

Quantitative determination of ampicillin and oxacillin in the “ampiox” preparation using potassium hydrogen peroxomonosulfate

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Aim: our work deals with the development of the new kinetic spectrophotometric method for quantitative determination of ampicillin and oxacillin in the “Ampiox” preparation on the base of the product of two conjugated reactions – peroxy acid oxidation and perhydrolysis in the alkaline medium. The relatively fast and easy-to-perform kinetic analysis techniques, based on the perhydrolysis reactions of the β -lactam ring with recording the generated with time products by spectrophotometry method [1] are of interest. The content of penicillins’ sum in the preparation can be determined by the method of iodometric titration, which presupposes analysing the alkaline hydrolysis of the tested penicillins at the first stage [2]. The spectrophotometric procedure of the quantitative determination of ampicillin and oxacillin in “Ampiox” are being narrowed down to the determining the products of their hydrolytic decomposition, they are long-lasting and need heating [3].

Materials and methods: the “Ampiox” preparation in the capsules of 0,250 g of series 291110, manufactured by the “PHARMACEUTICAL COMPANY “SDOROVYA” LTD., Kharkiv, Ukraine, was applied for the studies. As an oxidizing agent, the potassium triple salt of peroxymonosulfuric acid, $2\text{KHSO}_5 \cdot \text{KHSO}_4 \cdot \text{K}_2\text{SO}_4$, – “Oxone” manufactured by DuPont, was used. Its active agent is potassium hydrogen peroxomonosulfate, KHSO_5 . The choice of the reagent is to be explained by its accessibility, satisfactory solubility in water, relatively high oxidation capability ($E^\circ = 1,82 \text{ V}$) as well as by sufficient tolerance during storage and application. To ensure the needed solubility of the ampicillin trihydrate, *N,N*- dimethylformamide (DMFA) chemically pure was used.

Concluding part:

1. The reaction kinetics of the perhydrolysis of ampicillin and oxacillin with peroxomonosulfate in the alkaline medium is studied.
2. As an oxidizing agent, the potassium triple salt of peroxymonosulfuric acid, $2\text{KHSO}_5 \cdot \text{KHSO}_4 \cdot \text{K}_2\text{SO}_4$, – “Oxone” manufactured by DuPont, was applied.
3. The methodology was developed and the possibility of the quantitative determination of ampicillin and oxacillin in the “Ampiox” preparation based on the results of the kinetic-spectrophotometric and iodometric methods was shown. $\text{RSD} \geq 1,89 \%$ ($\delta \leq 1,8 \%$).

Results: of the quantitative determination of ampicillin in the “Ampiox” preparation based on the reaction with the potassium peroxomonosulfate ($n = 5$, $P = 0,95$).

Penicillin taken, mg	Determined		Metrological characteristics
	mg	%	
capsules of 250 mg of series 291110, manufactured by “PHARMACEUTICAL COMPANY “SDOROVYA” LTD., Kharkiv, Ukraine.			
ampicillin 124,3*	124,5	100,2	$\bar{x} = 126,5$ (101,4 %)
	128,2	103,1	$S = \pm 1,92$
	124,5	100,2	$S \bar{x} = \pm 0,86$
	127,2	102,3	$\Delta \bar{x} = \pm 2,39$
	128,1	103,1	$S_r = \pm 1,52\%$
			$RSD = \pm 1,89\%$
			$\delta = + 1,12 \%$
oxacillin 124,7**	127,9	102,6	$\bar{x} = 126,1$ (101,1 %)
	124,3	99,7	$S = \pm 1,77$
	127,3	102,1	$S \bar{x} = \pm 0,79$
	124,1	99,5	$\Delta \bar{x} = \pm 2,20$
	126,9	101,8	$S_r = \pm 1,41\%$
			$RSD = \pm 1,75\%$
			$\delta = + 1,77 \%$

Notes: * – the content of ampicillin, specified in the quality certificate;

** – the content of oxacillin, specified in the quality certificate.

Bibliography:

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