Section

A

Pharmaceutical Technology

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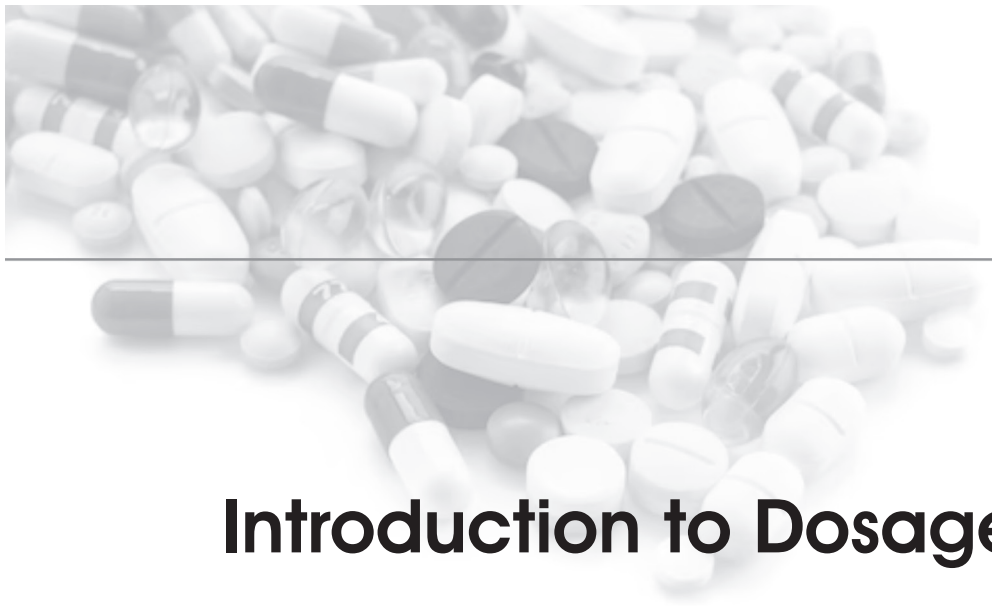

Chapter

1

Introduction to Dosage Forms

1. Which of the following is the correct definition of dosage forms?
(a) Pharmaceutical preparations produced from basic drug substances
(b) Pharmaceutical preparations suitable for direct application
(c) Registered industrial products, galenic preparations and preparations included in Formulae Normales
(d) All medical substances used for diagnostic, therapeutic or preventive purposes

2. What is/are the requirement(s) of the development of the dosage forms?
(a) Protection of the drug from degradation
(b) Mask the unpleasant taste and odor
(c) Provide dose accuracy
(d) All of the above

3. Which of the following statement is true?
(a) Drugs are always administered in their original pure state into the body
(b) Most of the dosage form is only contain non-drug components
(c) The additives are used to give a particular shape to the formulation, to increase its stability and also to increase palatability and improve elegancy
(d) All of the above

4. If the API has bitter test and unpleasant odour, which of the following dosage form best suited?
(a) Coted tablet
(b) Capsule
(c) Flavored syrup
(d) All of the above

5. Creams and ointments dosage form used for the purpose of:
(a) Better bioavailability
(b) Systemic action
(c) Maximum drug action at the topical administration sites
(d) All of the above

6. If the drug possesses lower water solubility, it can be formulated as:
(a) Syrup
(b) Gargles
(c) Suspension
(d) Mouth washes

7. Viscous liquid preparations used orally for the relief of cough: **[Kerala Pharmacist Grade 2 2018]**
(a) Gargles (b) Drops
(c) Elixirs (d) Linctuses

8. Solution of aromatic materials in alcohol known as:
(a) Syrup (b) Elixir
(c) Spirit (d) Aromatic water

9. Which of the dosage form intended for the internal use:
(a) Syrups
(b) Elixirs and linctus
(c) Drops and draughts
(d) All of the above

10. Choose the conditions for the development of enteric coated tablets:
[P] If the drug irritates the gastric mucosa
[Q] If the drug absorbs in the small intestine segment
[R] If the drug destroys in the gastric fluid
[S] If the action of drug required in the small intestine region locally
(a) Only P and Q
(b) Only Q, R and S
(c) Only P and S
(d) All P, Q, R and S

11. A dosage form contains the active ingredient in association with which of the following:
(a) Excipients (b) Impurities
(c) Adulterants (d) Containers

12. A drug is a substance that used for:
(a) Diagnosis
(b) Mitigation
(c) Treatment and cure
(d) All of the above

13. _____ are available in pharmacies and supermarkets without special restrictions:
(a) OTC (b) BTC
(c) POM (d) All of the above

14. Medication which affects the body as whole known as:
(a) Systematic medicine
(b) Behind the counter drug
(c) Organ medication
(d) Systemic drug

15. Liquid used as an intervening agent to reduce the particle size of a powder by grinding, usually in a mortar, known as:
(a) Vehicle (b) Solvent
(c) Media (d) Levigating agent

16. All of the following dosage form are administered by parenteral route *except*:
(a) Solutions (b) Ointment
(c) Suspensions (d) Emulsions

17. Choose the correct statement about the ointments, creams, pastes and plasters:
(a) They are semisolid dosage form
(b) they are introduced by the transdermal route of administration
(c) Both (a) and (b)
(d) They are express the better absorption rate into systemic circulation

18. Suppositories are which type of dosage form?
(a) Semisolid (b) Solid
(c) Liquid (d) Both (a) and (b)

19. Which of the following is the type of coarse dispersion?
(a) Suspension (b) Emulsion
(c) Both (a) and (b) (d) True solution

20. Aerosol is the type of gaseous dosage form which has the:
(a) Solution system (b) Emulsion system
(c) Suspension system (d) All of the above

21. Metabisulphites are the antioxidants with reducing action, used for:
(a) Acidic solution
(b) Basic solution
(c) Solution of intermediate pH
(d) Unbuffered solution

22. All of the above water-soluble synergist for antioxidant action *except*:
(a) Tartaric acid (b) Ascorbyl palmitate
(c) Citric acid (d) Ascorbic acid

23. Liquorice produce is the flavoring agent which having _____ taste.
(a) Salty (b) Sour
(c) Both (a) and (b) (d) Bitter

24. The best choice of a diluent for stock powders, especially when preparing capsules:
(a) Ascorbic acid (b) Talc
(c) Starch (d) Lactose

25. The water washability of cleansing creams or lotions increased by incorporating:
(a) Glycerin
(b) Ozokerite
(c) Sodium lauryl sulphate
(d) Lanoline

26. The sweetener which imparts metallic taste or bitter after taste among the following:
(a) Sodium saccharin (b) Sucrose
(c) Chloroform (d) Aspartame

27. The preservatives used in the formulation of tooth pastes is:
(a) Methyl paraben (b) Propyl paraben
(c) Benzoic acid (d) All the above

28. Agents that might be used to coat enteric-coated tablets include:
(a) Cellulose acetate phthalate (CAP)
(b) Syrup
(c) Hydroxy propyl methyl cellulose (HPMC)
(d) Carboxy methyl cellulose

29. Which one of the following formulations provides the slowest rate of drug absorption as compared with the others?
(a) Syrup (b) Elixir
(c) Aqueous solution (d) Tablet

30. Cyclodextrin used:
(a) As a buffering agent
(b) As a hydrotropic agent
(c) As a preservative
(d) As a solubility enhancing agent

31. Which one of the following is used as a preservative in ophthalmic preparations?
(a) Benzalkonium chloride
(b) Phenol
(c) Benzoic acid
(d) Chlorocresol

32. A commonly used antioxidant for oil system is:
(a) Butylated hydroxyl toluene
(b) Ascorbic acid
(c) Sodium metabisulfite
(d) Thioglycol

33. The role suspending agents in suspensions is:
(a) To increase viscosity
(b) To inhibit agglomeration
(c) To decrease the rate at which particles settle
(d) All of the above

34. Extended release dosage forms include:
(a) Controlled release dosage forms
(b) Sustained release dosage forms

(c) Long acting drug delivery system
(d) All of the above

35. Which of the following statements is *not* true about elixirs?
(a) Elixirs are solutions
(b) All elixirs contain alcohol
(c) The alcohol content of salt-containing elixirs should be high
(d) All elixirs have three or more components

36. Which of the following is are seed gum(s)?
[P] Guar gum **[Q]** Locust bean gum
[R] Xanthan gum **[S]** Gellan gum
(a) P and Q (b) R and S
(c) Q and R (d) P and S

37. 'Cresol with soap solution' is a preparation, in which soap is incorporated to:
(a) Impart detergent property
(b) Improve mutual miscibility of cresol and water by reducing critical solution temperature of cresol-water system
(c) Sustain the germicidal action of cresol
(d) Improve the stability of cresol

38. AC-Di-Sol:
(a) Internally cross-linked povidone
(b) Internally cross-linked potassium carboxy-methyl cellulose
(c) Externally cross-linked sodium carboxymethyl cellulose
(d) Internally cross-linked sodium carboxymethyl cellulose

39. Which one of the following is an example of the chemical modification of an active pharmaceutical ingredient?
(a) Converting a crystalline API into an amorphous form
(b) Combining a basic API with citric acid to produce the citrate salt of the API
(c) Mixing a poorly soluble API with water to produce a suspension
(d) Mixing a soluble API with water to produce a solution

40. What is the source of Cochineal and Spermaceti?
(a) Animal (b) Vegetable
(c) Mineral (d) Synthetic

41. In the pharmaceutical field gelatine used as:
(a) Constituent of capsule shell
(b) Coating agent
(c) Tablet binders
(d) All of the above

42. Certain cellulose derivatives are employed in syrups for which of the following reasons?
(a) Sweetener (b) Viscosity enhancer
(c) Flavoring (d) Caloric agent

43. Methyl paraben and propyl paraben are:
(a) Antifungal drugs
(b) Antibacterial preservatives
(c) Antifungal preservatives
(c) Increase shelf life of drugs

44. Benzoyl perioxide is: [GATE 1993]
(a) An astringent (b) An emollient
(c) A preservative (d) A keratolytic

45. Pharmaceuticals may be contaminated by all *except*: [AP DI 2012]
(a) Dust (b) Free organisms
(c) Poisonous gases (d) Droplets

46. All of the following are hydrophilic colloids obtain from animal sources *except*:
(a) Casein (b) Gelatin
(c) Lecithin (d) Alginates

47. Which of the following gases employed to displace air in a hermetically sealed container to enhance product stability:
(a) Carbon dioxide (b) Argon
(c) Nitrogen (d) Both (a) and (c)

48. Antifoaming agents act via:
(a) Increasing the surface tension
(b) Reducing the surface tension
(c) Increasing the solubility
(d) Reducing the contact angle

49. _____ are the substances that cause the *contraction or shrinkage of tissues* and that dry up secretions.
(a) Adsorbents (b) Astringents
(c) Adjuvants (d) Acidifiers

50. Which of the following work as desiccant?
(a) Zinc chloride (b) Calcium chloride
(c) Sodium chloride (d) Potassium bromide

ANSWER KEY

1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.	18.	19.	20.
(b)	(d)	(c)	(d)	(c)	(c)	(d)	(c)	(d)	(d)	(a)	(d)	(a)	(d)	(d)	(b)	(c)	(d)	(c)	(d)
21.	**22.**	**23.**	**24.**	**25.**	**26.**	**27.**	**28.**	**29.**	**30.**	**31.**	**32.**	**33.**	**34.**	**35.**	**36.**	**37.**	**38.**	**39.**	**40.**
(a)	(b)	(c)	(d)	(d)	(a)	(d)	(a)	(d)	(d)	(a)	(a)	(d)	(d)	(c)	(a)	(b)	(d)	(b)	(a)
41.	**42.**	**43.**	**44.**	**45.**	**46.**	**47.**	**48.**	**49.**	**50.**										
(d)	(b)	(c)	(d)	(c)	(d)	(d)	(b)	(b)	(b)										

EXPLANATIONS

1. (b) Pharmaceutical preparations suitable for direct application.

Drugs are rarely administered in their original pure state. They are converted into suitable formulations which are called dosage forms which are suitable for direct application. Every dosage form is a combination of the drug and other non-drug components.

2. (d) All of the above.

Transformation of the drug into different dosage forms is done for the following reasons:

- To protect the drug from oxidation
- To protect the drug from the destructive effect of gastric juice (HCl) of the stomach.
- To provide safe and convenient delivery of accurate dosage.
- To conceal the bitter, salty, or obnoxious taste or odor of a drug substance. Example: Capsules, coated tablets, and flavored syrups, etc.
- To provide optimum drug action through inhalation therapy.
- To provide drug into one of the body-cavities and to provide sustained release action.
- To provide maximum drug action from topical administration sites. Example: Creams, ointments, ophthalmic preparations.
- To provide a liquid dosage form of the drugs soluble in a suitable vehicle

3. (c) The additives are used to give a particular shape to the formulation, to increase its stability and also to increase palatability and improve elegancy.

Refer the explanation of question number 1.

4. (d) All of the above.

Refer the explanation of question number 2

5. (c) Maximum drug action at the topical administration sites.

Refer the explanation of question number 2

6. (c) Suspension.

Suspension: A liquid preparation that consists of solid particles dispersed throughout a liquid phase in which the particles are not soluble; may be oral, topical, otic, ophthalmic.

7. (d) Linctuses.

Linctuses are viscous liquid and oral preparations that are generally prescribed for the relief of cough. They contain medicaments that have demulcent, sedative, or expectorant action. Linctuses should be taken in small doses sipped and swallowed slowly without diluting it with water in order to have maximum and prolonged effect of medications. Gargles, drops and elixirs are not viscous liquid preparations used orally for the relief of cough. Gargles are solutions that are used to rinse the mouth and throat, usually for antiseptic or analgesic purposes. Drops are solutions or suspensions that are administered in small amounts into the eyes, ears or nose. Elixirs are clear, sweetened, hydroalcoholic solutions that are used as vehicles for oral administration of drugs.

8. (c) Spirit.

- The syrup is a solution containing a high concentration of sucrose or other sugars.
- Spirits are alcoholic or hydroalcoholic solutions of volatile substances. The active ingredient may be gas, liquid, or solid.
- Aromatic Water is the solution of aromatic material in water.

9. (d) All of the above.

Liquid preparations for internal use	*Liquid preparations for external use*
Example: Syrups, elixirs, linctus, drops, and draughts	(a) Liquids to be applied to the skin *Examples:* Liniments and lotions, etc. (b) Liquids meant for body cavities *Examples:* Gargles, throat paints, mouthwashes, eye drops, eye lotions, ear drops, nasal drops, sprays, and inhalation

10. (d) All P, Q, R and S.

An enteric coating is a polymer (pH-sensitive or smart) barrier applied to oral drug delivery systems (tablets and capsules) that prevents its dissolution or disintegration in the gastric environment. Most enteric coatings act by presenting a coated surface that is stable at the highly acidic pH found in the stomach but breaks down rapidly at a less acidic (relatively more basic) pH. Materials used for enteric coatings include CAP, CAT, PVAP and HPMCP, fatty acids, waxes, shellac, plastics, and plant fibers.

11. (a) Excipients.

Each dosage form is constituted by both drug and other non-drug components. The non-drug components are known as "**additives or excipient**". The additives are used to give a particular shape to the formulation, to increase its stability, and also to increase palatability and improve elegancy.

12. (d) All of the above.

A drug may be defined as an agent, intended for use in the diagnosis, mitigation, treatment, cure, or prevention of disease in man or animals.

13. (a) OTC.

Over-the-counter (OTC) drugs are medicines sold directly to a consumer without a prescription from a healthcare professional.

14. (d) Systemic drug.
Systemic therapy involves treatment with drug that affects the body as a whole or that acts specifically on systems such as the cardiovascular, respiratory, gastrointestinal, or nervous systems.

15. (d) Levigating agent.
Levigating agent: Liquid used as an intervening agent to reduce the particle size of a powder by grinding, usually in a mortar. Example: Mineral oil, glycerin and propylene glycol etc.

16. (b) Ointment.
Parenteral administration refers to any routes of administration that do not involve drug absorption via the GI tract (par = around, enteral = gastrointestinal), including the intravenous, intramuscular, subcutaneous, intradermal, etc. solution, suspension, and emulsion are dosage forms which are given by this route. Ointments are the topical preparations.

17. (c) Both (a) and (b).
Ointments, creams, pastes, and plasters are the most used semi solid dosage form which are applied topically for either local or systemic action. These dosage form has poor penetration via percutaneous route resulting has poor bioavailability.

18. (d) Both (a) and (b).
Suppositories are specially shaped solid or/semi-solid dosage form for insertion into body cavities, i.e. rectum, vagina, or the urethra.

19. (c) Both (a) and (b).
See Fig. 1.1.

20. (d) All of the above.
Aerosol is pressurized dosage form in which therapeutically active drug is dissolved or dispersed or suspended in compressed or liquefied gas to expel the content from the container in the form of spray upon activation of an appropriate valve system.

21. (a) Acidic solution.
Metabisulphites are reducing agents, which means they donate electrons to other substances. They are most effective in acidic solutions, where they can donate their electrons to oxygen molecules, preventing them from oxidizing other substances. In basic solutions, metabisulphites are less effective because they are more likely to react with hydroxide ions.

22. (b) Ascorbyl palmitate.
Tartaric acid, citric acid and ascorbic acid are expressed antioxidant action with synergistic effect which have water soluble characteristics. Ascorbyl palmitate is lipid soluble synergist for antioxidant action.

23. (c) Both (a) and (b).
Liquorice can be produced both sour and salty tastes.

24. (d) Lactose.
The most common diluent for capsule filling is lactose since it shows low chemical reactivity and non-toxicity and better water solubility.

25. (d) Sodium lauryl sulfate.
Among the all four-options, sodium lauryl sulfate is serving as surfactant with high HLB value (40) resulting in improved washing potential of cleansing cream.

26. (a) Sodium saccharin.
Sodium saccharin is synthetic sweetener which is 250–500 times more sweet than sugar but may leave bitter after taste and may be carcinogenic.

27. (d) All the above.
Sodium benzoate, propyl paraben, benzoic acid, methyl paraben, and ethyl paraben are the three most common preservative ingredients.

28. (a) Cellulose acetate phthalate (CAP).
Enteric coated materials:
1. Cellulose acetate phthalate (CAP)
2. Acrylate polymers (Eudragit L, S)
3. Hydroxypropyl methylcellulose phthalate (HPMCP)
4. Polyvinyl acetate phthalate (PVAP)

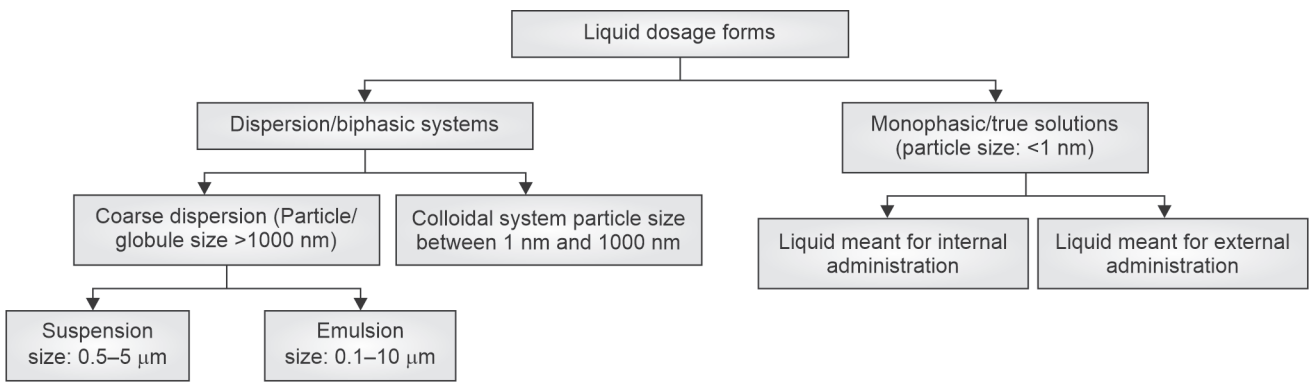

Fig. 1.1

29. (d) Tablet.

As a general rule, the bioavailability of a drug from various dosage forms decreases in the following order:

Solutions > Emulsions > Suspensions > Capsules > Tablets > Coated Tablets > Enteric Coated Tablets > Sustained Release Products.

30. (d) As a solubility enhancing agent.

Cyclodextrins have mainly been used as complexing agents to increase the aqueous solubility of poorly soluble drugs and to increase their bioavailability and stability in a few cases.

31. (a) Benzalkonium Chloride.

The most common preservatives in ophthalmic preparations are benzalkonium chloride, chlorobutanol, sodium perborate, and stabilized oxychloro complex.

32. (a) Butylated hydroxyl toluene.

Butylated hydroxyl toluene (BHT) is widely used to prevent oxidation in fluids (e.g. fuel, oil). Oxygen reacts preferentially with BHA or BHT rather than oxidizing fats or oils, thereby protecting them from spoilage.

33. (d) All of the above.

Suspending agent are also known as hydrophilic colloids which form colloidal dispersion with water and increase the viscosity of the continuous phase. Suspending agent form film around particle and decrease interparticle attraction. Suspending agents decrease the rate of settling of suspended particles.

34. (d) All of the above.

Controlled release, sustained release and long acting drug delivery system are act as extended drug release system.

35. (c) The alcohol content of salt- containing elixirs should be high.

Elixirs are sweet, clear, pleasantly flavoured, sweetened hydroalcoholic liquids intended for oral use. The alcohol content in salt containing elixirs is low.

36. (a) P and Q.

Many leguminous seeds contain galactomannans of related structures, called seed gums. Guar gum, Locust Bean Gum (LBG or carob seed gum), Phyllium Tamarind and Tara gum belong to this group of polysaccharides. They are commonly used as thickening and stabilizing agents.

37. (b) Improve mutual miscibility of cresol and water by reducing critical solution temperature of cresol-water system.

Cresol with soap solution is used as disinfectant during preparation soap is incorporated in the mixture of water and cresol which increase the mutual miscibility of both.

38. (d) Internally cross-linked sodium carboxy-methyl cellulose.

Ac-di-sol is cross-linked cellulose which is used as super-disintegrant in the manufacturing of tablet.

39. (b) Combining a basic API with citric acid to produce the citrate salt of the API.

Chemical modification of an active pharmaceutical ingredient (API) is the process of changing the chemical structure of the API in order to improve its properties. This can be done by adding or removing functional groups, or by changing the way the atoms are bonded together. Combining a basic API with citric acid to produce the citrate salt of the API is an example of chemical modification. The citrate salt is more soluble in water than the basic API, which can make it easier to formulate into a pharmaceutical product. The other options are not examples of chemical modification. Converting a crystalline API into an amorphous form is a physical change, not a chemical change. Mixing a poorly soluble API with water to produce a suspension or a soluble API with water to produce a solution are both methods of formulating an API, but they do not change the chemical structure of the API.

40. (a) Animal.

Both Cochineal and Spermaceti are obtained from animal sources.

- Cochineal is obtained from *D. coccus* (female cochineal insects).
- Spermaceti is a solid wax obtained from the head and blabber of the sperm whale, *Physeter macrocephalus Linn*. of the family Physeteridae.

41. (d) All of the above.

Gelatine also called puragel. It is obtained by the partial hydrolysis of collagen obtained from skin, white connective tissue and bones of animals. Gelatin is used primarily to make hard and soft gelatin capsule shells. It is also employed in the manufacturing of tablets, emulsions, suppositories and syrups.

42. (b) Viscosity enhancer.

Cellulose derivatives are extensively used for thickening (Viscosity enhancer) of pharmaceutical solutions and disperse systems such as emulsions and suspensions

43. (c) Antifungal preservatives.

Parabens are para hydroxybenzoic acid esters commonly referred as preservatives in pharmaceuticals, food and cosmetic products. Methyl- and propyl-parabens are the most common of these esters. Both serve as antifungal preservatives.

44. (d) A keratolytic.
Benzoyl peroxide (BPO) is a therapeutic agent for acne vulgaris, show antimicrobial, keratolytic, comedolytic and anti-inflammatory effects by free radicals generated in the process of degradation of the drug.

45. (c) Poisonous gases.
Poisonous gases do not any contaminating impact on to the pharmaceutical preparations.

46. (d) Alginates.
Alginate is a natural polymer extracted from brown seaweed; algae (plant). Alginate is used as thickening, gelling, and film forming agent. Casein, gelatin and lecithin are obtained from the animal sources.

47. (d) Both (a) and (c).
Carbon dioxide and nitrogen both are used in hermetically sealed containers to improve the self-life of product. These gases replace the oxygen containing air inside the container. This displacement, nullify the oxidation potential of air and create the inert environment in the container.

48. (b) Reducing the surface tension.
Antifoaming agents belong the surface-active substance category which decrease the surface tension via their surface activity (improving the adhesive forces).

49. (b) Astringents.
Astringents are the chemical substance that cause the contraction or shrinkage of tissues via either decrease the blood supply by narrowing the small blood vessels or abstract water from the tissue or coagulate the superficial tissue layers into a crust.

50. (b) Calcium chloride.
A desiccant is a hygroscopic substance that induces or sustains a state of dryness (desiccation) in its vicinity. Its action is opposite of a humectant.
Example: Calcium chloride.