

Formula I—Manna 1 part, Glycyrrhiza 1 part, Glycerin Q. S.

Formula II—Manna 2 parts, Yellow Dextrin 5 parts, Glycerin Q. S.

The writer has kept pills made by these two formulas in ordinary pasteboard pill boxes (not the hermetically sealed containers in which market soft mass pills are sold) for over a year; and at the end of that time, these same pills could be squeezed up and re-rolled, as readily as the day on which they were first made, showing that the pliability of these masses after one year's standing is perfect. Furthermore, in another experiment in which the writer subjected these and also market soft mass pills to disintegration tests, he found that these two varieties of soft mass pills disintegrated much more quickly than the proprietary articles. The only difficulty in the way of making these two masses is the fact that the grinding up of the manna with the diluent is an operation which requires not a little "elbow-grease," but to the average druggist, who is continually complaining that he does not get enough exercise, especially in his upper extremities, this operation should prove beneficial, rather than harmful.

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DISINTEGRATION OF PILLS.

BY WILLIAM MASKE, JR.

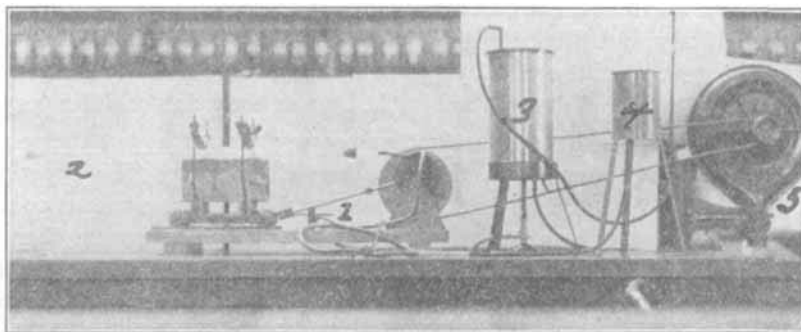
Realizing that it might be of some interest to know the relative rate of disintegration of various pill masses, and that very little about this subject is to be found in the literature, the following work was done in order that some data may be available. The writer realizes that a mechanical digestion is indeed a very poor imitation of what the human body actually does; he also does not wish the following figures to be taken as the actual time in which these various masses disintegrate in the human body; but this much is in all probability true: that the ratios of the time of disintegration of the pills by mechanical means (especially in the last set) and those of the time of disintegration in the human body do not differ very much.

Two methods were used. The first was somewhat crude, but the results are nevertheless of some interest, so they are herewith given. The experiment is briefly this: Into a number of beakers there was placed an aqueous solution of $\frac{3}{10}$ percent pepsin and $\frac{1}{2}$ percent hydrochloric acid. These were then heated in a bacteriological incubator at 37° C. When the solutions had reached this temperature, the various pills were immersed in the solutions, and observations made every fifteen minutes. The pills were all blanks, containing no medicinal ingredients, and were all made exactly the same size, and were the same age, so that the time records would be fair for all the different masses. Following is a table of results:

Pill Mass.	Time.
1 Glycyrrhiza, 1 part; manna, 1 part; glycerin, q. s. (soft mass).....	15 minutes
2 Dextrin, 5 parts; manna, 1 part; glycerin, q. s. (friable mass).....	30 minutes
3 Dextrin, 5 parts; manna, 2 parts; glycerin, q. s. (friable mass).....	45 minutes
4 Althaea; syrup, q. s.....	45 minutes
5 Magnesium oxide, 3 parts; manna, 1 part, glycerin, q. s.....	45 minutes

Pill Mass.	Time.
6 Glycyrrhiza; confection of rose, q. s.....	1 hour
7 Althaea; confection of rose, q. s.....	1 hour
8 Althaea; syrup of glucose, q. s.....	1 hour
9 Glycyrrhiza; syrup, q. s.....	1 hour
10 Magnesium oxide, 2 parts; manna, 1 part; glycerin, q. s.....	1 hour
11 Glycyrrhiza; syrup of glucose, q. s.....	1 hour 15 minutes
12 Glycyrrhiza; glycerite of tragacanth, q. s.....	1 hour 15 minutes
13 Althaea; glycerite of tragacanth, q. s.....	1 hour 15 minutes
14 Starch; syrup of glucose, q. s.....	1 hour 15 minutes
15 Starch; glycerite of tragacanth, q. s.....	1 hour 30 minutes
16 Acacia; water, q. s.....	1 hour 30 minutes
17 Acacia, 1 part; tragacanth, 1 part; water, q. s.....	1 hour 30 minutes
18 Blaud's pill.....	1 hour 30 minutes
19 Magnesium oxide, 3 parts; manna, 1 part; water, q. s.....	1 hour 30 minutes
20 Dextrin, 5 parts; manna, 1 part; water, q. s.....	1 hour 30 minutes
21 Tragacanth; water, q. s.....	1 hour 45 minutes
22 Magnesium oxide, 2 parts; manna, 1 part; water, q. s.....	1 hour 45 minutes
23 Dextrin, 5 parts; manna, 2 parts; water, q. s.....	2 hours
24 Hard mass, manufacturing firm (Sample 1).....	2 hours
25 Hard mass, manufacturing firm (Sample 2).....	2 hours 15 minutes
26 Soft mass, manufacturing firm (Sample 1).....	3 hours
27 Soft mass, manufacturing firm (Sample 2).....	3 hours
28 Kaolin and petrolatum.....	Did not disintegrate

This experiment was repeated, but this time much more care was used. An apparatus was set up which gave not only the temperature and chemical composition of the stomach contents, but mechanical motion as well. Onto a car used for mechanical shaking, a glass tube of $\frac{3}{4}$ inch diameter was clamped. On each end was placed a paraffined cork having a piece of glass tubing inserted. One end was connected with a continuous flow water heater of the type used for refractometers,



1, Mechanical Shaker. 2, Tube serving as jacket for vials containing pills. 3, Thermostat and heater.
4, Can used to maintain constant water pressure. 5, Water motor.

and the other end led to the drain. The connection between the water heater and glass jacket had an outlet tube leading to the drain so that when once the temperature of 37° was reached, the apparatus would not have to be shut down when filling the glass jacket. Each kind of pill was placed in a separate 2-drachm

vial in which a solution of artificial gastric juice was placed. This solution has the following composition:

Water.....	99.44 percent
Pepsin.....	0.32 percent
Hydrochloric Acid.....	0.25 percent
Sodium Chloride.....	0.14 percent
Potassium Chloride.....	0.05 percent
Calcium Chloride.....	0.006 percent
Calcium Phosphate.....	0.015 percent

The vials were all tightly corked. They were then quickly placed in this jacket, and the apparatus was set in motion. The pills used in this experiment were about six weeks old, which was sufficient time to harden them. Results with a given pill were somewhat irregular so four different trials were taken with each pill and an average taken of the four readings. The following table of results will show how differently the masses behave than in the first table, which is merely a "test-tube phenomenon." The writer can state the difference in a striking way by stating that he has yet to find an enteric pill in which the supposed acid-resisting coating does not come off in an hour and a half when tested by this apparatus, even when slow shaking is used.

RESULTS.

Pill Mass.	Trial.				Average.
	1	2	3	4	
1 Starch; syrup of glucose, q. s.....	4	4	4	4	4 minutes
2 Yellow dextrin, 5 parts; manna, 1 part; glycerin, q. s.....	7	7	6	8	7 minutes
3 Yellow dextrin, 5 parts; manna, 2 parts; glycerin, q. s.....	7	9	9	7	8 minutes
4 White dextrin, 5 parts; manna, 2 parts; glycerin, q. s.....	7	9	8	9	8 minutes
5 Yellow dextrin, 5 parts; manna, 1 part; glycerin, q. s.....	12	10	9	10	10 ¹ / ₄ minutes
6 Yellow dextrin, 5 parts; manna, 2 parts; water, q. s.....	12	10	10	11	10 ³ / ₄ minutes
7 Althaea; confection of rose, q. s.....	12	11	12	11	11 ¹ / ₄ minutes
8 White dextrin, 5 parts; manna, 1 part; water, q. s.....	12	12	13	11	12 minutes
9 Althaea; syrup of glucose, q. s.....	13	12	12	14	12 ³ / ₄ minutes
10 Glycyrrhiza; confection of rose, q. s.....	15	12	16	13	14 minutes
11 Glycyrrhiza, 1 part; manna, 1 part; glycerin, q. s.....	17	16	17	20	17 ¹ / ₂ minutes
12 Bland's pill.....	19	17	20	17	18 ¹ / ₄ minutes
13 Bland's pill.....	19	18	18	21	19 minutes
14 Glycyrrhiza; syrup of glucose, q. s.....	21	18	18	20	19 ¹ / ₄ minutes
15 Acacia, 1 part; althaea, 2 parts; water, q. s.	25	27	26	29	26 ³ / ₄ minutes
16 Starch; glycerite of tragacanth, q. s.....	39	33	32	41	37 ³ / ₄ minutes
17 Althaea; syrup, q. s.....	36	38	39	35	39 ¹ / ₂ minutes
18 Glycyrrhiza; syrup, q. s.....	43	45	48	41	44 ¹ / ₄ minutes
19 Soap, 1 part; glycyrrhiza, 2 parts; water, q. s.....	52	54	57	50	53 ¹ / ₄ minutes

RESULTS—(Continued).

Pill Mass.	Trial.				Average.
	1	2	3	4	
20 Soap, 1 part; althaea, 1 part; water, q. s.	1:21	1:28	1:19	1:27	1 hour 23 ³ / ₄ minutes
21 Althaea; glycerite of tragacanth, q. s.	1:28	1:20	1:34	1:29	1 hour 27 ³ / ₄ minutes
22 Acacia; water, q. s.	1:26	1:29	1:31	1:29	1 hour 28 ¹ / ₄ minutes
23 Acacia, 1 part; tragacanth, 1 part; water, q. s.	3:43	3:48	3:53	3:51	3 hours 48 ¹ / ₄ minutes
24 Tragacanth; water, q. s.	6:53	7:15	7:12	6:56	7 hours 3 ¹ / ₂ minutes
25 Kaolin; petrolatum, q. s.	Not disintegrated at the end of 8 hours				

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ELIXIR FERRI, QUININAE ET STRYCHNINAE PHOSPHATUM.*

BY WILLIAM H. GLOVER.

It is to be regretted that this valuable Elixir was dropped from both the U. S. P. IX and N. F. IV. It would seem best at least to have recognized it in the latter book. As formerly made, it was quite troublesome and did not keep well, particularly in the winter months when, if chilled, it separated badly. If the method of making is slightly modified, a very satisfactory preparation is obtained. Being fortunate in having a large call for this elixir in my prescription department and thinking perhaps others have a similar demand, I offer the following formula which I have found very satisfactory. I claim no credit for it, as the changes have been suggested by Prof. Charles Caspari, Jr., and others in the pharmaceutical journals:

Soluble Ferric Phosphate	17.500 Gm.
Quinine	8.750 Gm.
Strychnine275 Gm.
Phosphoric Acid, U. S. P.	2.000 mils
Ammonium Carbonate	5.100 Gm.
Alcohol	60.000 mils
Acetic Acid, U. S. P.	16.000 mils
Distilled Water
Aromatic Elixir each q. s.
To make	1000.000 mils

Dissolve the quinine and strychnine in the alcohol, then add the phosphoric acid previously mixed with 350 mils of aromatic elixir. Add acetic acid to ammonium carbonate in the flask and do not neutralize; add to solution of alkaloids. Dissolve the soluble ferric phosphate in 30 mils of distilled water and do not neutralize, add 250 mils of aromatic elixir, add this to above solution and after 24 hours, filter. By using the aromatic elixir warm, no precipitate is formed when solution of ferric phosphate is added to the solution of the alkaloids. This precipitate is very slow to dissolve when the mixture is cold. Finally, add aromatic elixir to make 1000 mils. This makes a very satisfactory product; however, it will darken with age, but I believe in making preparations like this often and in quantity which obviates the necessity of long keeping, and thereby the indicated trouble will be avoided.

* Read before Section on Practical Pharmacy and Dispensing, A. Ph. A., Indianapolis meeting, 1917.