect | $H_3BO_3$, Cocaine, Phenobarbital | 2.0 |
| Divalent | $MgSO_4$, $ZnSO_4$ | 2.0 |
| Uni-uni | NaCl, KCl, Pilocarpine $NO_2$, Ephedrine $SO_4$ | 3.4 |
| Uni-di | $Na_2SO_4$, Atropine $SO_4$ | 4.3 |
| Di-uni | $ZnCl_2$, $CaBr_2$ | 4.8 |
| Mono-tri | Na Citrate, K Citrate | 5.2 |
| Tri-mono | $AlCl_3$, $FeCl_3$ | 6 |

## Class II – add solvent

### White Vincent Method

$$Vol\ of\ H2O = wt\ x\ E\ x\ 111.1$$

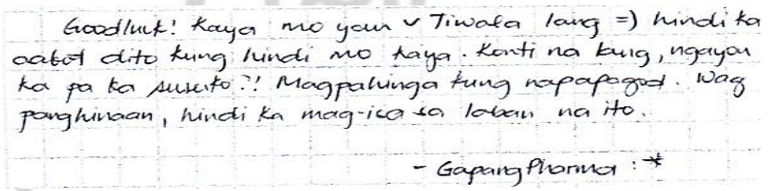
### Sprowl's Method

$$Vvalue = 0.3g\ x\ E\ x\ 111.1$$

### Newtons Law of Flow

$$N = \frac{F\ \rightarrow shear\ stress}{G\ \rightarrow\ rate\ of\ shear}$$

| Theories | Acid | Base |
|---|---|---|
| Arrhenius *hydrogen | H+ donor | H+ acceptor |
| Bronsted-Lowry *proton | Proton donor | Proton acceptor |
| Lewis *electron | Electron acceptor | Electron donor |




## REACTION KINETICS

| | Zero | First | Second |
|---|---|---|---|
| K (reaction Constant) | $\frac{Co - Ct}{t}$ | $In(\frac{Co}{Ct})(\frac{l}{t})$ | $\frac{Co - Ct}{Co\ \cdot\ Ct}\ (\frac{l}{t})$ |
| $t_{1/2}$ | $\frac{0.5\ Co}{Ko}$ | $\frac{0.693}{K1}$ | $\frac{1}{Co\ \cdot\ K2}$ |
| $t_{90}$ | $\frac{0.1\ Co}{Ko}$ | $\frac{0.105}{K1}$ | |
| Unit of K | $\frac{Conc.}{Time}$ | $\frac{1}{Time}$ | $\frac{1}{Conc.\ \cdot\ Time}$ |

# MANUF

| DEPARTMENTS OF MANUFACTURING PLANT |
|---|
| 1. Research & Development |
| 2. Production Department |
| 3. Warehouse Deparment |
| 4. Quality Assurance Department |
| 5. Quality Control Department |
| 6. Marketing Department |
| 7. Regulatory Department |
| 8. Engineering Department |
| 9. Medical Department |

| STAGES OF DRUG DEVELOPMENT | | |
|---|---|---|
| 1. Discovery & Development | | |
| 2. Pre-clinical Research | | |
| 3. Clinical Research | | |
| 4. FDA Review | | |
| Phase | | |
| 1 | Healthy human | Safety |
| 2 | Subj w/ dse. (Small) | Efficacy |
| 3 | Subj w/ dse. (Larger) | Safety & Efficacy |
| 4 | Post Marketing Surv. | |

| TABLET COMPONENTS | | | |
|---|---|---|---|
| 1. APIs | | 7. Colorants | |
| 2. Diluents/Fillers | LaSuSDiAMiMa | 8. Flavors | |
| 3. Binder | StAT GeSuCeP | 9. Sweeteners | |
| 4. Disintegrant | SCC | | |
| 5. Super disintegrants | | | |
| 6. Antifrictionals | LAG | | |

| TYPES OF PACKAGING | |
|---|---|
| Primary | Immediate container |
| Secondary | Outer Packaging |
| Tertiary | Corrugated box |

| CLASSIFICATION OF CONTAINERS | |
|---|---|
| **A. Protection Ability** | |
| 1. Well-Closed | 4. Light-resistant |
| 2. Tight | 5. Child-resistant |
| 3. Hermetic | 6. Tamper-resistant |
| **B. Quantity Held** | |
| 1.Single Unit | 2. Multiple Unit |
| **C. Materials Used** | |
| 1. Glass | 4. Rubber |
| 2. Plastic | 5. Metal |
| 3. Foils, Films & Laminates | |

| TYPES OF GLASSES | |
|---|---|
| I | Highly resistant Borosilicate glass |
| II | Treated Soda Lime Glass |
| III | Soda Lime Glass |
| IV | General Purpose |

| TYPES OF PLASTIC | |
|---|---|
| 1. Thermoplastic | 2. Thermoset |

| POLYMERS OF PLASTIC | |
|---|---|
| 1. PET (Polyethylene Terepthalate) | beverages |
| 2. HDPE (High-Density Polyethylene) | Thermoset for solid dosage forms |
| 3. PVC (Polyvinyl Chloride) | Less resistant to permeation |
| 4. LDPE (Low-Density Polyethylene) | Thermoplastic for squeeze bottles & medicine droppers |
| 5. Polypropylene | High temp, resistance |
| 6. Polystyrene | |
| 7. Others | |

| LABELLING | |
|---|---|
| 1. Name of the Product | 4. Rx Symbol |
| 2. Dosage form & strength | 5. Name & Complete address of Manufacturer, trader or distributor |
| 3. Pharmacologic category | 6. Net Content |

| STORAGE CONDITIONS | | 9C = 5F - 160 |
|---|---|---|
| Cold | NMT 8ºC<br>Freezer<br>→ -20 to -10 ºC | Refrigerator<br>→ 2-8 ºC |
| Cool | 8-15 ºC | |
| Room Temp | Temp. prevailing in the place | |
| Controlled RT | 20-25 ºC | |
| Warm | 30-40 ºC | |
| Excessive Heat | >40 ºC | |

| DILUENTS/FILLERS | SUPER DISINTEGRANTS | | | |
|---|---|---|---|---|
| 1. Lactose | 1. Sodium Starch Glycolate | Explotab ®, Primogel ® | | |
| 2. Sucrose | 2. Croscarmellose Na | Cross polymers | | |
| 3. Starch | 3. Crospovidone | | | |
| 4. Dibasic $CaHPO_4$ | **ANTIFRICTIONALS** | | | |
| 5. Anhydrous Lactose | Blue No.1 | Brilliant blue | Red No.40 | Allura Red |
| 6. Microcrystalline Cellulose | Blue No.2 | Indigotine | Yellow No.5 | Tartrazine |
| 7. Mannitol & Xylitol | Green No.3 | Fast Green | Yellow No.6 | Sunset Yellow |
| **BINDER** | Red No.3 | Erythrosine | | |
| 1. Starch | **FLAVORS** | | | |
| 2. Acacia | Salty | Cinnamon, Orange, Cherry, Butterscoth | SCCOB | |
| 3. Tragacanth | | | | |
| 4. Gelatins | Bitter | Chocolate, Cherry, Raspberry, Mint | Bitter C CRaM | |
| 5. Sucrose | | | | |
| 6. Cellulose | Sour | Raspberry, Lemon, Fruity | SouRaLF | |
| 7. PVP | Oily | Mint, Lemon, Orange | OiLeM | |
| | Unpleasant Sweet | Vanilla, Fruity | UnVF | |

| ANTIFRICTIONALS | | | |
|---|---|---|---|
| **3 Roles: Lubricant, Anti-adherent, Glidant** | | | |
| Stearates Mg,Ca,Na | 3 roles | | |
| Purified Talc | LA | | |
| Colloidal Talc | Glidant | | |
| Colloidal $SiO_2$ | | Cab-o-sil® | |
| Silicates Ca,Mg | Glidant | | |
| PEG & SLS | | | |

| SWEETENERS | | | |
|---|---|---|---|
| Sucralose | 1000x Splenda | Acesulfame K | 180-200x |
| Saccharin | 500x | Aspartame | 180-200x |
| Na Saccharin | 300x | Na cyclamate | 30x magic sugar |
| Equal = Acesulfame K + Aspartame | | | |

## PROCESS IN TABLET MANUF

Dispensing → Milling → Mixing → Granulation → Tableting → Coating

| **MILLING** EQUIPMENTS | **MIXING** EQUIPMENTS | **GRANULATION** | | **TABLETING** | |
|---|---|---|---|---|---|
| 1. Cutter Mill | 1. **Batch Type Mixer** | Methods: | | Parts: | |
| 2. Edge Runner Mill | a. Rotating Shell Mixer | 1. Wet Granulation | 2. Dry Granulation | 1. Hopper | 4. Punches |
| 3. Hammer Mill | ▪ Drum-type blender | Old Process | a. Slugging | 2. Feed Shoe | 5.Cam tracks |
| 4. Fluid Energy Mill | ▪ Slanted Position of the Cylindrical Drum | 1. Blending of Dry Ingredients | b. Roller Compaction | 3. Die | |
| 5. Roller Mill | | 2. Addition of Liquid Blender | | Types: | |
| 6. Ball Mill | b. Fixed Shell Mixer | 3. Screening of Damp Mass | | Single Station | Multiple Station |
| | ▪ Ribbon Blender | 4. Drying the Granulation | | Requirements: | |
| | ▪ Sigma Blade Mixer | 5. Screening the dry granules | | 1. Flowability | (2) |
| | ▪ Planetary Mixer | New Process | | 2. Compressiblity | |
| | ▪ Vertical Impeller | Fluid Bed Granulator | | | |

## TABLET DEFECTS

| **Process** | |
|---|---|
| 1. Capping | 3. Cracking |
| 2. Lamination | |
| **Excipients** | |
| 1. Chipping | 3. Picking |
| 2. Sticking | |
| **Machine** | |
| 1. Double impression | |
| **More than 1 factor** | |
| 1. Mottling | |

## COATING

| Equipments: | Examples |
|---|---|
| 1. Standards Coating Pan | Pellegrini Fan |
| 2. Perforated Coating Pan | Accela-Cota Pan, Glatt coater |
| 3. Fluid Bed Coater | Air suspension or Wurster process |
| Types: | |
| 1. Sugar-coating | 2. Film-coating |

### SUGAR-COATING STEPS

| | | |
|---|---|---|
| 1. Sealing | CAP Cellulose Acetate Pthalate | |
| | PVAP Polyvinyl | |
| 2. Subcoating | Alternate layers of Gum & Dusting Powders | |
| 3. Smoothing | 60-70% syrup | |
| 4. Color-coating | 60-70% syrup + colorant | |
| 5. Polishing | Beeswax & Carnauba wax | |

| FILM-COATING STEPS | | Examples |
|---|---|---|
| 1. Film-former | | |
| NonCeMeP | Non-enteric | Cellulose, Methacylate, PVP |
| | Enteric | Shellac, CAP, PVAP, salol |
| 2. Plasticizer | PlastiCErin | Castor oil, Glycerin |
| 3. Surfactant | | Polysorbate Tween® |
| 4. Alloying Substance | | PEG |
| 5. Glossant | | Beeswax |
| 6. Volatile solvent/vehicle | | Alcohol + Acetone |

### COATING DEFECTS

| | | |
|---|---|---|
| 1. Mottling | 6. Blistering | 11. Film Cracking Type I |
| 2. Sweating | 7. Blooming | 12. Film Cracking Type II |
| 3. Bridging | 8. Blushing | 13.Delayed dissolution |
| 4. Erosion | 9. Twinning | |
| 5. Cratering | 10. Orange Peel | |

## MANUFACTURING OF CAPSULES

| **A. Hard Gelatin Capsules** | | **B. Soft Gelatin Capsule** |
|---|---|---|
| Steps: | Special Technique | Method |
| 1. Supply | 1. Sealing | 1. Plate Process |
| 2. Rectification | ▪ Gelatin Bonding | 2. Rotary Die Process |
| 3.Separation | ▪ Heat welding | 3. Reciprocating Die Process |
| 4. Filling | ▪ Thermal coupling | |
| 5. Joining/Closing | 2. Imprinting | |
| 6.Finishing | 3. Coating | |

## MANUFACTURING OF SEMI-SOLID DOSAGE FORMS

| **A. Ointments** | | | |
|---|---|---|---|
| Methods: | 1. Incorporation method | 2. Fusion | |
| **B. Gels** | | | |
| Alginic Acid | Natural | Colloidal $SiO_2$ | Cab-o-sil® |
| Cellulose | | Mg Al Silicate | Veegum® |
| Tragacanth | | Carbomer | Carbopol® |

## MANUFACTURING OF LIQUID DOSAGE FORMS

| A. Equipments: | | | Components: | | Stability Enchancers | |
|---|---|---|---|---|---|---|
| 1. Mixing tanks | SS 304 | SS316 | 1. APIs | 4. Viscosity Enhancers | Preservatives | |
| 2. Mixers | ▪ Mechanical stirrer | ▪ Homogenizer | 2. Solvent or vehicle | 5. Humectant | Antioxidants | |
| | ▪ Colloidal Mill | ▪ Ultrasonifier | 3. Buffer | 6. Stability Enchancers | | |

| PRESERVATIVES | | ANTIOXIDANTS | | **SOLUTION** | | | |
|---|---|---|---|---|---|---|---|
| Parabens (p-hydroxybenzoic acid) | | ▪ True Antioxidants | | Dispensing → Mixing → Storage → Filtration → Filling & Aging | | | |
| **MOA:** taken by cell membrane of microorganisms & lysis the cell | | 1. Vit. E | 2. Alkylgalates | | | | |
| | | Butylated Hydroxy | 3. Toluene BHT | Co-solvents: Alcohol : Glycerin | | | |
| Methylparaben | molds | | 4. Anisole BHA | Membrane Filter | 0.22 µm | For sterile dosage from | |
| Ethylparaben | | ▪ Reducing Agents | | | 0.5 µm | Smallest bacteria | |
| Propylparaben | Yeasts & bacteria | 1. Vit. C | 3. Glutathione | | QC: Bubble point Test | | |
| Benzoic acid | Disrupting of Cell membrane | 2. Sulfites | | Filling | Gravimetric | Constant level | |
| Sorbic acid | | ▪ Antioxidant synergist | | **SUSPENSION** | | | |
| Benzyl alcohol | Protein denaturation | 1. EDTA | 3. Tartaric acid | Formulation: | | | |
| Chlorobutanol | | 2. Citric acid | | Suspending Agents | | Wetting agents | |
| Benzalkonium Cl | Disrupting of Cell membrane | Mnemonics | | Veegu | Bentonite magma | Glycerin | Syrup |
| | | Suspending | VeCeAT BeAGCa | Cellulose | Gelatin | PEG | Surfactant |
| Thimerosal & Phenylmercuric $NO_3$ | Cause enzyme inhibition | Wetting | SurfGlyPPS | Acacia | Agar | PPG | |
| | | Flocculating | Na/K Cl | Tragacanth | Carageenan | | |
| | | | | Flocculating agents | NaCl | KCl | |

| **EMULSION** | | | | | | | |
|---|---|---|---|---|---|---|---|
| Theories: | Key words | Carbohydrates | | Finely Divided Solid | | Instabilities: | |
| 1. Surface Tension | "spherical" | Acacia | Pectin | Bentonite | $AlOH_2$ | 1. Sedimentation | |
| 2. Oriented Wedge | "monomolecular" | Agar | Xanthan | $MgOH_2$ | | 2. Creaming | |
| 3. Interfacial Film | "Interface between the oil & water" | Carageenan | Tragacanth | Synthethic surfactants | | 3. Breaking/Cracking | |
| | | Protein | | a. Anionic | | 4. Phase inversion | |
| 4. Viscosity | "viscosity" | Gelatin | Casein | Soaps | | | |
| Emulsifying agents | | Eggyolk | Casein | Sodium Lauryl | Sulfate SLS | | |
| 1. Carbohydrates | 4. Finely Divided Solid | HMW alcohol | | | Ether SLE | | |
| 2. Proteins | 5. Synthethic Surfactants | Stearyl alcohol | | b. Cationic | Benzalkonium Cl | | |
| 3. HMW Alcohol | | Cetyl alcohol | | c. Amphoteric | Betaine (Cocamidopropyl betaine) | | |
| | | Glyceryl Monostearate | | d. Non-ionic | Span® & Tween® | | |
| | | Cholesterol | | Span® | Sebo | Sorbitan esters | Monostearate & Monoacetate |
| | | | | Tween® | Tubig | Polyoxyethylene sorbitane | |

## MANUFACTURING OF STERILE DOSAGE FORMS

### A. Sterilization method

| | Instrument | MOA | Condition | BI |
|---|---|---|---|---|
| Moist heat | Autoclave | Protein coagulation | 121˚C, 15psi, 15mins. | Bacillus stearothermophillus |
| Dry heat | Oven | Oxidation | 160-170 ˚C, 2-4hrs. | Bacillus subtilis |
| Membrane Filtration | | Physical separation | | Brevundimonas diminuta |
| Gas | Ethylene Oxide or β-popiolactone | Alkylation | | Bacillus subtilis |
| Ionizing radation | Gamma or cathode rays | DNA mutation | | Bacillus pumilus |

### B. Depyrogenation

| Oven settings | |
|---|---|
| 180˚C for 4hrs. | 600˚C for 1hr. |
| 250˚C for 45mins. | |

### C. Sterile Production Area

| Clean Room Parts: | |
|---|---|
| 1. Ante-room | ISO Class 100,000 |
| 2. Buffer Area | ISO Class 10,000 |
| 3. Compounding Area | |
| 4. Aseptic Filling Area | |
| 5. Quarantine Area | |
| 6. Finishing Area | |

### PROCEDURE

| | | | | | |
|---|---|---|---|---|---|
| 1. Dispensing & Cleaning | | 4. Filling | Net weight = solids | | |
| | | | Volumetric & Gravimetric for liquids | | |
| 2. Compounding | Spray drying & Freeze drying for sterile solids | 5. Sealing | Vials: Siliconiation or Halogenization | | |
| 3. Filtration | Clarification: 2-3 µm | | Ampules: | Tip/Bead sealing | |
| | Cold filtration: 0.2-2.3 µm | | | Pull sealing | |