TABLET MANUFACTURING

BY

ERNEST GOTTFRIED KUENZI

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Introductory Statement

Although the compressed tablet manufacture is one of the newer industries, its growth during the past ten years has been abnormal. Working formulas for tablets have been published from time to time, but as yet no standard formulary has been prepared. A text on tablet manufacture has been published by Wood but this discusses the subject of technique mainly. The experimental work conducted in the Practical Pharmacy laboratory along the line of tablet manufacture, the products being used by the Hospital Dispensary, emphasized the need of such a formulary. Hence an attempt is here made to assemble such formulas as may be of practical importance and arrange them in such a manner as to be serviceable. Two previous theses have been prepared by pharmacy students, on compressed tablets, one by R. W. Danuser and R. O. Schoen in 1902 and the second by H. P. Rief in 1912. Duplication of work has been avoided as much as possible although it seemed necessary in some instances especially in regard to the bibliography, so that a working formulary might be obtained.

Historical Statement

The manufacture of medicinal substances is a phase of pharmacy which is of quite recent origin and has been developed by leaps and bounds to the stage which it has reached at the present time.

William Brockedon an Englishman is undoubtedly the originator of the tablet machine and its compressed product. Brockedon was granted the English Patent No. 9977 in 1843 under the title "Shaping Pills, Lozenges and Black Lead by pressure in dies. The inventor put his invention into practical use and placed his goods on the English and American merket. Compressed tablets of potassium chlorate and sodium bicarbonate were commercially imported in 1854 by E. Milkau, a druggist of New York City, at the request of Commodore Perry. Frederick Brown of Philadelphia was one of the earliest druggists to stock Brokedon's goods. Brokedon sold his entire business to Messrs. Newbery a few years later, and later this firm became the well known firm of Burroughts, Wellcome Co., who are famous for "Tabloid" goods.

Jacob Dunton a graduate of the Philadelphia College of Pharmacy in 1855 was the first pharmacist to manufacture compressed tablets in the United States. He made medicinal tablets for the government in the early 60's. Dunton took out U. S. Patent No. 168240 in 1875 and No. 174790 in 1876. These patents included quinine tablets.

John Wyeth & Brother also Philadelphia druggist built the first rotary tablet machine in the year 1872. About this time Dr. Fuller conceived the idea of making tablets in molds and from his ideas we have the modern tablet triturate.

Professor Rosenthol of Erlangen, Germany, made a tablet machine during the year 1872. He described his machine at a session of the "Physicalisch-Medicinische Socictät." The tablet industry did not take very well in Germany because the pharmacy laws allowed only extemporaneous preparation of tablets.

In 1874 patents were issued to Dr. McFerran and Thomas J. Young of Philadelphia for automatic compressed "Pill" machines. The later was assigned to Henry Bower. Five years later Jabez H. Gill of Philadelphia was granted a patent on an improved machine. Patents were also issued to Charles Kilgore and C. T. Jones in 1882.

John Wyeth & Bros. originated the term "Compressed Tablets" and took out several trade marks covering the same.

For further details as to history and development of tablets see:

Kleber, A.J.Ph., 3, p. 822.

Wood, Tablet Manufacture.

Pharmacopoeial Tablets

Whereas the dispensing of medicines in tablet form is a practice of considerable magnitude, the introduction of tablets into pharmacopoeias, up to the present time has been neglected. The U.S.P. revision of 1910 contains but one viz.: Toxitabellae Hydrargyri Chloride Corrosive. A formula for the preparation of these is not included. The British Pharmacopoeias of 1885, 1898 and 1914 each contain one viz., Tabellae Trintrini. Other pharmacopoeias seem to have excluded this type of products. Commentaries comparable to our National Formulary have introduced tablets to a greater extent. Thus the British Pharmaceutical Codex of 1907 contains 50 tablet formulas. The revision of 1915 contains 54 formulas. The Ergaenzungs Buch zum Deutschen Arzneibuch contains but one viz: Tabulae Liquiritae cum Ammonio Chlorato.

The title Tabellae is found in other standards but is applied in many instances to tablet trinturates or lozenges. Compressed tablets only are considered in this work.

The following is a list of the tablets included in the standards mentioned above:-

1885. British Pharmacopoeia.

Tabellae Nitroglycerini.

1898. Tabellae Trinitrini.

1914. Tabellae Trinitrini.

1907 British Pharmaceutical Codex

Tabellae Apomorphinae

Tabellae Caffeine

Tabellae Cocaine

Tabellae Erythrolis

Tabellae Mentholis

Tabellae Trinitrini

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Tablettae Aloes et Nucis Vomicae et Belladonnae

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Tablettae Antipyrinae

Tablettae Bismuthi et Sodii Bicarbonatis

Tablettae Cascarae Sagradae

Tablettae Colocynthidis Compositae

Tablettae Erythrol Nitratis

Tablettae Ferri

Tablettae Ferri Carbonatis

Tablettae Galbani Compositae

Tablettae Glusidi

Tablettae Hydrargyri cum Creta

Tablettae Hydrargyri Subchloridi

Tablettae Hydrargyri Subchloridi Compositae

Tablettae Ipecacuanhae cum Scilla

Tablettae Nitroglycerini

Tablettae O Pii

Tablettae Pepsinae

Tablettae Phenacetini

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Tablettae Plumbi cum Opio

Tablettae Podophylli Compositae

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Tablettae Potassii Chloratis

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Tablettae Potassii Chloratis et Boracis et Cocaina

Tablettae Quininae et Ferri

Tablettae Quininae

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Tablettae Rhei et Sodae

Tablettae Santonini Compositae

Tablettae Saponis Compositae

Tablettae Scillae Compositae

Tablettae Sodii Bicarbonatis Compositae

Tablettae Sulphonali

Tablettae Suprarenales

Tablettae Thyroidei

Tablettae Zinci. Valerienatis Compositae

Tablettae Zingiberis Compositae

1915 British Pharmaceutical Codex

Tabellae Apomorphinae

Tabellae Caffeine

Tabellae Cocaine

Tabellae Erythrolis

Tabellae Mentholis

Tabellae Trinitrini

Tablettae Acetanilidi Compositae B.P.C.

Tablettae Acetanilidi Compositae cum Codeina B.P.C.

Tablettae Acidi Acetyl Salicylici B.P.C.

Tablettae Aloes et Ferri B.P.C.

Tablettae Aloes et Myrrhae B.P.C.

Tablettae Aloini Compositae B.P.C.

Tablettae Antipyrinae B.P.C.

Tablettae Bismuthi et Sodii Bicarbonatis B.P.C.

Tablettae Cascarae Sagradae B.P.C.

Tablettae Colocynthidis Compositae B.P.C.

Tablettae Erythrolis Tetranitratis B.P.C.

Tablettae Ferri B.P.C.

Tablettae Ferri Carbonatis B.P.C.

Tablettae Ferri Phosphatis cum Quinina et Strychnina B.P.C.

Tablettae Formaldehyde B.P.C.

Tablettae Galbani Compositae B.P.C.

Tablettae Glusidi B.P.C.

Tablettae Hydrargyri cum Creta B.P.C.

Tablettae Hydrargyri Subchloridi Compositae B.P.C.

Tablettae Ipecacuanhae cum Scillae B.P.C.

Tablettae Nitroglycerini B.P.C.

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Tablettae Thyroidei B.P.C.

Tablettae Zinci Valerienatis Compositae B.P.C.

Tablettae Zingiberis Compositae B.P.C.

1897 - Ergänzungs Buch zum Deutschen Arzneibuch.

Tabulae Liquiritae cum Ammonio Chlorato.

1906 - Erganzungs Buch zum Deutschen Arzneibuch.

Tabulae Liquiritae cum Ammonio Chlorato.

Bibliography, formulas and index to same.

Introductory Statement. Inasmuch as the literature collected is somewhat extensive, a detailed index was considered necessary in order to obtain the proper use of this information. The index is arranged alphabetically, based upon the subject material, whether it be method, function of ingredient, medicinal agent, etc. The bibliographical sheets and formulas are arranged chronologically. Within each year, the authors are arranged alphabetically. Hence, Absorbents 1911, Dunnet refers to the year of 1911, lettered. Where no author's name is given, such formulas are placed in the year, following the alphabetical arrangement of authors. The tablets listed under Pharmacopoeial Tablets are not included in this index.

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Theobroma Emulsion, Use of as granulating agent, 1906, Rodwell

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Weight, Variation in 1914, Briggs

Wilbert's Tablets, 1916

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BIBLIOGRAPHY

Sauter, A. 1880

Comprimirte Medicamente.

Pharm. Centralh, 21, p. 395

The author comments on the advantages of tablets over that of pills made with gum or Tragacanth. Tablets are porous even after great pressure has been applied in their manufacture. The porous nature of the tablet helps quick disintegration in the stomach.

The author continues his discussion by relating some of the difficulties of tablet manufacture. He emphasizes the necessity of absolute cleanliness of machinery and utensils.

Charcoal cannot be compressed even under a pressure of 500000 Kg. while all vegetable products - Lycopodium (Kamala) and salts are compressed very easily under a pressure of 8000 Kb. - 10000 Kg.

Sod. Salicylate is one of the most difficult substances to compress, because it sticks to the dies very easily.

Crystaline salts and magnesia are worked up very easily. Charcoal may be compressed by adding a small quantity of gum and moistening with dilute alcohol.

McFerran, J. A. 1893

The Preparation of Compressed Tablets.

Drug. Circ., 37, p. 152

A general discussion of tablet manufacturing by the retail pharmacist.

Bernegau, L. 1895

Kolatabletten.

Apoth. Zeit., 9, p. 704; (Pharm. Centralh., 35, p. 559; Proc. A. Ph. A., 43, p. 616).

The author gives a formula and method of preparation.

Formula

Kola powder	25.
Cacao	30.
Sugar powdered	70.
Aromatic Mixture	1.

In preparation of Kola powder the nuts are roasted and ground.

Thomas, D. J. 1895

Tablet Triturates.

A. Jour. Ph., 1894, p. 329 (Pro. A. Ph. A., 43, p. 617)

The writer comments upon the advantages and disadvantages of tablet triturates.

Edel, Frank 1896

The Making of Tablets.

Merck's Report, 5, p. 219

Tablets can be prepared in the pharmacist's own laboratory without difficulty. The lack of information on the subject is probably the main reason why so few pharmacists prepare their own tablets.

Professor Coblentz in his handbook of Pharmacy suggests the use of 5 per cent of powdered acacia and 10% of powdered sugar as adhesive agents. Starch and glucose may also be used.

Vaseline, talcum and boric acid are suggested as lubricants.

Geder, F. R. 1896

The Manufacture of Compressed Tablets.

Western Druggist, 18, p. 103

The writer describes the general process of manufacturing tablet and gives the following formulas:

Phenacetin	gr. 1000
Powdered Sugar	" 100

Mix carefully, then moisten with water, pass through a sieve and dry. When dry, spray with ethereal solution of petrolatum and mix on paper. Pass through sieve again after ether has evaporated. Make 200 tablets.

The following tablets may be made by using the same formula

Phenacetin and Salol
Antikamnia
Antihysine
Trional
Sulphonal
Bismuth Subnitrate
Bismuth Subgallate
Quinine Salicylate
Quinine Sulphate

The petrolatum may be replaced by talcum.

Sodium Benzoate	gr. 1000
Powdered Acacia	" 60

Moisten with water and proceed as in the proceeding formula.

Sodium Salicylate and Lithium Benzoate Tablets may be made by this formula.

Tablets of Calomel and Sodium Bicarbonate.

Calomel	gr. 200
Sodium Bicarbonate	" 200
Sugar powdered	" 30
Acacia powdered	" 16

Mix the calomel and 20 gr. of sugar, moisten and granulate; then mix the soda with 10 gr. of powdered sugar and the acacia and moisten and granulate. When both are dry mix in a mortar, reducing

to fine powder and moisten with alcohol granulate and dry. Make 200 tablets.

Tablets of Soda Mint

Sodium Bicarbonate	gr. 400
Powdered Acacia	" 60
Ammonium Carbonate	" 25
Oil of Peppermint	" 16

Mix thoroughly, moisten with water, granulate and dry. Lubricate with petrolatum. Make 100 tablets.

Hardwick, S. 1896

Tablet-Making at the Dispensing Counter.

Merck's Report, 5, p. 511

Salol, phenacetin and sulphonal tablet can be made by addition of one grain of starch to every five grains.

Bismuth subcarbonate and sodium bicarbonate compress well if the mixed powders are sprayed over with paraffin.

The author further suggests the use of powdered cacao in place of milk sugar to aid lubrication. Caffeine Citrate may be compressed without further additions.

Hardwick, Stewart 1896

Tablet Making at the Dispensing Counter.

YB. of Pharm. & Trans. Brit. Pharm. Conf., 1896, p. 311

The author advocates the use of an inexpensive tablet machine made by Messrs. Maw, Son & Thompson. Tablets of drugs given in small doses such as alkaloids, arsenious acid, calomel, grey powder, aloin podophyllin, and sulphide of lime should be made by mixing the drug with a sufficient quantity of sugar of milk to make the finished tablet weigh two grains. Heavy paraffin oil may be used to prevent sticking. Cocoa in powder form (from which the

oil has been expressed) may be used in place of milk sugar. The author gives the following formula

Medicament	as ordered
Cocoa powder	gr. ½
Sugar of milk q.s. ad	gr. 2

Finally the writer gives a list of mixtures and method of procedure for making tablets.

Leder, F. R. 1896

Compressed Tablets - Practical Suggestions Concerning their Preparation.

West. Drug. Mar. 1896, p. 103-105 (Pro. A. Ph. A., 44, p. 451.)

The author encourages pharmacists to make their own tablets and makes many practical suggestions. He advises the use of a No. 20 tined-wire sieve, for granulation. A list of substances which may be compressed without further preparation is given. The author advocates the use of 10% of powder sugar and petrolatum as a lubricant in the preparation of phenacetin, salol, antipyrin, anti kammia, trional, sulfonal, Bis. Subnitrate and Subgallate, quinine Salicylate and Sulphate. Active alkaloids should be mixed with sugar of milk and 10% of cane sugar.

Bernagau 1897

Tablets for Mouth Washes.

Brit. Y.B. Pharm. 1897, p. 265 (from Pharm. Centralhalle.)

The author recommends the following formula.

Heliotropin	.01 gram
Saccharin	.01
Salicylic Acid	.10
Menthol	1.
Sugar of Milk	5.
Spts. of Rose q.s. to make 100 tablets	

Eosin, chlorophyll, or indigo-carmine may be used as a coloring agent.

Cornelius, James 1897

Tablets - A Practical Machine for the Prescription Counter.

Am. Drug., Mar. 10, 1897, p. 160 (Proc. A. Ph. A., 45, p. 447.)

A description of the tablet machine which James Cornelius devised.

Hardwick, Stewart 1897

Compressed Tablets - Practical Hints for Making them at the Dispensing Counter.

Yrbk. of Pharm., 1896, pp. 311-313. (Pro. A. Ph. A., 45, p. 448)

The author gives practical hints for tablet manufacturing and recommends the use of liquid petrolatum as a lubricant. Cocoa from which the oil has been expressed may be used with excellent results. A list of combinations is given.

Edel, Frank 1898

Compressed Tablets and Tablet Triturates.

West. Drug., Apr. 1898, p. 155 (Pro. A. Ph. A., 46, p. 736).

The writer gives practical hints on the preparation of tablets-triturates and compressed tablets. He claims the pharmacist must be in a position to supply these goods as wanted.

Gibbs, R. Darton 1898

Tablet Compressor - A New and Advantageous Form for the Prescription Counter.

Pharm. Jour., Dec. 18, 1897, p. 548 (Proc. A. Ph. A., 46, p. 736).

Description of a new tablet compressor, The "Pazo" Machine.

Milner, Jas. W. 1898

Tablet Making - Practicability in Retail Stores.

Pro. Ala. Ph. A., 1897, pp. 22-23, (Pro. A. Ph. A., 46, p. 736).

The author comments on the advantage of tablet manufacture in the prescription departments of the retail stores. Would not the doctor be served better and would he not often come to you for tablets of special strength, rather than use those prepared by the manufacturer.

Thomas, D. J. 1900

Tablet Triturates - Increased Popularity.

Pro. Pa. Pharm. Assoc., 1899, pp. 169-171, (Pro. A. Ph. A., 48, 525).

The author gives statistical information concerning the manufacture and use of tablet triturates and of compressed and coated tablets.

Edel, Frank 1902

Compressed Tablets - Importance of Granulating the Ingredients.

Am. Drugg., Nov. 25, 1901, p. 311 (Pro. A. Ph. A., 50, p. 765).

The author gives practical suggestions based on six years of experience in tablet manufacturing and a description of a drying oven.

Hallberg, C. S..N. 1902

Compressed Tablets, Pills and Encapsulated Powders - Ratio of Disintegration.

Merck's Report, July, 1901, p. 211 (Pro. A. Ph. A., 50, p. 764).

The investigator gives a table of the ratio of disintegration of tablets, and he proposes several formulas for tablets, powders, pills, and

pastilles. His tables show that tablet triturates are most desirable.

Hance, A. M. 1902

Compressed Tablets - Solubility an Essential Quality.

Am. Journ. Ph. 74, p. 80 (Pro. A. Ph. A., 50, p. 765).

The author discusses the essential characters of compressed tablets in a paper read before the Philadelphia College of Pharmacy. He gives only general information, No formulas.

1902

Headache Tablet

Merck's Report,11, p. 366.

A Formula

Acetanilid	grains	300
Caffeine	"	50
Sodium Salicylate	"	400
Sugar	"	50
Powdered Acacia	"	25

Mix, moisten and pass through a sieve and dry. Lubricate with vaseline and when dry, pass through sieve again. Make 100 tablets.

1902

Die Gebrauchliche Hilfsmittel zur Darstellung von Arzneitabletten.

Pharm. Ztg. 47, p. 228. (Jb. der Pharm., 37, p. 461).

A description of machines and other apparatus used in tablet manufacture with illustrations.

1903

Tabellae Santonini Compositae

Merck's Report, 12, p. 361.

Formula

Santonin	1	grain
Mercurous Chloride	1	"
Chocolate Powder	2	"

Lightly compressed. They should be disintegrated in the mouth or crushed and given as powder.

Buckley 1903

Tablet-Machine - Simple Form for Hand Work.

Chem. and Drug., 61, p. 751 (Pro. A. Ph. A. 51, p. 669).

A description of the tablet machine placed on the market by Allen & Hanbury of London. The machine was perfected by Mr. Buckley.

Dreser, H. 1903

Zur Controle der einzelnen Tabletten und Pulver auf ihren Gehalt an starkwirkenden Arzneimitteln.

Therap. Monatshefte, 16, p. 415 (JB. der Pharm., 38, p. 411).

The author recommends the use of electricity for the estimation of the quantity of active ingredient, if the substance in question is electro active.

Gray, P. C. 1903

Tablets - Practical Hints.

Pro. N. Carol. Ph. Assoc., 1902, p. 54 (Pro. A. Ph. A., 51, p. 671).

The author makes some observations on tablet making and gives a few practical suggestions. For tablets composed almost entirely of milk sugar, a menstruum of three volumes of alcohol and one volume of water is preferable.

Moser, E. O. 1903

Anfertigung von Arzneitablatten.

Apoth. Ztg., 18, p. 291 (Jrbk. der Pharm. 38, p. 411).

In order to prepare medicinal tablets which are very soluble, the author treats plant fibers such as cotton, sponges, straw, turf, flas, and wood fibers until they become hydroscopic and then saturates them with medicinal solutions containing a high per cent of active ingredient. After drying, the mixture is compressed with high pressure.

St. Thomas' Hospital Pharmacy 1903

Tabellae Santonini Compositae

Brit. Y.B. Pharm., 1903, p. 281

Santonin	gr. 1
Calomel	" 1
Chocolate powder	" 2

Compress lightly. Tablet should be disintegrated in the mouth or crushed and given as a powder.

White, M. E.
Rodwell, H. 1903

Neue Vorschriften zur Bereitung von Tabletten.

Schweiz. Wochenchrift f. chem. u. Pharm., 41, p. 411. (Pharm. Centralh., 44, p. 832). (J.B.d. Pharm., 38, p. 411).

The authors give a formula for a new adhesive which reads as follows:

Oil of Theobroma	25 grams
Soap (medicinal)	5. "
Tragacanth	.5 "
Benzoic Acid	.25 "
Water	100. "

White & Rodwell 1903

Compressed Tablets.

Merck's Report 12, p. 350.

A contribution from St. Thomas Hospital Laborabory advocating the use of theobroma emulsion and ether-alcohol solution of theobroma in the manufacture of tablets in the dispensary.

Theobroma Emulsion

Oil of theobroma	25 parts
Hard Soap or Acacia	5 "
Tragacanth	.5 "
Benzoic Acid	.25 "
Water to	100.

Dissolve soap in 25 parts of water by aid of head, add the hot solution to the melted theobroma, and mix by agitation; shake in the tragacanth and benzoic acid then the remainder of the water.

In using this emulsion, substances to be compressed in fine powder are moistened enough to allow them to be shaken through a #20 or #30 sieve without pressure. Dry several hours before compressing.

Ether Alcohol Solution of Theobroma

Oil of Theobroma		1 fl. oz.
Ether	to	6 fl. oz.

Dissolve and add on equal volume of alcohol as required for use.

Remarks - Mixtures should be passed through a No. 30 sieve and then allowed to dry before compressing.

Formulas

I. Soda Mint.

Sod. Bicarbonate	40 parts
Oil of Peppermint	1 "
Theobroma Emulsion	8 "

2. Gray Powder.

Mercury with chalk	3 parts
Sugar powdered	2-7/8 "
Theobroma Emulsion	3/8 "

The dried product weighs 6 parts. To be used for one and two grain tablets.

3. Hutchinson's Pills.

Mercury and Chalk	3 parts
Compl powder of Ipecac	2 "
Theobroma Emulsion	1 "

When dried tablets weighing 2.1 grains will contain 1 grain each of the two constituents.

4. Bismuth and Soda.

Bismuth Carbonate	3 parts
Sod. Bicarbonate	2 "
Theobroma Emulsion	1 "

When dried, tablets weighing 5-1/3 grains will contain 3 grains of Bismuth Carbonate.

5. Thyroid Powder.

Dried Thyroid Gland	11 parts
Sugar Powdered	10 "
Theobroma Emulsion	3 "

When dried tablets will contain ½ their weight of dried thyroid. Do not compress too firmly.

6. Saccharin.

Saccharin	9 parts
Sod. Bicarb.	8 "
Theobroma emulsion	3 "

Dried tablets contain ½ their weight in saccharin.

7. Santonin and Calomel.

Calomel	
Santonin	
Cocoa	
Sugar	22 equal parts
Theobroma Emulsion	q.s.

This is made into 4 grain tablets tightly compressed, so as to be easily crushed for administration in powder form for children.

8. Compound Calomel Pill.

Calomel	1 part
Sulphurated Antimony	1 "
Guaiac Resin	2 "
Sugar	1 "
Theobroma Emulsion	0.5 "

9. Phenacetin.

Phenacetin	17.5 parts
Sugar	7. "
Glucose	.5 "
Theobroma Emulsion	2. "

The glucose should be added to the emulsion. This formula yields a coherent tablet with light pressure. Without glucose more pressure is necessary to avoid adhesion to dies.

10. Phenazone.

Phenazone	5 parts
Sugar	1 "
Glucose	.075 "
Theobroma Emulsion	q.s.

11. Quinine Sulphate.

Quinine Sulphate	5 parts
Sugar	2.5 "
Glucose	0.25 "
Theobroma Emulsion	1 "

12. Acetaniled Compound.

Acetanilid	2 parts
Caffeine Citrate	1 "
Sod. Bicarbonate	1 "
Glucose	.125 "
Theobroma Emulsion	.75 "

This formula represents Tabellae Acetanilidi Compl. of the St. Thomas Hospital Pharmacopoeia.

13. Opium.

Opium fine powder	2 parts
Sugar	1 "
Ether-alcohol Theobroma	0.75 "

14. Pepsin.

Pepsin	2 parts
Sugar	2 "
Ether Alcohol Theobroma	1 "

15. Cascara Sagrada.

Cas. Sag. powdered	2 parts
Sugar	1 "
Ether Alcohol Theobroma	q.s.

16. Compound Rhubarb.

Rhubarb	3 parts
Socotrine Aloes	2.25 "
Myrrh	1.5 "
Oil of Peppermint	.175 "
Sugar	4. "
Ether-Alcohol Theobroma	1.5 "

17. Podophyllin Compound.

Podophyllin Resin	1 part
Calomel	4 "
Alcoholic Ext. Belladonna	.66 "
Sugar	4. "
Ether-Alcohol Theobroma	1.5 "

Made into 2½ gr. tablets each containing 1 grain of calomel

18. Aloin Compound.

Aloin	8 parts
Ipecac	2 "
Ext. Nux Vomica	1 "
Sugar	4 "
Ether-Alcohol Theobroma	6 "

19. Aloes and Iron.

Barbados Aloes	2 parts
Exsicc. Ferrous Sulphate	1 "
Comp. Cinnamon powder	3 "
Sugar	3 "
Ether Alcohol Theobroma	1.25 "

The above represents official pill of Aloes and Iron.

Ambrose, C. A. 1904

Tablets - A Cheap and Good Machine.

Am. Drugg., 43, p. 95. (Pro. A. Ph. A., 52, p. 580).

A description of a small hand tablet machine.

Hunter, L. H. 1904

Medicinal Tablets - Manufacture

Western Drugg., 26, p. 219. (Pro. A. Ph. A. 52, p. 578).

This article is the first of a series on the various processes involved in the manufacture of medicinal tablets. The author gives a general discussion under the following headings:

Masses - Granulation
Mixing and wetting
Sieving and drying
Grinding
Special cases
Incompatibilities

Lloyd, Prof. John Uri.- 1904

Tablets - Austrian Regulation Concerning their Use.

Medical Gleanor

Midland Drugg., 5, p. 841. (Pro. A. Ph. A., 52, p. 577).

The author comments on the attitude which the Austrian government has taken against tablet manufacturing. The Austrian government has issued a regulation making it necessary to secure the consent of the Minister of the Interior before stocking any kind of compressed tablet. This restriction is due to a report of a government expert.

Meyer, Dr. 1904

Uber Sublimattabletten.

Schw. Uschr. f. Pharm., 41, p. 501. (Pro. A. Ph. A., 52, p. 581).

The author calls attention to a Swiss Specialty which presents corrosive sublimate tablets in effervescent form, which dissolve very rapidly. No formula or method of preparation is given.

Rodwell, Henry 1904

Compressed Tablets.

Merck's Report, 13, p. 323.

A discussion of tablet manufacturing under the following headings:-

Granulation
Disintegration
Compression

Several improved typical formulas are given

Phenacetin Tablets

Phenacetin	64 parts
Starch	4 "
Glucose	6 "
Theobroma Emulsion	13 "

The glucose may be incorporated by mixing it with the emulsion in a mortar.

Iron Tablet

Reduced Iron	16 parts
Gum Acacia	2 "
Starch	1 "
Sugar	4 "
Theobroma Emulsion	2 "

Iron Tablets

(a) Dried Ferrous Sulphate	150 parts
Gum Acacia	25 "
Sugar	125 "
Theobroma Emulsion	60 "

Granulate and dry thoroughly by application of heat.

(b) Sodium Bicarbonate	150 parts
Theobroma Emulsion	35 "

Granulate and dry thoroughly with heat and mix 2 parts of (a) with one part of (b).

Weideman, Geo. B. 1904

Compressed Tablets - Preliminary Treatment of Material.

Am. Jour. Pharm., 76, p. 30. (Pro. A. Ph. A. 52, p. 579).

The author advises the use of water, dilute alcohol, or a mixture of syrup and water as moisteners. Water makes a firmer granule. A No. 16 sieve should be used for larger tablets, a No. 20 for the smaller sizes. Manufacturers use liquid petrolatum as a lubricant. They use about 10 to 12 drops to a pound of mass and about 2% of talc, but in the authors estimation the talc alone is sufficient.

White, Edmund. 1904

Compressed Tablets - Preparation by aid of Emulsion of Oil of Theobroma.

Trans. Brit. Pharm. Conf., 1903, p. 487. (Pro. A. Ph. A., 52, p. 579).

The author gives the following formula for a theobroma emulsion which should be used in making

tablets.

Soap (hard)	5 parts
Water	25 "
Oil of Theobroma	25 "
Tragacanth or acacia	.5 "
Benzoic acid	.25 "
to make	100

The soap is dissolved in water by aid of heat, oil of theobroma added to hot solution, the other ingredients are added.

The substance to be compressed should be in powder form. Enough of the emulsion should be added so that the moist mass may be shaken through a No. 20 or 30 sieve without adhering to meshes or requiring pressure.

The mass should dry over night and is then ready for compression.

Part II

Ether alcohol solution of Theobroma.

This is applicable to vegetable drugs and is prepared by following formula.

Oil of Theobroma
Ether
Alcohol

The alcohol is added when required.

The author gives several formulas illustrating the two methods.

Wood, Jos. R. 1904

Tablets and Pills - Causes of Unsatisfactory Quality.

Pro. Rhode Island Pharm. Assoc., Jan. 1904 (Am. Drugg., 44, p. 105) (Pro. A. Ph. A., 52, p. 578).

The author discusses some of the causes of unsatisfactory character of tablets and pills so frequently complained of in medical and pharmaceutical journals. He claims smaller manufacturers

obtain poor results because the ingredients used are not always the best.

The physician should instruct his patient to take a draught of water with each dose to insure good results.

Lewis, S. Jadd 1905

Compressed Tablets - Disintegration Test.

Chem. & Drugg., 65, p. 1060. (Pro. A. Ph. A., 53, p. 593).

The author describes a devise for determining the readiness with which a compressed tablet is likely to break up in the stomach. It consists of a piece of muslin stretched over the top of a funnel, drum fashion, and on it rests a flat spiral of wire, about 1/32 of an inch thick on which the tablet is placed. At a height of six inches above the spiral is a jet from which one large drop of solvent falls on the tablet every second.

Lowry, Wm. J. 1906

Tablets of Insoluble Powder - Method of Securing Disintegration.

Pro. Md. Ph. Assoc., 1905, pp. 26-33 and 78-80. (Pro. A. Ph. A., 54, p. 663).

The author comments on difficulties of tablet manufacturing and advises the use of a cooked corn-starch paste, to insure disintegration of insoluble tablets.

Rodwell, H. 1906

Preparation of Compressed Tablets.

Pharm. Journ., 21, p. 826. (Y B. Pharm., 1906, p. 125).

The author having continued the investigation of White and Robinson gives further data on the use of Theobroma emulsion. The author also advocates the use of the ether-alcohol solution of theobroma.

1907

Iron Tablets.

Y. B. Pharm., 1907, p. 437.

Formula

Saccharated carbonate of iron 1000 grains

Liquid Glucose) equal parts q.s.
Water)
Lubricant, q.s.

Method:- Granulate with liquid glucose and water, dry and add the lubricant to produce 1,056 grains.

Press into tablets 1 3/5 gr. each = 1 gr. Blaud
3 1/5 " " 2 " "
4 4/5 " " 3 " "

Woolcock, J. U. 1908

Tablet Making.

Pharm. Jour. 26, p. 249. (Yrbk. Pharm. 1908, p. 319).

A general discussion of the rudiments of tablet manufacturing.

Woolcock, Uglow W. J. 1908

The Art of Tablet Making.

Pharm. Jour. 80, p. 249. (Pro. A. Ph. A., 56, p. 129).

The evolution of tablet making and general instructions. The author discusses his subject under the following heading:

1. Construction of formula (Medicament
Granulating agent
Adhesive
Disintegrator
Lubricant

2. Reduction of ingredients to a powder and incorporation of granulating agent.
3. Granulation.
4. Lubrication.
5. Compression.

Woolcock, W. J. U. 1908

The Art of Tablet Making.

Merck's Report, 17, p. 123

A general discussion of tablet manufacturing.

The following formula is given:
Tabellae Ferri Phosph. cum Formula Quinina et Strychnina

Iron Phosphate	9600	grains
Strychnine	100	"
Quinine Sulphate	2560	"
Sugar	2620	"
Starch	700	"
Lubricant	420	"

Method:-

Powder Quinine Sulphate. Rub down the Strychnine with the sugar, adding the latter in small quantities and mix thoroughly with the quinine sulphate. Add iron phosphate and 300 grains of starch, mix well and pass through a #60 sieve. Damp well with water and pass through a #20 sieve and set aside to dry. When dry add remainder of starch and lubricant. Weigh and divide into 3200 tablets each representing Easton's Syrup 1 dram. Use 5 fl. oz. 160 m H_2O

3/8 die 4 3/8 gr. each

Bachem, C. 1909

Zur Tablettenfrage.

Therap. Rundsch,, 1909, p. 785; (Jb. d. Pharm. 44, p. 347).

The author reports the results of his experiments on tablet disintegration and claims that in general tablets have some advantages over other

forms of medication.

Blaschnek 1909

Ueber die Herstellung von Tabletten.

Pharm. Post, 42, p. 169. (Yahresbericht d. Ph., 44, p. 347).

The experiences of the author indicate that tablets disintegrating easily in water can be made by the use of 12 to 15 per cent of dry starch without granulation. If enough pressure is applied the tablets will be sufficiently hard and can still be briken by the fingers.

Dowzard, Edwin 1909

Tablets Containing Chloroform - Assay and Relative Stability.

Am. J. Ph., 80, p. 511. (Pro. A.P.A., 57, p. 112).

The author discusses a method for determining the chloroform content of a tablet or lozenge and the relative stability of such tablets.

Schleimer, A. 1909

Compressed Tablets - Practical Directions for Prescription Quantities.

Nat. Drugg., 39, p. 54. (Pro. A. Ph. A., 57, p. 111).

The author gives practical directions for preparing small quantities by means of a little hand machine and advises the use of cocoa butter as a lubricant.

1910

Vorschriften zur Herstellung von Tabletten mid der Tabletten machine "Aesculap".

Apoth. Ztg., 25, p. 683. (Yrbk. d. Pharm. 45, p. 303).

The author gives stock formulas which are added to various medicinal substances before granulation.

#1

Sacch. Alb.		
Sacchar. Lactes	aa	45.
Talc		10

#2

Amyli Marant.	100.
Talc.	25.

#3

Sacchar. Lactis	70.
Talc	30.

Besides these stock formulas 14 special tablet formulas are given in which the preceding stock mixtures are used.

#1

Antipyrin	100.
Mixture #2	12.5

#2

Phenacetin Tablets

Phenacetin	100.
Mixture #2	12.5

#3

Acetylsasicylic acid tablet

Aspirin	100.	gm.
Mixture #2	12.5	

#4

Antifebrin Tablets

Antifebrin	100.	gm.
Mixture #2	12.5	"

#5

Salicylic Acid Tablets

Salicylic acid	100.	grm.
Mixture #2	12.5	"

#6

Salipyrin Tablets

Salipyrin	100.	gm.
Mixture #2	12.5	"

#7

Diethylbarbutiric Acid Tablets

Diethylbarbutiric acid	100.	grm.
Amyl Marant. Talc. aa	5	"

#8

Tannalbin Tablets

Tannalbin	100.	gm.
Mixture #2	12.5	"

#9

Salol Tablets

Salol	100.	gm.
Mixture #2	12.5	"

Salol is not to be granulated because its melting point is about 42°C.

#10

Quinine Tablets

Quinine Sulphate	100.	gm.
Amyl Marant.	10.	"

Granulate with absolute alcohol and add 5. gms. of talc. after drying.

#11

Rhubarb Tablets

Rhubarb

Granulate with dilute alcohol and pass through proper sieve.

#12

Potassium Iodide Tablets

Pot. Iodide	100.
Sod. Bicarbonate	5.

The tablets remain white by adding the $NaH.CO_3$

#13

Digitalis Tablets

Digitalis powder - no additions

1910

Mouth Wash Tablets

Merck's Report, 19, p. 142

Formula

Heliotropin	.01 Gm.
Garantoss	.01 "
Salicylic Acid	.01 "
Menthol	1. "
Milk Sugar	5. "
Spirit Rose	q.s.
	to make 100 tablets

Color with indigo carmene or chlorophyll.

1910

Die Selbstdarstellung von Tabletten.

Pharm. Ztg., 55, p. 797.

The pharmacist can compete with the manufacturer in making compressed tablets. He must make his own tablets in order to know that he is dispensing tablets containing best drugs in required quantities.

Drew 1910

Ueber Gelonida-Tabletten

Apoth. Ztg., 25, p. 80. (Yrbk. 47, p. 257).

The author suggests the use of Gelonide as a disintegrating agent. Gelonide is prepared by treating a quantity of gelatin with Formaldehyde; Trioxymethylengelatine is formed which can be powdered easily. The addition of 10% of this substance to a tablet mass, will cause instand disintegration of tablet into fine particles as it comes in contact with moisture. Gelonide absorbs moisture very rapidly. Disintegration is controlled by coating tablet with sugar or chocolate. The formaldehyde in a tablet weighing one gram is 1/10 mg. and need therefore not be taken into consideration.

1910

Die Selbstdarstellung von Tabletten.

Pharm. Ztg., 55, p. 797. (JB. d. Pharm. 45, p. 303).

The author warns pharmacists to make their own tablets, if they wish to retain some of the professional aspects of a pharmacy. He claims the individual pharmacist can prepare a tablet to equal that of the manufacturer.

1911

Guaiacol Carbonate and Menthol Tablets.

Yrbk. Pharm., 1911, p. 263.

The following formula is given

Guaiacol Carbonate	gr. 2
Menthol	gr. 1/6
Eucalyptol	gr. 1/6

1911

Diarrhea Tablets.

Merck's Report, 20, p. 262.

Formula

Powdered	Catechu	200 grains
"	Kino	100 "
"	Opium	20 "
"	Sugar	600 "
"	Acacia	175 "
Oil of Cinnamon		20 drops

To make 100 losenges.

Mass with mucilage of Acacia.

Bauermeister, W. 1911

Herstellung von in den Verdauungswegen leicht zerfallenden Arzneimittel enthaltenden Tabletten.

Jb. der Pharm., 46, p. 247 (from Ebenda, p. 447).

The author prepared tablets which disintegrate very easily, by a patented process in which he adds gas forming organic ferments to the mass. If enteric tablets are wanted an enzyme is added which will only act in a neutral or alkaline medium.

Dunnet, David 1911

Practical Notes on Tablet Making.

Chem. and Drugg., 78, p. 206. (Yrbk. Pharm., 1911, p. 302).

The author discusses granulation and gives a list of suitable agents under proper subdivisions as follows:

Absorbents - Pulv. Rad. Althaeae
Pulv. Glycyrrhizae.

Lubricants - Pulv. Theobroma Comp. (White & Robinson)
Pulv. Cretae Gallis
Pulv. Cacao

Hofman, J. J. 1911

Kompsimierte Tabletten.

Pharm. Weekbl., 48, p. 968 (Jahresbericht der Pharmazie, 46, p. 247).

A treatise on tablet manufacturing and a description of necessary machinery.

Linhart, Joseph 1911

Making Tablet Triturates.

Drugg. Circ. 55, p. 124.

Directions for making tablet triturates. The author advises the amateur to prepare tablet triturates from sugar of milk alone, until he can prepare them successfully, then he may go ahead and prepare tablet triturates containing active ingredients.

Mosely, W. 1911

Manufacture of Tablets.

Pharm. Jour. 31, p. 123. Ibid., 32, p. 6. (Yrbk. Pharm. 1911, p. 302).

A series of practical instructions in tablet-making enabling the pharmacist to prepare his own tablets with facility. Illustrations of simple apparatus required for this purpose are given.

Orr, Forrest H. 1911

Making Tablet Triturates.

Drugg. Circ., 55, p. 137.

The writer used a diluent composed of five parts of milk sugar and one part of cane sugar in preparing tablet triturates. He moistens his mixture with a liquid excipient composed of five parts of alcohol and one of water. One-half dram is usually enough for fifty tablets.

A formula for 1000 - ¼ gr.

Morphine Sulphate tablet triturates follows

Morphine Sulphate	250 grams
Milk Sugar	995 "
Cane Sugar	199 "
Alcohol (80%)	about 1 to 1½ ounces

Seel, E.
Friedrich, A. 1911

Uber die Ursachen Ungleichmassiger und minderwertiger Wirkung einiger Anzneimittel in Tablettenform.

Med. Klinik, 1911, pp. 886-927. (Pharm. Ztg., 56, p. 363.) (JB. d. Pharm. 47, p. 247).

The authors show that the chief reason for the unequal value of various tablets are impurities and improper storage. German Law requires the pharmacist to make qualatative and quantitative tests of all stock bought from manufacturers, if the letter of the law were followed doctors would have little trouble in obtaining pure medicinal tablets.

Seel, Eugene
Friederich, Albert 1911

Uber Arzneitabletten mid besonderer Berücksichtigung ihrer Untersuchung.

Pharm. Centralh., 52, p. 991, 1055, 1115, 1187 (JB. d. Pharm., 46, p. 247).

The author discusses the advantage of tablet medication in the German Army. The author gives a general review of tablet manufacturing and advises that as little talc should be used as possible, for talc produces a hard tablet. He prefers starch because it is a desintegrator and not a hindrance in the breaking up of a tablet.

1912

Faults of Tablet Medication.

J.A.M.A. (I.A. Ph. Assoc., 1, p. 90).

Compressed tablets are valueless because speed of solution of most tablets on the market is problematical, hence tablets should be redissolved if immediate action is wanted. Bromide tablets should always be dissolved in water before administering. The author claims the use of $KClO_3$ tablets is dangerous.

Bernegau, L. H.
E'We, E. 1912

Asafoetida Tablets - Assay.

Pro. Penn. Ph. Assoc., 1912, p. 305 (Yrbk. A. Ph. A., 1, p. 67).

The authors recommend a method of assay.

Hoffmann, J. 1912

Zur Herstellung von Komprimierten Tabletten.

Pharm. Centralh 53, p. 515. (Yrbk. Pharm., 1912, p. 337) from Pharm. Weekbl. 1911, No. 34.

To every 100 Gm. of Acetylsalicylic acid, of phenacetin, of salipyrine, of tannalbin, 12.5 Gm. of a mixture of arrowroot 100 parts and French chalk 25 parts are added. The mixed powders are moistened with alcohol, granulated and compressed.

With antipyrine use 12.5 Gm. of the following mixture for every 100 Gm.

Lactose 70 parts
French Chalk 30 "

With quinine, 10 Grams of arrowroot are mixed with 100 grams of the drug, dampened with absolute alcohol, granulated and compressed. The dry powder is mixed with 5 Gm. of French Chalk.

With 100 Grams of Sod. Bicarbonate, mix 10 Gm. of milk sugar and 2 gm. of French chalk, dampened

with spirit, granulate, dry, and then mix with 2 Gm. of French Chalk. Rhubarb merely requires dampening with dilute spirit, granulating, drying and compressing.

Hoyer, Jos. 1912

Die Herstellung von Arzneitabletten in der Apotheke.

Pharm. Ztg., 57, p. 114 (Yrbk. d. Pharm. 48, p. 275).

The author gives a general review of tablet manufacturing and gives formulas for about forty different chemicals with proper moistening agents.

1) Acetanilid 250.
Starch 50.
Granulate witn 70% alcohol

2) Acid Acetylsalicylic should be granulated
Starch 10%
With 70% alcohol

3) Acid Citricum 100.
Sacch. lactis 50.
Moisten with absolute alcohol and dry at a heat of 25°C. Finally dry in dessicator.

4) Tannic Acid 20.
Sacch. lactis 80.
Moisten with 58% alcohol and dry well before compressing.

Amidopyrin
Amm. Brom. to be compressed without any
Ammon. Chlor. additions
Antipyrine crystals

Antipyrin salicylate 100.
Starch 10.

Bismuth preparations are mixed with 1/3 to ½ of Sacch. lactis.

Bismuth Salicylate 50.
Sacch. lactis
Sacch. alba aa 25.
Moisten with water and dry at 25°C.

Charcoal 10.
Sacch. Alb. 4.
Gum Arabic 1.
Moisten with water and dry well

Quinine bisulphate 100.
Sacch. Lactis 50.
Moisten with 90% alcohol and dry at low temperature.

Quinine hydrochloride 100.
Sacc. lactis
Amyl Oryzae aa 50.
Granulate with 90% alcohol and dry

Quinine Sulphate 300.
Milk Sugar 100.
Citric acid 100.
Granulate with absolute alcohol and compress in a warm room

Chloral Hydrate in medium powder, dry and compress without other additions.

Salol 100.
Sugar of milk 10.
Granulate with alcohol

Sulphonal
Sugar of milk 10-20%
Moisten with 70% alcohol

The following are to be dried and compressed without further additions:

Notropin
Pot. Chlorate
Pot. Iodide
Sod. Iodate

To be compressed at once

Sod. Salicylate
Sod. carbonate
Sod. bromate

Hoyer, Jos. 1912

Tablets: Their Manufacture by the Pharmacist.

Ph. Post, 1912, No. 2, 4, 6, 10, 12.

The author deplores the fact that the market is flooded with tablets manufactured in factories and suggests tablet manufacture for the pharmacist. He relates his own experiences in a series of articles.

1913

Formaldehyde Tablets.

Nat. Drugg., 43, p. 313, (Jb. d. Pharm., 48, p. 242).

A formula for formaldehyde tablets which reads as follows:

Sol. Formaldehyde	22.5 Grams
Powd. Sacch. Lactis	15.
Citric Acid powd.	1.
Oil of Lemon	.6
Powdered Sugar	80.
Emulsion of cocoa butter	q.s.

Method:

Mix formaldehyde with sugar until a uniform paste is obtained, dry with constant stirring at a moderate heat on water bath; powder and mix with other ingredients. Mix with Emulsion of Theobroma and make 100 tablets.

1913

Tablets for Seasickness.

Yrbk. Pharm., 1913, p. 334.

Formula:

Sodium Bromide	5 Gms.
Magnesium Oxide (heavy)	2. "
Validol	2. "
To make	10 tablets

1913

Tablets of Pancreatin

Nat. Drugg., 43, p. 360.

Formula

Pancreatin	16. Gm.
Sod. Bicarbonate	64. "
Sugar powdered	16. "

Mass with emulsion of cacao butter and divide into 100 tablets.

Chamberlain, P. G. 1913

Tablet Making for the Retailer.

Trans. Brit. Pharm. Conf., 1913, p. 533. (Yrbk. A. Ph. A., 2, p. 80).

The author discusses the advantage of the tablet over pill medication, and gives a description of the various operations involved in the manufacture of tablets. A description of a hot water table for drying granules is given.

E'We, G. E. 1913

Medicinal Tablets - Commercial Quality.

Pro. Penn. Ph. Assoc., 1913, p. 83 (Yrbk. A. Ph. A., 2, p. 81).

The author calls attention to a sample of Boric Acid and Buchu Compound Tablets which were lighter than average weight stated.

Fantus Bernard 1913

Candy Tablets - A Suitable Form of Medicament for Children.

Journ. A. Ph. A., 2, p. 95 (Yrbk. A. Ph. A., 2, p. 82).

The author strongly advocates candy medication for children and advises pharmacists to prepare tablets themselves. He gives the following typical formula for a candy tablet:

Arsenic Trioxide	1/100 Grain
Arsenic Trioxide	1
Paraffin, low melting point	9
Talc	9
Malachite green 1% sol. mm.	10

Spts. of Peppermint mm. 5
Powdered sugar gr. 281
5/16 die weight of tablet gr. 3

1914

Borax Tablets.

Nat. Drugg., 44, p. 22 (Pharm. Ztg.)

Formula

Borax	100. Gms.
Sugar Powdered	900. "
Decoction of Benzoin	15. "
Mucilage of Tragacanth	25. "

Sufficient water is added to make a stiff paste, which is cut into 1000 tablets.

Beringer, Geo. M. 1914

Mercuric Chloride Tablets - Pharmacopoeial Formulas and Titles.

Proc. N.J. Ph. Assoc. 1914 (Y.B. A. Ph. A., 3, p. 95).

A review of formulas and titles for corrosive sublimate tablets in foreign Pharmacopoeias. He recommends the use of the Angeres formula in which equal parts of mercuric chloride and sodium chloride is used. He proposes as the official U.S.P. title "Toxitabellae Hydrargyri Chloridi Corrosive" and recommends a coffin shaped tablet.

Briggs, C. H. 1914

Compressed Tablets - How Much Should They Vary in Weight.

J. A. Ph. A., 3, p. 31 (Yrbk. A. Ph. A., 3, p. 92).

Tablets are by far the most accurate means of dispensing medicine. A variation of 10% is permissible.

Bernard Fantus 1914

The Making of Tablets by the Retail Druggist.

J. A. Ph. Assn., 3, p. 72.

The author discusses the advantage of the tablet medication, the use of a solid fat as a lubricant and inexpensive tablet machines.

Bernard Fantus, M. D. 1914

Tabellae Dulces, Sweet Tablets for Children's Medication.

J. A. Ph. A., 3, p. 656.

The author expresses the need of palatable preparations for children and suggests the use of Alcresta alkaloids which are tasteless. Strychnine and Quinine are the only alkaloids which do not lose the bitter flavor by the Alcresta process. The author suggests the use of tartaric acid with Strychnine and glycyrrhiza and a tannin with quinine. He advocates the use of sugar chocolate and licorice in tablet manufacture and gives the following formulas:

Tabellae Terpin Hydratis Dulcis	gr. ½
Terpin Hydrate	50 grains
Paraffin shavings	15 "
Trof. Curcuma	60 mm.
Sp. of Rose 10%	5 mm.
Powd. Sugar	435 gr.

Method-

Mix T. Hyd. with sugar, the coloring and the flavoring by trituration in a mortar, incorporate paraffin by gentle trituration compress 3/8 in. die to make 100 5 gr. tablets. Two tablets = 1 oz. of NF Elx of T.H.

Tabellae Acetphenetidini Dulcis	gr. ½
Acetphenetidin	50 gr.
Powd. Cacao	100
Tr. vanilla	15 mm
Powd. sugar	350

3/8 - die. to make 100 5 gr. tablets.

Tabellae Antipyrinae Dulcis gr. ½

Antipyrin	50 gr.
Ext Glycy. powd.	25 gr.
Carmel 50% sol.	30 mm
Sp. Anise 18%	8 mm
Sp. Coriander 10%	4 mm
Powd. sugar	425

3/8 - die. to make 100 - 5 gr. tablets.

Jones, H. W. 1914

Medicinal Tablets - Assay Difficulties.

Am. Drug. 62, p. 369 (Yrbk. A. Ph. A., 3, p. 93).

A discussion of various methods of assaying tablets.

Kebler, L. F. 1914

The Tablet Industry - Its Evolution and Present Status - The Composition of Tablets and Methods of Analysis.

J. A. Ph. A., 3, pp. 820, 937, 1062.

A historical review of the tablet industry. Description of various types of early machines. The writer gives a general discussion of bases, disintegrators, absorbents, lubricants and fillers.

Lundin, P. E. 1914

Ueber die Herstellung leicht Zerfallender Tabletten, besonders solcher von Acetylsalicylsaure.

Farmaceutisk Revy, 1914, No. 20, 21. (Pharm. Ztg., 59, p. 548) (Yrbk. A. Ph. A., 3, p. 92).

The author discusses older and newer methods used in imparting friability to tablets and suggests the following formulas for Acetylsalicylic acid Tablets.

#1

Acid Acetylsalicyl	100
Amyl. Marant.	10
Amyl. Osyzae	10

#2

Aspiring	grams	100
Amyl. Marant		7.5
Amyl. Osyzae		7.5
Agar-Agar pulv.		5.

The second formula is best. Used 90% alcohol for granulation.

Raubenheimer, Otto 1914

Shape of Tablets for External Use.

J. A. Ph. A., 3, p. 1158 (Yrbk. A. Ph. A., 3, p. 95).

A discussion of shape and color of poisonous tablets.

Conclusions:-

1. Either the U.S.P. or N.F. should adopt a general chapter on tablets.

2. The tablet should be square and flat.

3. Poisonous tablets intended for external use should have the same square shape, should be colored blue and should be wrapped individually with black paper, which in white ink bears the word "Poison".

Rippetoe, J. R.
Smith, N. 1914

Deterioration of Nitroglycerin Tablets.

J.A.Ph.A., 3, p. 96. (Yrbk. A.Ph.A., 3, p. 96).

The authors have made several analysis of nitroglycerin tablets because of the varied difference of opinion regarding their stability. They give tabulated results and reach the conclusion that nitroglycerin volatalizes during granulation but after compression and storing in bottles sealed with a cork, the deterioration stops almost completely.

Vanderkleed, Chas. E. & E'We, E. 1914

Compressed Tablets.

Pro. Penn. Ph. Assoc., 1914, p. 277. (Yrbk. A. Ph. A., 3, p. 92).

The authors claim that the fine powder which settles at the bottom of the granulation should not be regranulated, for they have found that it is as much as ten per cent low in active ingredients.

Mueller, Bertha S. 1915

A note on Compressed Tablets.

Am. Jour. Pharm., 87, p. 197.

White Dextrin is generally used as a diluent and disintegrator in commercial compressed tablets and tablet triturates.

Acetysalicylic Acid tablets contain about 30% of this diluent while those of basic bismuth salts and of salol contain between 40 and 50% of it.

Sodium salicylate does not need a disintegrator.

1915

Digestive Tablets.

Natl. Drug., 45, p. 23. (Yrbk. Pharm. 1915, p. 351).

A formula for a digestive tablet.

Diastase	gr. 25
Mag. Carb. Pond.	gr. 500
Pancreatin	gr. 25
Pepsin	gr. 100
Precip. Chalk	gr. 100
Powd. Sugar	gr. 800
Sugar of Milk	gr. 500
Oil of Cinnamon)	
Oil of Coriander)	aa q.s.

Mix and divide into 100 tablets.

1915

Anti-Constipation Tablets.

Nat. Drug., 45, p. 526

Formulas

#1

Podophyllin	gr. ¼
Ext. Colocynth	gr. ¼
Ext. Nux Vomica	gr. 1/8
Ext. Belladonna	gr. 1/8
Ext. Cascara Sagrada	"

To make one tablet

#2

Phenolphthalein	gr.
Cascarin	gr. ½
Aloin	gr. ¼
Podophyllin	gr. 1/8
Ext. Belladonna	gr. 1/8

For one tablet

1916

Cinnamol Tablets: (Alkaline Antiseptic Tablets; Wilbert's Tablets)

Yrbk. of Pharm., 1916, p. 405.

$NaHCO_3$	.25
$Na_2B_4O_7$	.25
NaCl	.25
$NaC_6H_5SO_4$	.25
Oil of Cinnamon	.005

To make one tablet

Sig. Dissolve - 6 oz. of H_2O for a gargle.

1916

Leicht Zerfallende Tabletten.

Pharm. Post, 1914, p. 539. (Schweiz. Apoth. Ztg., 53, p. 519). (Yrbk. of Pharm., 1916, p. 347).

The admixture of from 10 to 20% of megnesium peroxide to the powder before compressing is re-

commended. On contact with water, the oxygen is involved and the tablet disintegrates rapidly. The quantity of peroxide is quite harmless, in fact it makes a very good intestinal antiseptic.

Bernard Fantus & Snow, Clyde M. 1916

Extemporaneous Tablet Making.

J. A. Ph. A., 5, p. 147.

The author gives a list of chemicals which are on the market in granular form, and can be compressed without further treatment.

Substance that are almost soluble such as Salol Phenacetine require a disintegrating agent. Starch is the best. 20% of starch should be used.

Betanaphthol, acetanilide, sulphonal and trional may be made into tablets after the same formulae. The author suggests the use of 3% of cacoa butter - preparing tablet from Bis. Sub. Sulphur calomel and charcoal.

Formulae given:

Bis. Sub. Nit.	4. Gm.
Starch	1. "
Cacoa butter	0.1 "

He further suggests the use of 20% of Fat Starch in making tablets of Sod. Bicarb., Sod. Salicy. & Aspirin.

Finally he lists advantages of extemporaneous preparations of tablets by druggists.

Fat Starch

Liquid Petrolatum	25. Grams
Starch	75. "

Mix by trituration.

Fantus, B. and Snow, C. M. 1916

Binding Lubricant for Tablets.

J.A.Ph. A., 5, p. 147. (Yrbk. of Pharm., 1916, p. 356).

The authors confirm the statement of Schlermer that the addition of 3% of cacao butter, shaved and

mixed with gentle trituration, enables tablets to be made of Bismuth Subnitrate, Calomel, and similar fine powders.

They give the following formula:-

Bismuth Subnitrate	4. Gms.
Starch	1. "
Cacao butter	1. "

Fat starch is also a good binding powder in the estimation of the authors.

Francois, M. 1916

Compressed Tablets - Introduction in France.

J. Pharm. Chim., 13, p. 314. (Yrbk. A.Ph.A. 5, p. 88).

The author protests against the introduction of compressed tablets in France, where he says, they were almost unknown before the war. He objects to them on a commercial and scientific ground stating that a tablet containing diluents is just as objectionable to pharmacy as the sale of butter made firmer by the addition of 20 per cent paraffin would be to the food administration.

Voiry, M. R. 1916

Les comprimes. Advantages et inconvenients. Fabrication. Dosage. Analyse.

J. Pharm. Chim., 14, p. 177. (Yrbk. A.Ph.A., 5, p. 88).

The author discusses the paper of M. Francois and exhibits more friendliness toward the compressed tablet. The author claims the use of 20 per cent of diluent unnecessary, and emphasizes the fact that it behooves the pharmacist to supply the demand. Both authors know very little of tablet manufacture.

Miller, Reginald 1917

Analysis of Tablets Containing Salol and Quinine Sulphate.

Am. Jour. Pharm. 89, p. 215.

Directions for analysis of tablets containing salol and quinine sulphate.

Miller, Reginald 1917

Analysis of Rhinitis Tablets.

Am. Jour. Pharm., 89, p. 214.

The author gives a method for determining the amount of camphor, quinine sulphate and Fl. Ext. of Belladonna in rhinitis tablets.

——————— 1917

Astringent Gargle Tablets.

Am. Drug., 65, p. 189. (Yrbk. Pharm. 1917, p. 214).

A formula for a gargle

Alum	grs.	2
Tannic acid	gr.	1½
Boric acid	"	1
Phenol	"	¼

Sig. Dissolve one or two tablets in half a glass of warm water and use as a gargle.

Fantus, Bernard 1918

Tablets for the Disinfection of Drinking Water.

J. A. Ph. A. 7, p. 1034.

A discourse on disinfecting tablets, method of preparation and stableness.

White, R. C. 1919

Manufacture of Acetylsalicylic Acid Tablets.

Am. J. Pharm., 90, p. 640. (Yrbk. Pharm.,

1919, p. 261).

The following are the chief practical details given in the article.

As excipient, a weak solution of white dextrin in combination with starch as a filler is found to answer best. Contact with metallic utensils must be avoided. The granulated mass should be dried at a temperature of 49°C. (120°F.), before stamping. About 1/8 grain of talcum may be used to each tablet to prevent "picking." Potato starch should be used.

1919

Antiseptic Tablets.

Nat. Drugg., 49, p. 391.

Formula

Mercuric Chloride	437.5 grains
Calcium Chloride	186. "
Sodium Chloride	3476. "
Potassium Chloride	8. "
Alcohol	q.s.

Make into 40 grain tablets. One tablet dissolved in a pint of water constitutes a powerfully penetrative antiseptic and germicidal liquid.

1919

Tonic Tablets.

Yrbk. of Pharmacy 1919, p. 294.

Haæmoglobin	gr. III
Iron Peptonate	gr. I
Ext. Cascara Sagrada	gr. ¼
Ext. Nux Vomica	gr. 1/12

Ma F D T D

Used in anaemic conditions, one capsule being given four times daily.

Arends, G. 1920

Schnell Zerfallende Tabletten

Pharm. Ztg., 65, p. 49.

The addition of 5-10% magnesium peroxide to a tablet mass makes the tablets disintegrate a few seconds, after it comes in contact with water.

Starch also aids disintegration.

Harrisson, W. E.
Ehmann, E. H. 1920

The Accuracy of Dispensing Tablets.

J. A. Ph. A., 9, p. 518.

Pharmacists question the accuracy of so called "Dispensing" tablets of potent drugs. Tablets of strychnine sulphate and mercuric chloride were obtained from various manufacturers and analized to determine whether the tablets contained the stated quantity of active ingredient.

Method of analysis and results obtained are given.

Tablets may be allowed to vary about ten per cent.

" Welbhäuser, F. 1920

Talan - Tabletten.

Pharm. Ztg., 65, p. 372.

The above mentioned is a laxative tablet having the following formula

Phenolphthalein	0.1
Sugar	.5
Menthol	.005
Vanillin	.002
Sacch. lactis	.1

White, R. C. 1920

Tablet Manufacture.

J. A. Ph. A., 9, p. 788.

The author discusses the tablet under the following headings:

Medical Viewpoint
Mechanical viewpoint
Viewpoint of pharmaceutical chemist

Then he takes up the manufacture under the following subdivisions

Mechanical methods
Simple salts for granulation
Mixed Salts
Mixing of mass
Mixers
Excipients
Screening
Protection from Exposure
Suction Systems
Moisture
Polishing dies and punches
Moist appearance
Sticking
Edges
Tablets for Solution
Disintegration
Lettering of Tablets
Compressing machines

Wulfing, Johann A. 1920

Herstellung haltbarer leicht zerfallender Tabletten aus acetylsaicylsaurem Lithium.

Pharm. Ztg., 65, p. 251.

Lithium Acetylsalicylic has hygroskopic properties and its tablets become very hard in a comparatively short time. The addition of 5% of Sod. Bicarbonate remedies this bad feature.

1920

Phenolphthalein, Sweet Tablets of .06 Gm. each.

J.A.M.A. 1920, 74, p. 30. (Yrbk. of Ph. 1920, p. 277).

Phenolphthalein	6. Gm.
Saccharin	.12 "
Tr Vanilla	1.5 "
Cacao powder	3. "
Sugar powdered	21. "

Method:- Mix the saccharin with the Tr of vanilla and incorporate the phenolphthalein. Finally add the sugar and the cacao by thorough trituration in a mortar. Compress in a tablet machine using 3/8 inch die and punches, to make 100 - .30 Gm. tablets.

Fantus, B. 1921

Chocolate Tablets.

J.A.Ph.A., 10, p. 534.

The author gives a number of formulas of medicinal substances which are intended for children and are hence sweeted with chocolate or cocoa.

Formulas given are as follows:

Tabellae Ferri Dulces
Tabellae Ferri et Arseni Dulces
Tabellae Acetphenetidini Dulces
Tabellae Aristochinae Dulces
Tabellae Acetylaminosaloli Dulces
Tabellae Atropine Dulces
Tabellae Digitalis Dulces
Tabellae Ipecacuanhae Dulces
Tabellae Hexamethylenaminae Dulces
Tabellae Sajodini Dulces
Tabellae Terpene Hydratis Dulces
Tabellae Thyroidae Dulces
Tabellae Albutannin Dulces

Snow, Clyde M.
Fantus, Bernard 1921

Tablets for the National Formulary.

J.A.Ph.A., 10, p. 850.

The authors give reasons why tablets should be introduced into the National Formulary. They advocate the use of petrolatum starch. Powdered cocoa acts like petrolatum starch in favoring tablet making: 20% is usually satisfactory.

Formulas for Tablets:
Tabellae Hydrargyri Chloridi Mitis
Tabellae Santonini
Tabellae Santonini Compositae
Tabellae Phenolphthaleini
Tabellae Sodii Bicarbonatis
Tabellae Sulphuris et Potassi-Bitartratis
Tabellae Carbonis

Stokes, F. J. 1922

An Outline History of Tablet Compressors.

The Practical Druggist, 40, p. 45.

First tablets were compressed in England in 1853.

An Englishman by name of Dunton manufacture compressed tablets with a hand machine. A few years later Dr. J. A. McFerran of Philadelphia designed the first automatic tablet machine in the early '80.

Tablet machines were perfected by F. J. Stokes Machine Co. and others.

Approved H. A. Langenhan

Asst. Professor of Pharmacy