Quality control of tablets "Papazol" by spectrophotometry using chemometrics

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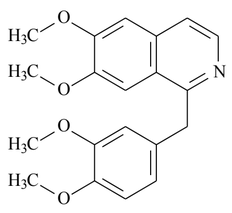
The aim of the work was to assess the possibility of using the spectrophotometry method in combination with the method of principal components to control the quality of tablets "Papazol" according to the indicator "Uniformity of dosage"

Research objects

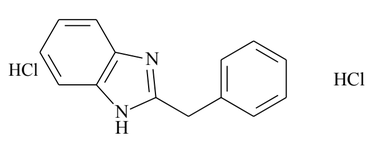
Ltd «Farmstandart – Leksredstva» Russia. Kursk

OJSC «Irbit Chemical-Pharmaceutical Plant» Russia. Irbit

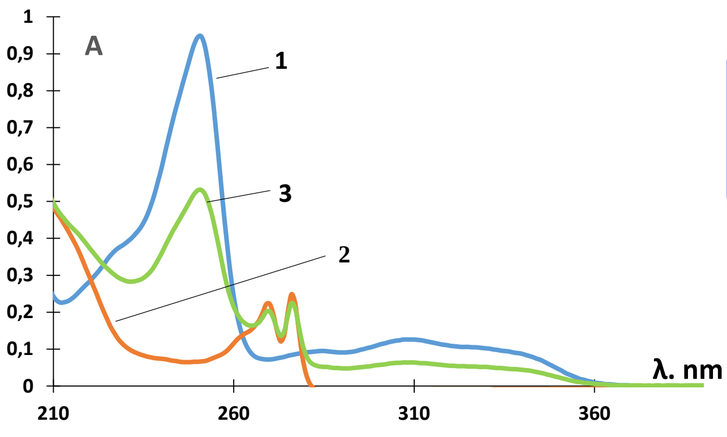
Activ compound	**bendazole hydrochloride (dibazole) - 30 mg; papaverine hydrochloride - 30 mg;**
Excipients	**potato starch - 56 mg; talcum powder - 3 mg; stearic acid - 1 mg.**



Papaverine hydrochloride



Bendazole hydrochloride



Electronic absorption spectra of papaverine hydrochloride (1). dibazole (2) and their mixture (3). The concentration of the components is 6 mg/l.

Equipment:

spectrophotometer SHIMADZU UV-1800 (Japan);
Quartz cuvettes (*l*=10 mm)
UV-Probe 2.31 program

Absorbace spectra registration parameters:

wavelength interval 210-400 nm;
scanning step – 0.2 nm;
comparing solution – 0.1 M HCl

The benefits of combined medicines

- ✓ ease of use for the patient;
- ✓ potentiation of action;
- ✓ reduced risk of side effects;
- ✓ economic factor.

Features of combined quality control medicines:

- ➢ the composition includes substances both close and different in physicochemical and chemical properties;
- ➢ the possibility of interaction of medicinal substances with each other;
- ➢ the possibility of interaction of medicinal substances with excipients.

Pharmacopoeia control requirements quality tablets without a shell

1. Composition.
2. Description.
3. The homogeneity of the mass.
4. Abrasion.
5. Crush strength
6. Disintegration.
7. Dissolution
8. Determination of excipients.
9. Dosing uniformity.
10. Microbiological purity.
11. Quantitative determination.
12. Packing.
13. Marking.
14. Storage.

Analysis methods for multicomponent drugs

Spectrophotometry

- ***Vierordt's method***
- ***Chemometrics***

Chromatography

***The purpose of the uniformity test* is to monitoring the uniformity of the distribution of the active substance (s) for individual units of the dosage form (OFS.1.4.2.0008.18. State Pharmacopoeia XIV)**

Test "Uniformity of Dosage "

Application

Dosage Forms:
- Tablets
- Capsules
- Suppositories

Dosage forms in single dose individual packages:
- Granules
- Powders

Methods

method of direct determination

mass calculation method

Protocol of direct determination method

Stage I:
1. Determination of the mass of each of 10 dosage units
2. Calculation of the content of the active substance (A,%)
3. Calculation of active substance content from the nominal value (X,%)
4. The calculation of the arithmetic mean. standard deviation S
5. The calculation of the first indicator of acceptability AV,%

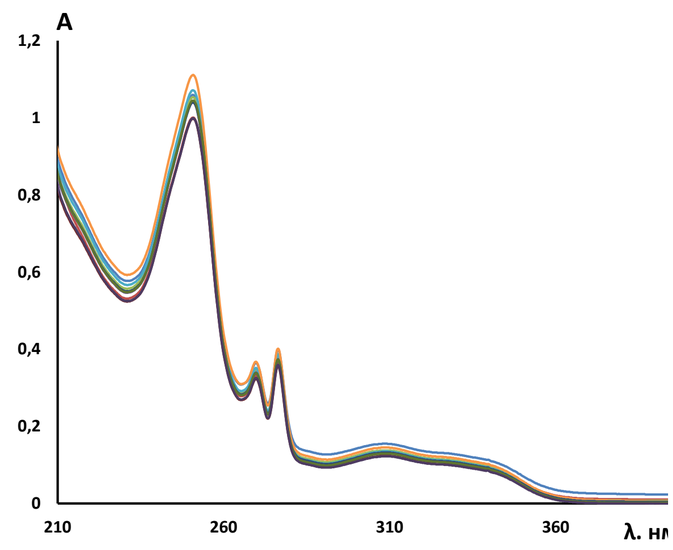
Stage II:
1. Determination of the mass of each of the 20 dosage units
2. Calculation of the content of the active substance
3. Calculation of active substance content (%) from nominal value
4. The calculation of the arithmetic mean. standard deviation S
5. The calculation of the second indicator of acceptability |M-Xi|,%

Interpretation of the results of stage I:
AV≤15 - satisfactory result
AV≥15 - stage II

Interpretation of the results of stages I and II:
The result is satisfactory if for n = 30
AV≤15 |M-Xi| ≤0.01 * 25 * M

Application of the Vierordt's method for determining the content of dibazole and papaverine in Papazol tablets

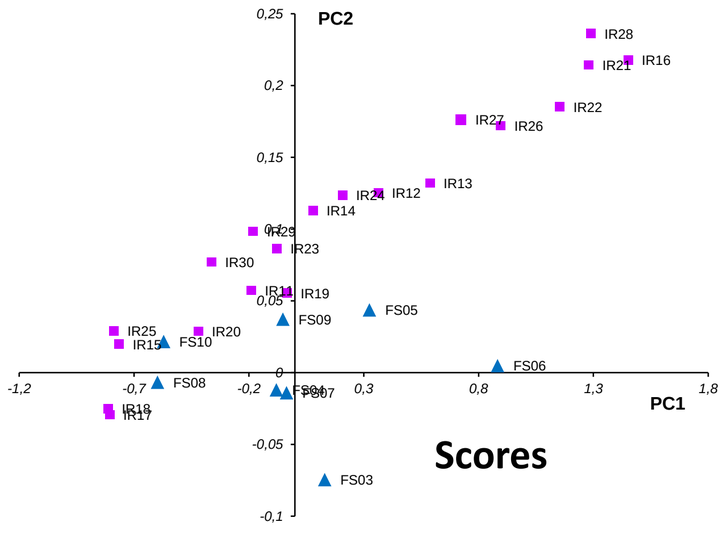
Absorbance coefficient, k, $l \cdot mg^{-1} \cdot sm^{-1}$		
	λ= 251 nm	λ= 276 nm
Dibazole	0.017	0.050
Papaverine	0.160	0.015



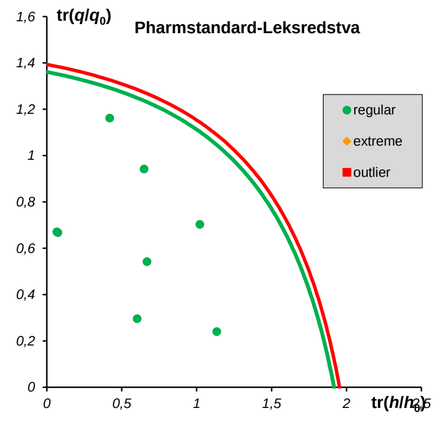
Electronic absorption spectra of aqueous solutions of tablets Papazol (Pharmstandard-Leksredstva)

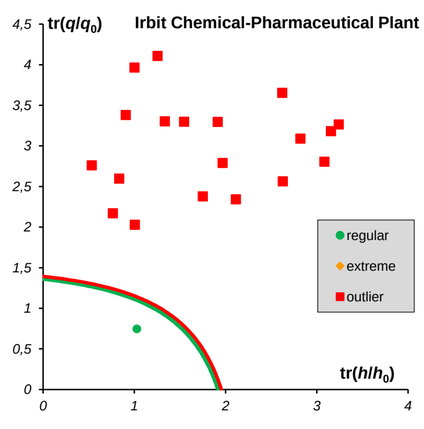
The results of the test "Uniformity of Dosage " for tablets "Papazol" (company-manufacturer "Pharmstandard-Leksredstva")										
No		1	2	3	4	5	6	7	8	9	10
m_{tabl}, g		0.1210	0.1217	0.1214	0.1219	0.1218	0.1213	0.1210	0.1212	0.1222	0.1217
A, %	Papaverine	99.5	94.3	99.5	98.2	101.2	104.8	98.3	94.3	98.8	94.3
	Bendazole	111.2	100.0	104.2	102.0	105.8	109.7	101.7	96.8	101.5	97.8
X, %	Papaverine	99.1	94.4	99.1	98.6	101.4	104.1	97.2	93.7	99.8	94.4
	Bendazole	110.7	100.1	104.1	102.3	106.1	109.5	101.2	96.6	102.1	97.9
Standard deviation (S): Papaverine – 3.329; Bendazole – 4.604											
Dose reference value (M,%) : Papaverine – 98.5; Bendazole – 101.5											
First acceptance indicator (AV): Papaverine – 8.3; Bendazole -12.6											

Application PCA method for the test "Uniformity of Dosage "



Scores





Outliers

PC 2, method - robust

CONCLUSIONS

- ➢ The quality assessment of the «Papazol» tablets of two manufacturers was carried out according to the Dosing Uniformity indicator according to the General Pharmacopoeia article SF XIV. It was found that «Papazol» tablets («Pharmstandat-Leksredstva») satisfy the requirements of the Global Fund for dosage uniformity. «Papazol» tablets («Irbit Chemical Pharmaceutical Plant») do not meet the requirements for dosing uniformity.
- ➢ The possibility of the PCA method for rapid testing of «Papazol» tablets for dosage uniformity was evaluated. The results obtained are consistent with the data obtained using the pharmacopoeial direct determination method.