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EVALUATION OF BLEND OF EXCIPIENTS FOR DIRECT COMPRESSION OF OXYTETRACYCLINE HYDROCHLORIDE TABLETS

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Directly compressible vehicles such as Avicel, Emdex, sugartab, Anhydrous Lactose U.S.P, and STA-R$_X$1500 strach were evaluated either singly or in binary blends in the ratios of 1:1,1:3 and 3:1 w/w, to formulate oxytetracycline hydrochloride tablets. Avicel, Celutab and STA-R$_X$1500 starch were found to be the most suitable single vehicles for the preparation of oxytetracycline hydrochloride tablets.

Direct compression is the newest and most advanced technique for the preparation of tablets. It consist of the compression of tablets directly from powdered materials without modefying their physical nature after mixing with suitable vehicles and lubricant. Direct compression has great advantages from the technological point of view as it requires fewer operations and less machinery. With regard to chemical stability and biological availability, direct compression was the best method of tabletting technique. The reduction of steps, automatically, reduces the number of variables, and thus improves the reproducibility considerably[1]. The aqueous granulation may cause

drug decomposition or drug migration during drying[2-4]. Therefore, efforts have been attempts to choose dry binders to be used for direct compression and also the development of directly compressible vehicles[5].

Many direct compression vehicles were investigated and reported. eg. Colloidal silica and cellulose, dicalcium phosphate dihydrate, anhydrous lactose, microcrystalline lactose dextrose, STA-R_x1500 starch, spray crystalized maltose dextrose, microcrystalline cellulose , and Nu-Tab. Handerson and Bruno stated that no single material has been found to be suitable for all direct compression formulas.

The goal of this work is to evaluate some directly compressible vehicles either single or in binary blends in order to prepare oxytetracycline hydrochloride tablets of relatively good properties. The produced tablets were evaluated with regard to their physical standards and their stability as well as physiological availability .

EXPERIMENTAL

Materials:

Microcrystalline cellulose (Avicel) of grade PH 101 (FMC Co., Pennsylvania U.S.A), directly compressible starch (STA-R_x1500) (A.E. Staley, MFg. Co., Decature, Illinois , U.S.A.), Sugartab(processed sucrose), Spray crystallized maltose dextrose (Celutab) Edward Mendell Co., Inc. New York, U.S.A.) , Anhydrous Lactose U.S.P (Shiffield Chemical Union, N.J. 01083 U.S.A. Oxytetracycline hydrochloride (PLIVA harmc. and Chem. Works, ZAGREB, Yougoslavia), Magnesium stearate and Stearic acid (CID Co., Assiut branch, Assiut, Egypt).

Preparation and evaluation of tablets:

Oxytetracycline hydrochloride powder was used as received from the manufacturer and the produced tablets

were prepared using the following formula:

Drug (oxytetracycline hydrochloride) 100 parts

vehicle 25-100 parts

Magnesium stearate 2% w/w

Magnesium stearate was found to be unsuitable[13] for STA-R_x1500 starch and therefore, stearic acid was used instead.

The actual concentration of the vehicles added were calculated. They were, 49, 42, 32.6 and 19.6% w/w for oxytetracycline hydrochloride tablets.

Each of Avicel, STA-R_x1500 starch and Celutab was mixed with other vehicles to produce binary blends in ratio of 1:1, 1:3 and 3:1 . Mixing was carried out in a drum mixer for a period 15 minutes. Manesty F_3 single punch eccentric tablet compression machine was used. The machine was set to produce flat scored 6.44 $\pm$ 0.01 mm tablets having an average weight of about 0.1 g with the best possible hardness and loss percent for the blend containing 49% w/w of excipient. The machine settings were kept constant throughout the compression for all concentrations of the same excipient. Readjusting of the machine settings were usually necessary on compression of the various vehicles due to variations in their particle size and or bulk density. A minimum of 100 tablets was produced for each batch.

The mean particle size. the bulk density and angle of repose of the powdered drugs and vehicles were determined according to the previousely mentioned procedures[24] . Results obtained are shown in Table 1.

The manufactured tablets were evaluated for their weight uniformity *B.P. 1973* , uniformity of thickness(Baty

Dial Micrometer, Model 120-1206, Baty Co., Ltd. Sussex, England), hardness (Monsanto), Friability (Roche Friabilator, Erweka apparatabeau, Frankfurt, Western Germany) and disintegration time[B.P. 1968], according to the previously published procedures[25].

RESULTS AND DISCUSSION

Physical standards of directly compressed oxytetracycline hydrochloride tablets:

1- Uniformity of weight:

The uniformity of weight of tablets was evaluated by B.P. 1973 test. Control tablets containing only oxytetracycline hydrochloride and lubricant showed high coefficient of variation percent. Some of these batches failed to pass the test. The compression force applied to produce tablets using Anhydrous Lactose as a vehicle, was not sufficient to produce plain tablets. This can be shown in Table 2.

From data given in that table, the single vehicles were found to produce oxytetracycline hydrochloride tablets which were uniform and complied with the B.P. 1973 test for uniformity of weight. The uniformity of weight was found to increase by increasing the proportion of the vehicle in the formula, and consequently C.V. % values decreased.

To explain this, Avicel in actual concentration 42% w/w produced tablets with C.V.% value(9.26), more than that of tablets produced using Avicel in actual concentration of 49% w/w (6.50).

The least C.V.% values were shown for tablets produced using 49% w/w of Celutab, Sugartab and STA-R_x1500 starch. With respect to uniformity of weight

single vehicles can be arranged as follows:

STA-R_x1500 >Celutab >Sugartab> Avicel> Anhydrous Lactose.

Good results were obtained for tablets produced using binary vehicles. Avicel when blended with the other vehicles gave the most uniform tablets especially Avicel/Anhydrous Lactose 1:1 blends. Tablets show small C.V. % especially those produced using 1:1 blends of Avicel with other vehicles, tablet can be arranged as follows with respect to uniformity of weight.

Avicel/Anhydrous Lactose >Avicel/Celutab> Avicel/ STA-R_x1500 >Avicel/Sugrtab. The result obtained was shown in Tablete 3.

STA-R_x1500 starch when mixed with the other vehicles in different ratios produced good uniform tablets with small C.V.% values. Some batches were not uniform the most uniform tablets were produced using STA-R_x/Anhydrous Lactose 3:1 blends. Non uniform tablets produced may be due to segregation of STA-R_x when blended with other components of the formula, or with other vehicles as a result of particle size or and density varaiations. as shown in Table 4.

Celutab when mixed with other vehicles, gave rise to tablets which can be arranged with respect to uniformity of weight as follows:

Celutab/Avicel 1:1 >Celutab/STA-R_x1500 3:1> Celutab/ AVicel 3:1 >Celutab/STA-R_x3:1>Celutab/Anhydrous Lactose 3:1 >Celutab/Anhydrous Lactose 1:1. The results obtained was shown in Table 5.

The uniformity of thickness was found to be an addittional control to the tablet dimensions and ensured reproducibility. Tablets prepared using single vehicles and their binary blends with Avicel, Celutab, and STA-R_x1500

starch, had the same variation in the thickness, more or less parallel to those of weight. This was shown in Tables 2-5.

2- Disintegration time (D.T):

Disintegration time of the produced tablets was within the limit of B.P. 1973 (30 min). Three batches produced using actual concentrations 32.6, 42.0 and 49% w/w failed to pass the test.

Single vehicles produced uniform disintegrated tablets. It was found that the increase in actual concentration of the vehicle in the formula is accompanied by decrease in disintegration time, i.e. tablets produced using Anhydrous Lactose of actual concentrations of 32.6, 42.0 and 49.0% w/w disintegrated within 10.95, 8.85 and 3.89 minutes respectively. Celutab produced fast disintegrated tablets. It was found that the increase in actual concentration of the vehicle in the formula, produced slowly disintegrated tablets as shown in Table 2.

All tablets prepared using binary blends of Avicel, Celutab and STA-R_x 1500 starch, disintegrated within the limit of B.P. 1973.

Avicel/Anhydrous Lactose 1:3 blends produced fastly disintegrated tablets than the other blends. This may due to the small proportion of Avicel used in the blend. On the other hand Avicel/Celutab 1:1 blends produced tablets with longer disintegration time than that prepared by using Avicel/Anhydrous Lactose 1:1 blends. This may be due to solubilization of Celutab in the disintegration medium used and therfore change its physical characteristics especially viscosity. It also, may be due the synergistic effect of Avicel and Celutab to each other to act as binders. These results were, also, adhered to tablets prepared by Avicel/

STA-R_x 1:1, 1:3 and 3:1 blends as shown in Table 3.

As it acts as disintegrant, STA-R_x 1500 starch and its blends with other vehicles produced fast uniform disintegrated tablets. Disintegration time did not exceed 15.65 minutes. The best disintegrated blends were of STA-R_x 1500/ Anhydrous Lactose 1:3 and STA-R_x 1500/Celutab 1:3, respectively as shown in Table 4.

Solubility of oxytetracycline hydrochloride, and Celutab may be the main factor responsible for fastly disintegrated tablets prpared using Celutab as a vehicle. The most disintegrated tablets were produced from Celutab/Anhydrous Lactose 3:1 belnds. The C.V.% values of all produced tablets were high because of the variation of the manufactured tablets as shown Table 5.

3- Hardness:

Control tablets prepared using oxytetracycline hydrochloride and lubricant only had good hardness value, not less than 5.25 K_g with high C.V.% value, not more than 17.53%.

Hardnesss values were improved using single vehicles , the values increased side by side with increase in the actual concentration of the vehicle in the formula. Celutab and STA-R_x 1500 starch produced the hardest tablets among the other tried vehicles. With respect to hardness single vehicles can be arranged as follows:

Celutab > STA-R_x 1500 > Anhydrous Lactose> Avicel> Sugertab.

Hardeness was improved when binary blends of Avicel , STA-R_x 1500 and Celutab mixed with each others. The C.V.% values decreased. The hardest tablets were produced, when Avicel/Anhydrous Lactose 3:1 blends used.

Tablets showed small C.V.% values.

In general, the hardness values increase by increasing the vehicle proportion in the formula as shown in Table 2-5.

Binary blends of Avicel with other vehicles, can be arranged with respest to hardness of the prepared tablets as follows:

Avicel/Anhydrous Lactose 3:1 > 1:3 > 3:1 Avicel/STA-R_x 3:1 >1:3 >1:1 Avicel/Celutab 3:1> 1:3 > 1:1 Avicel/ Sugartab 1:3 >1:1 >3:1.

STA-R_x 1:1 blends with other vehicle can also be arranged in the following manner:

STA-R_x/Celutab> STA-R_xR/Anhydrous Lactose> STA-R_x/Sugartab.

STA-R_x had synergistic effect when blended with Celutab as it gave rise to the hardest tablets.

Tablets prepared using binary blends of Celutab with other vehicles has small hardness values. The hardness of the produced tablets using Celutab 1:1 blends with other vehicles can be arranged in the following sequence

CElutab/Anhydrous Lactose >Celutab/Sugartab. The produced tablets showed high C.V.% values.

4- Friability:

The control tablets cannot be compressed under the pressure used for preparing tablets containing Anhydrous Lactose. Its friability value was 100% and showed high C.V.% values.

Incorporation of vehicles lead to decrease in friability, Friability can be arranged as follows, with regard to tablets produced using single vehicles.

Avicel< Celutab< STA-R_x <Sugartab< Anhydrous Lactose

Friability of the produced tablets decreased by increased by increasing the propartion of vehicle in the formula, as shown in Table 2. On the otherhand friability of tablets produced using Blends of these vehicles was reduced especially on using blends of Avicel, Celutab and STA-R_x. This may due to the binding effect of these vehicles. Increase in the ratio of one of these vehicles in their blend with other vehicles decrease loss percent of the produced tablets. as shown in Table 3-5.

From this point of view Avicel blends with other vehicles can be arranged as follows:

Avicel/Anhydrous Lactose 1:1< Avicel/Celutab 1:1< Avicel /STA-R_x 1:1 <Avicel/Sugartab 1:1.

Another sequence was, also obtained for Celutab blends It was as follows:

Celutab/STA-R_x 1:1 <Celutab/Anhydrous Lactose 1:1< Celutab/Sugartab 1:1 < Tablets produced had high C.V.% values.

The increase in Celutab ratio in the blend used decreased the friability and this may due to the high binding characteristics of the vehicle.

On the other hand, STA-R_x which improved friability, can be arranged as follows:

STA-R_x/Anhydrous Lactose 3:1 STA-R_x/Anhydrous Lactose 1:3 STA-R_x/Anhydrous Lactose 1:1

Hardness Friability Ratio H.F.R.:

It gives an indication for the mechanical properties of the produced tablets.

Control oxytetracycline hydrochloride tablets had small H.F.R. values, hence their mechanical properties were poor as shown in Tables 2-5.

H.F.R. of the obtained tablets using single vehicles was found to increase by increasing the proportion of the vehicle as shown in Table 2.

The single vehicles can be arranged with respect to H.F.R. of the prepared tablets in the following manner.

Avicel> STA-R_x1500> Celutab> Sugartab >Anhydrous Lactose.

Tablets produced using binary blends of each of Celutab, Avicel and STA-R_x1500 with other vehicles, showed improved H.F.R. values. H.F.R. was found to increase by increasing the proportion of Celutab, Avicel and STA-R_x each in blend with other vehicles. H.F.R. value can be arranged as follows for tablets manufactured using blend of vehicles.

Avicel/Anhydrous Lactose 1:1 Avicel/Celutab 1:1 Avicel/STA-R_x1500 1:1 Avicel/Sugartab 1:1. The results obtained are shown in Tables 2-5.

Table 1: Physical properties of powdered oxytetracycline hydrochloride, and direct compression vehicles used

Materials	*Average particle size (U)*	*Packed bulk density gm/ml*	*Angle of repose*	
Oxytetracycline Hydrochloride	75.00	0.72	20°	63"
Avicel pH 101	8.2.99	0.355	40°	00
STA-R_x1500	113.21	0.668	28°	30"
Anhydrous Lactose	185.07	0.559	40°	00"
Celutab	342.58	0.683	31°	58"
Sugartab	661.12	0.641	30°	42"

Table 2: Effect of single vehicles on the physical characteristics of oxytetracycline hydrochloride tablets.

Vehicle			Weight	Thickness		Hardness		Friability		H.F.R.	D.T	D.T. (minutes)
	Conc.%		(gm)	(mm)		(Kg)		(loss)				
Name	w/w	mean	C.V.%	mean	C.V.%	mean	C.V.%	mean	C.V.%		mean	C.V.%
Avicel	0.0	0.1396	1.42	3.17	1.06	5.75	11.95	3.735	20.09	1.53	18.61	12.90
	19.6	0.1228	1.47	2.90	9.02	6.15	12.14	0.8762	7.00	7.01	27.10	7.05
	32.6	0.1156	7.80	2.66	5.90	5.65	7.28	0.769	18.53	7.33	42.88	9.50
	42.0	0.1100	9.26	2.57	1.29	5.87	9.24	0.757	4.25	7.75	53.10	6.54
	49.0	0.1045	6.50	2.57	2.03	6.05	3.25	0.685	38.79	8.82	75.10	23.36
Anhydrous Lactose	19.0	0.0891	6.50	2.22	4.85	4.82	22.12	8.520	16.32	01.565	6.81	9.18
	32.6	0.1226	1.57	2.61	11.85	5.17	10.19	5.585	14.53	0.925	10.95	15.06
	42.0	0.1217	1.53	2.55	9.11	6.10	14.86	5.193	1.923	1.17	8.85	14.87
	49.0	0.1209	7.56	2.54	5.16	6.10	12.09	4.725	1.83	11.11	3.89	17.69
Celutab	0.0	0.1153	3.21	2.70	2.12	5.25	17.53	6.688	11.78	10.784	12.15	7.91
	19.6	0.1246	1.57	2.88	1.25	5.55	15.51	1.1446	25.09	4.84	13.20	5.59
	32.6	0.1338	51.37	2.99	6.80	5.80	8.57	1.1386	15.45	5.09	14.14	9.99
	42.0	0.1145	3.21	2.65	2.94	7.10	10.39	1.069	0.13	7.32	15.76	19.94
	49.0	0.1228	1.840	2.80	1.29	7.60	11.09	1.0826	28.97	7.02	16.83	8.14
Sugartab	0.0	0.1112	3.22	2.39	1.80	7.32	9.10	0.887	11.30	8.24	8.85	17.6
	19.6	0.1204	4.98	2.50	11.77	5.70	6.79	1.250	17.61	4.56	9.46	23.09
	32.0	0.1252	2.88	2.78	2.84	5.07	3.32	1.2471	22.54	4.06	10.61	28.27
	42.0	0.1045	1.46	2.33	1.65	4.97	12.63	1.445	2.76	3.43	13.95	13.79
	49.0	0.1916	3.13	2.16	22.24	5.02	10.60	1.1550	2.111	4.34	10.02	9.23
STA-R_x	0.0	0.1031	3.86	2.43	2.17	6.19	11.22	1.868	18.26	3.31	4.99	5.78
	19.6	0.1036	3.26	2.49	1.27	6.22	6.12	1.036	3.50	5.99	7.53	9.39
	32.0	0.1066	3.40	2.52	1.98	6.87	11.03	1.332	11.51	4.40	2.24	4.29
	42.0	0.1053	2.11	2.54	5.78	7.02	12.14	1.113	12.03	6.30	5.93	4.29
	49.0	0.1077	3.19	2.58	2.35	7.55	57.98	0.943	16.05	8.004	6.91	4.89

Table 3: Effect of blends of Avicel with the other vehicles on the physical characteristics of oxytetracycline hydrochloride tablets.

Vehicle	*Conc.%*	*Weight (gm)*		*Thickness (mm)*		*Hardness (Kg)*		*Friability (loss%)*		*H. F. R.*		*D.T. (minutes)*	
Name	*w/w*	*mean*	*C.V.%*	*mean*	*C.V.%*	*mean*	*C.V.%*	*mean*	*C.V.%*			*mean*	*C.V.%*
	0.0	0.1080	2.78	2.47	2.50	9.82	6.57	0.925	124.85	1.06	10.47	2.02
Avicel/	19.6	0.165	2.83	2.53	2.48	9.65	6.36	0.0730	99.71	132.19	11.58	2.65
Anhydrous	32.6	0.1079	2.35	2.47	2.13	10.40	9.00	1.1513	7.71	9.03	11.26	7.69
Lactose	42.0	0.1074	3.93	2.45	3.02	10.85	4.37	0.174	34.97	62.21	12.24	6.77
1:1	49.0	0.1059	2.20	2.38	2.45	10.87	3.89	0.252	3.89	38.67	9.79	3.66
	0.0	0.1055	3.45	2.50	1.51	5.95	12.17	1.056	9.767	5.63	6.21	9.17
Avicel/	19.6	0.1129	2.32	2.60	1.13	5.87	22.26	0.686	3.40	8.55	8.76	14.73
Anhydrous	32.6	0.1144	1.76	2.62	8.92	10.22	6.14	4.117	6.87	2.48	10.72	14.95
Lactose	42.0	0.1161	1.78	2.65	1.26	10.85	7.92	0.451	9.06	24.04	10.29	14.42
1:3	49.0	0.1163	2.39	2.633	1.88	11.02	5.70	0.463	9.000	23.78	9.82	13.52
	0.0	0.1119	4.15	2.57	3.62	7.22	8.70	1.390	11.41	5.19	11.16	21.00
Avicel/	19.6	0.1111	1.67	2.54	1.37	10.02	7.38	0.889	5.012	11.2	11.24	11.28
Anhydrous	32.6	0.1165	1.45	2.61	9.66	10.22	7.68	0.842	3.75	12.12	12.43	11.40
Lactose	42.0	0.1189	1.85	2.66	1.16	10.62	8.24	0.204	11.78	51.85	14.84	7.24
3:1	49.0	0.1176	2.88	2.83	1.74	10.02	7.28	0.677	2.55	16.25	14.10	20.18
	0.0	0.0960	3.95	2.20	4.05	5.17	11.62	1.630	18.33	3.17	5.83	7.41
Avicel/	19.6	0.0969	1.71	2.26	1.75	7.32	9.79	1.169	25.16	6.31	9.73	7.74
Celutab	32.6	0.1011	20.06	2.31	2.51	8.15	0.27	0.729	14.38	11.16	13.57	6.12
1:1	42.0	0.0945	50.51	2.39	2.38	8.56	6.27	0.536	15.56	16.12	16.19	4.49
	49.0	0.1062	1.22	2.39	1.174	8.85	303	0.462	23.65	19.13	16.59	7.27
	0.0	0.1010	2.39	2.82	6.82	4.17	13.25	1.224	10.86	3.40	9.82	15.1
Avicel/	19.6	0.0944	11.43	2.26	2.47	5.20	9.82	1.6011	12.33	3.24	5.89	8.24
Celutab	32.6	0.1030	2.71	2.36	2.12	7.90	8.60	25.41	25.41	0.3109	6.74	8.97
1:3	42.0	0.1105	2.87	2.53	2.36	7.27	10.30	12.53	23.84	0.580	15.81	6.50
	49.0	0.1151	1.76	2.62	1.98	5.87	8.80	0.752	4.06	38.49	14.26	10.06

Vehicle	Conc.%	Weight (gm)		Thickness (mm)		Hardness (Kg)		Friability (loss%)		H. F. R.	D.T (minutes)	
Name	w/w	mean	C.V.%	mean	C.V.%	mean	C.V.%	mean	C.V.%		mean	C.V.%
Avicel/	0.0	0.0992	2.34	2.34	3.28	5.17	17.48	1.135	25.93	4.55	7.88	6.233
Celutab	19.6	0.191	2.32	2.47	2.05	7.22	17.77	9.362	15.71	19.89	16.63	18.13
3:1	32.6	0.1969	3.29	2.43	1.94	6.95	6.06	0.765	13.18	4.08	12.5	8.57
	42.0	0.1090	2.36	2.46	1.81	9.17	6.27	0.481	13.87	19.05	21.34	9.09
	49.0	0.1090	1.48	2.42	1.00	9.52	5.01	9.201	49.29	47.15	22.03	21.16
Avicel/	0.0	0.1030	5.75	2.37	4.41	5.25	2.77	0.970	16.44	5.40	8.17	10.18
Sugartab	19.6	0.1103	4.65	2.51	3.88	6.67	8.83	1.247	38.91	5.34	13.84	19.70
1:1	32.6	0.1108	3.60	2.51	2.96	8.27	8.94	0.905	19.18	9.13	15.27	8.49
	42.0	0.1122	4.03	2.56	9.14	8.27	7.46	0.628	8.77	13.18	17.03	5.86
	49.0	0.1067	3.52	2.40	3.03	8.72	6.39	0.619	26.49	14.08	16.65	7.65
Avicel/	0.0	0.1103	2.72	2.49	2.86	5.15	6.94	1.632	10.79	3.15	6.03	9.26
Sugartab	19.6	0.1151	43.62	2.55	3.86	6.97	7.82	1.219	10.72	5.71	10.65	10.63
1:3	32.6	0.1201	1.53	2.84	1.79	7.30	13.12	1.387	9.04	5.28	12.70	10.13
	42.0	0.1266	3.1	2.78	3.10	8.37	9.86	0.991	1.59	8.44	19.55	5.55
	49.0	0.1270	1.51	278	1.73	10.6	7.95	0.553	26.25	19.15	17.29	9.52
Avicel/	0.0	0.1123	4.36	2.54	3.67	5.55	16.13	1.259	13.81	4.40	5.86	10.18
Sugartab	19.6	0.1179	1.56	2.83	1.16	6.90	4.58	0.579	0.98	11.91	17.78	8.5
3:1	32.6	0.1168	1.83	2.61	1.45	7.90	6.16	0.429	6.86	18.38	22.29	10.87
	42.0	0.1139	1.39	2.56	1.14	8.47	2.93	0.464	22.68	17.47	25.22	3.37
	49.0	0.1124	1.58	2.52	1.46	8.80	4.60	0.205	36.18	42.90	29.34	6.10

Vehicle		Weight		thickness		Hardness		Friability		H. F. R.	D.T.	
	Conc.%	(gm)		(mm)		(Kg)		(loss%)			(minutes)	
Name	w/w	mean	C.V.%	mean	C.V.%	mean	C.V.%	mean	C.V.%		mean	C.V.%
Avicel/	0.0	0.1129	4.60	2.67	3.19	2.87	14.36	0.5532	25.25	10.61	5.38	2.67
STA-R_x	19.6	0.1105	2.19	2.58	1.53	9.30	8.13	3.272	30.01	2.84	9.76	5.61
	32.6	0.1104	1.55	2.59	1.55	9.30	8.85	0.689	4.95	19.98	9.39	9.36
1:1	42.0	0.1108	1.19	2.58	9.51	9.40	5.49	0.287	31.36	32.72	17.83	6.03
	49.0	0.1173	9.52	2.59	6.4	10.20	7.73	0.591	39.41	17.25	20.37	3.59
Avicel/	0.0	0.0998	4.39	2.36	3.76	5.45	2.57	3.676	23.98	1.482	4.78	31.64
STA-R_x	19.6	0.1011	3.33	2.30	2.85	7.31	3.78'	0.640	10.30	11.40	7.39	6.93
	32.6	0.1044	1.27	2.45	1.18	8.65	4.75	0.579	5.31	14.77	10.01	4.80
1:3	32.0	0.1042	2.46	2.45	2.17	9.65	4.81	0.234	42.48	41.84	16.81	7.98
	49.0	0.1051	3.05	2.49	2.72	10.00	5.32	0.246	19.54	40.65	21.83	5.43
Avicel/	0.0	0.1090	2.72	2.62	3.03	5.30	17.89	3.599	17.99	1.47	5.83	3.88
STA-R_x	19.6	0.1074	2.20	2.50	1.47	8.30	11.42	0.227	32.82	36.56	6.58	3.79
	32.6	0.1032	2.23	2.49	2.13	9.10	3.47	0.255	2.86	35.81	17.02	9.21
3:1	42.0	0.1017	1.10	2.45	1.23	10.70	4.51	0.245	2.75	43.20	20.11	8.81
	49.0	0.1027	2.96	2.40	2.91	11.70	5.76	0.284	17.78	41.06	28.88	5.38

Table 4: Effect of blends of STA-R$_x$ 1500 with the other vehicles on the physical characteristics of oxytetracycline hydrochloride tablets.

Vehicle		*Weight (gm)*		*thickness (mm)*		*hardness (Kg)*		*Friability (loss%)*		*H.F.R.*	*D.T. (minutes)*	
Name	*Conc.% w/w*	*mean*	*C.V.%*	*mean*	*C.V.%*	*mean*	*C.V.%*	*mean*	*C.V.%*		*mean*	*C.V.%*
STA-R$_x$ / Anhydrous Lactose 1:1	0.0	0.1027	2.96	2.40	1.91	4.30	15.96	0.327	21.59	13.41	5.57	9.
	19.6	0.0822	3.26	2.04	10.41	4.00	16.66	0.551	66.25	7.25	5.08	17.
	32.6	0.0912	2.74	2.19	2.18	4.30	11.23	0.203	22.94	21.08	2.73	8.
	42.0	0.0987	4.48	2.31	3.77	6.80	11.60	2.806	14.91	1.78	7.46	3.
	49.0	0.1050	1.78	2.48	1.70	7.90	12.58	3.483	11.26	2.26	9.05	5.
STA-R$_x$ / Anhydrous Lactose 1:3	0.0	0.1093	1.36	2.49	1.58	4.20	15.05	2.631	80.35	1.59	4.38	9.
	19.6	0.1053	3.12	2.43	3.93	5.70	14.44	0.680	36.85	8.36	4.78	5.
	32.6	0.0946	2.61	2.29	3.32	7.10	19.30	0.582	23.82	12.18	4.36	4.
	42.0	0.113	9.01	2.55	1.01	7.10	15.50	0.341	21.81	20.82	5.72	3.
	49.0	0.1162	1.24	2.58	8.86	7.80	0.11	2.403	28.26	3.24	6.93	4.
STA-R$_x$/ Anhydrous Lactose 3:1	0.0	0.1070	3.30	2.46	2.11	4.80	16.43	3.946	21.01	1.21	4.57	6.
	19.6	0.0916	6.76	2.22	4.72	5.50	17.66	0.888	11.84	8.18	6.79	
	32.6	0.0964	2.12	2.25	2.09	7.50	11.77	1.2018	32.77	8.07	8.57	
	42.0	0.1088	9.17	2.41	1.23	7.90	12.58	0.095	14.67	11.36	11.84	
	49.0	0.1080	1.57	2.50	1.27	7.70	12.32	1.678	49.98	4.58	15.67	3.
STA-R$_x$ / Sugartab 1:1	0.0	0.10909	4.10	2.25	1.37	4.40	15.89	1.493	14.25	2.94	4.39	8.
	19.6	0.0965	2.10	2.32	1.55	5.50	15.45	1.099	4.46	5.14	5.13	10.
	32.6	0.1045	4.86	2.42	2.54	6.50	13.07	0.949	16.88	6.84	6.07	13.
	42.0	0.1061	4.98	2.59	4.53	4.40	11.73	0.529	17.58	8.31	6.44	15.
	49.0	0.1098	7.17	2.47	5.62	4.50	11.71	0.747	92.91	8.02	7.61	14.
STA-R$_x$ / Sugartab 1:3	0.0	0.0943	4.24	2.25	3.27	4.90	11.58	3.572	84.84	1.37	4.43	7.
	19.6	0.0977	8.18	2.29	4.52	4.80	13.17	0.502	18.92	9.55	5.53	5.
	32.6	0.0989	4.15	2.49	5.32	4.95	13.15	0.405	58.41	12.20	8.61	7.
	42.0	0.1074	1.77	2.45	1.77	5.90	18.85	0.395	53.56	14.93	10.84	7.
	49.0	0.1081	5.27	7.52	5.15	5.00	12.05	0.953	9.20	9.76	13.67	6.

Vehicle Name	Conc.% w/w	Weight (gm) mean	Weight (gm) C.V.%	Thickness (mm) mean	Thickness (mm) C.V.%	Hardness (Kg) mean	Hardness (Kg) C.V.%	Friability (loss%) mean	Friability (loss%) C.V.%	H. F. R.	D.T. (minutes) mean	D.T. (minutes) C.V.%
STA-R / Sugartab 3:1	0.0	0.0807	10.51	2.14	10.53	4.30	15.09	4.936	25.24	6.87	4.04	3.
	19.6	0.0912	3.15	2.65	2.89	5.10	14.46	0.928	30.80	5.49	4.62	11.
	32.6	0.0974	3.48	2.32	2.67	4.50	1.71	0.825	35.58	7.18	6.53	5.
	42.0	0.0992	8.87	2.27	7.02	4.60	15.20	0.588	13.17	8.08	8.00	11.
	49.0	0.1036	3.31	2.40	3.39	5.50	12.85	0.0590	19.85	93.22	11.99	11.
STA-R / Celutab 1:1	0.0	0.0866	18.52	2.13	2.6	5.42	9.22	3.78	35.62	1.433	4.09	12.91
	19.6	0.0962	2.75	2.29	2.11	7.42	10.29	0.858	44.93	8.647	4.83	7.41
	32.6	0.1011	1.75	2.39	1.47	8.60	9.41	0.568	8.98	15.122	5.85	5.06
	42.0	0.1063	1.56	2.50	1.45	9.37	6.31	0.539	11.50	17.365	6.52	2.28
	49.0	0.1103	2.24	2.58	1.67	9.85	6.35	0.367	15.29	26.839	8.39	5.60
STA-R / Celutab 1:3	0.0	0.079	3.15	1.95	3.04	4.75	12.15	2.375	29.67	1.99	3.78	2.62
	19.6	0.091	9.01	2.22	2.18	6.60	11.35	0.905	21.72	7.28	3.94	5.63
	32.6	0.1043	1.35	2.37	2.25	8.50	8.47	0.550	12.07	15.44	4.22	10.60
	42.0	0.1072	1.53	2.45	1.28	9.55	4.76	0.648	60.57	14.88	4.87	7.64
	49.0	0.1166	1.65	2.63	1.61	10.12	6.91	0.648	52.83	15.61	4.88	3.03
STA-R / Celutab 3:1	0.0	0.0943	1.79	2.20	2.08	4.65	13.45	2.288	29.83	2.031	4.32	8.97
	19.6	0.0976	2.29	2.28	2.28	5.50	12.65	1.511	82.34	2.638	5.00	6.86
	32.6	0.0984	4.30	2.31	1.30	6.10	13.62	0.615	21.88	9.913	6.94	4.27
	42.0	0.1041	1.29	2.41	1.06	6.55	9.13	0.508	8.101	12.87	10.25	9.11
	49.0	0.1091	1.24	2.50	3.63	7.80	5.40	0.287	23.17	27.111	13.88	7.16

Table 5: Effect of blends of Celutab with other vehicles on the physical characteristics of oxytetracycline hydrochloride tablets.

Vehicle		Weight (gm)		Thickness (mm)		Hardness (Kg)		Friability (loss%)		H.F. R.	D.T. (minutes)	
	Conc.%											
name	w/w	mean	C.V.%	mean	C.V.%	mean	C.V.%	mean	C.V.%		mean	C.V.%
Celutab/	0.0	0.0866	1.70	2.07	1.85	5.10	6.20	1.875	14.85	2.715	5.73	5.16
Anhydrous	19.6	0.097	4.43	2.20	3.99	5.60	9.22	2.592	21.80	2.162	5.22	7.53
Lactose	32.6	0.1082	1.86	2.41	1.87	6.30	7.66	1.49	10.22	4.228	5.95	8.67
1:1	42.0	0.1098	2.66	2.48	2.77	6.50	10.87	0.852	15.77	7.623	9.43	18.09
	49.0	0.1124	2.32	2.48	2.24	7.45	5.87	0.090	20.88	8.501	6.31	8.11
Celutab/	0.0	0.0944	2.34	2.25	1.96	4.45	11.78	1.993	23.09	8.44	6.11	6.79
Anhydrous	19.6	0.0799	2.95	1.87	3.05	4.50	11.98	2.069	32.73	2.17	5.48	6.81
Lactose	32.6	0.1026	1.95	2.33	2.21	5.905	5.35	0.897	8.94	6.57	5.81	4.70
1:3	42.0	0.1072	1.50	2.41	1.92	6.15	11.52	0.733	13.36	8.38	6.18	17.40
	49.0	0.1100	1.87	2.51	1.79	7.09	10.22	0.746	47.98	3.67	8.67	18.85
Celutab/	0.0	0.0895	6.64	2.00	21.93	4.99	19.75	1.357	21.20	3.676	6.56	3.01
Anhydrous	19.6	0.1063	2.04	2.27	1.29	5.22	8.09	0.792	7.25	6.59	7.47	7.98
Lactose	32.6	0.1050	1.13	2.23	1.08	7.18	8.24	1.812	5.15	3.966	5.69	5.38
1:1	42.0	01074	1.10	2.30	1.19	7.25	12.01	1.124	12.54	6.45	6.09	4.51
	49.0	0.110	1.55	2.43	1.05	7.43	13.75	1.114	6.02	6.669	5.49	10.23
Celutab	0.0	0.0718	1.77	1.64	1.56	3.60	22.77	0.597	34.60	6.028	4.83	7.68
Sugartab	19.6	0.0869	2.58	1.96	2.92	4.55	19.60	0.225	36.57	20.204	6.58	11.07
1:1	32.6	0.0948	5.80	2.15	3.25	4.77	14.04	0.899	7.11	5.246	7.30	14.57
	42.0	0.1022	3.57	2.20	3.42	4.80	8.78	0.9019	14.94	5.322	4.94	20.91
	49.0	0.1052	4.43	4.65	4.65	4.27	9.77	1.000	17.97	4.27	5.86	21.81
Celutab/	0.0	0.0872	2.24	2.03	1.24	4.84	4.16	0.232	34.91	17.18	6.23	20.48
Sugartab	19.6	0.1013	2.39	2.76	2.00	4.49	12.61	0.430	10.78	10.223	7.22	5.04
1:3	32.6	0.1132	3.14	2.51	2.58	4.32	19.91	0.329	11.54	13.13	7.12	11.48
	42.0	0.1173	4.87	2.57	3.10	3.77	15.11	0.543	29.20	6.931	8.43	13.48
	49.0	0.1787	2.23	2.68	1.88	4.02	8.51	0.565	8.91	7.936	9.18	8.13
Celutab/	0.0	0.0735	1.51	1.75	1.62	3.22	12.36	0.886	16.6	3.632	5.24	6.67
Sugartab	19.6	0.0861	2.09	2.01	1.94	4.22	12.91	2.734	10.12	1.543	6.00	19.98
3:1	32.6	0.0953	3.73	2.16	3.04	3.85	15.96	0.410	13.70	9.381	7.22	11.47
	42.0	0.1058	21.96	2.36	2.14	4.30	66.04	0.644	25.69	6.669	8.80	19.98
	49.0	0.1080	2.21	2.41	4.65	4.40	8.18	0.696	18.34	10.316	7.22	2.81

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تقييم خليط الصواغات لتحضير أقراص التتراسيكلين هيدروكلوريد بطريقه الكبس المباشر

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الطريقه الحديثه لتصنيع الاقراص هى طريقه الكبس المباشر . ولقد قيمت صواغات الكبس المباشر مثل الافسيل ، الاموكس ، الشجرتاب سكر البن الأمائى الرسمى فى قانون الادويه الامريكى والاس ت أ.أر. اكس ت ١٥٠٠ .

ولقد استخدمت هذه الصواغات اما بمفردها أو فى مخاليط ثنائيه بنسب ١:١ ، ٣:١ ، ١:٣ وزنا على وزن وذلك لعمل أقراص التتراسيكلين هيدروكلوريد ولقد وجد أن الافسيل ، والسلوتاب والاس ت. أ . ار.اكس ت ١٥٠٠ هما أفضل الصواغات التى أستعملت بمفردها وذلك لعمل اقراص تتراسيكلين هيدروكلوريد . بينما وجد أن المخلوط الثنائى لكل نسبه من الافسيل والاس. ت . أ . ار أكس ت ١٥٠٠ هو الافضل .

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