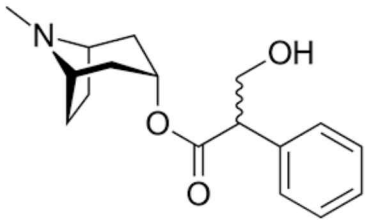
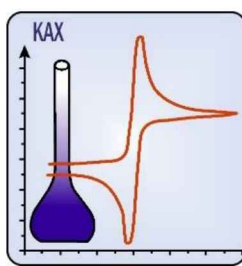


VALIDATION OF VOLTAMMETRIC DETERMINATION OF ATROPINE IN SOLUTION FOR INJECTION AND IN EYE DROPS

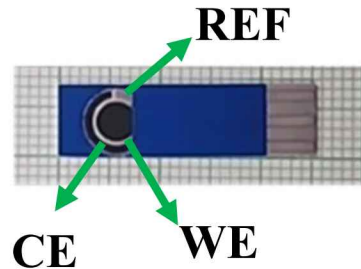
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Atropine (ATR) is an alkaloid naturally occurring in several Solanaceae plants like *Atropa Belladonna* and is widely used in pharmaceuticals. ATR is destroyed by enzymatic hydrolysis, and is excreted unchanged in the urine.



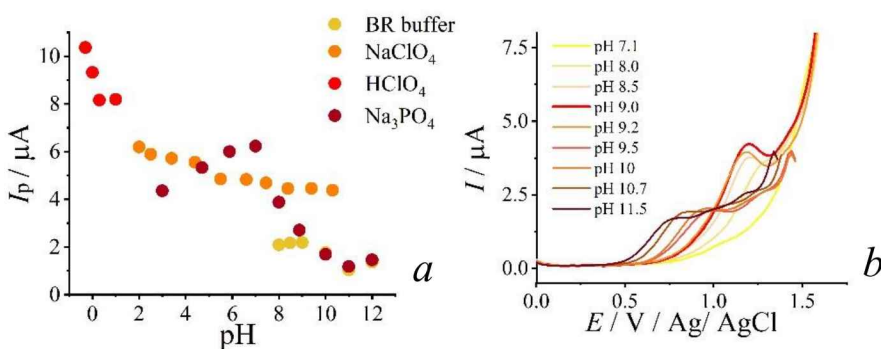
WE – the working electrode – *BDDE*

REF – the reference electrode – Ag/AgCl/ 3 M KCl

CE – the counter electrode – *graphite electrode*

Boron doped diamond electrode (BDDE) – one of the most modern devices for electrochemistry which is widely used in many fields: for organic synthesis, cleaning environmental objects from pollution, medicine, analytical and bioanalytical chemistry. In voltammetric analysis, BDDE is used to determine trace amounts of many organic substances and their metabolites in complex objects (medicines, biological fluids, food products, etc.).

Selection of the supporting electrolyte



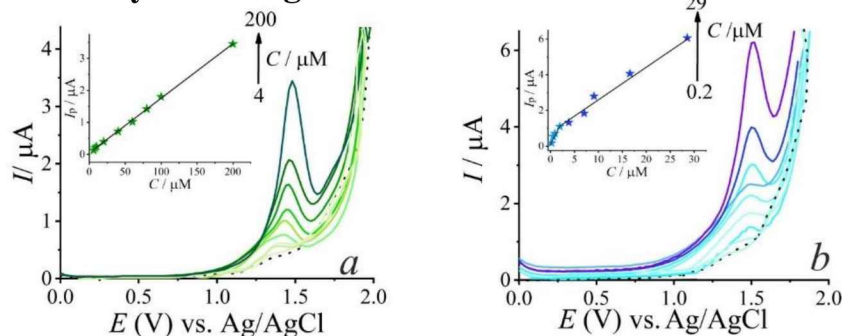
The dependences of 100 μM ATR oxidation current (a) vs. pH of the solution in the medium of various supporting electrolytes; DPV records of 100 μM ATR at BR buffer background (b).

Results of pharmaceuticals analysis for ATR content.

Pharmaceuticals	Method	Declared content, mg / mL	Specified in the Quality Certificate, mg / mL	Results, mg / mL	Recovery, %
solution for injection					
"Atropine-Darnitsa" (Pharmaceutical Company Darnitsa)	DPV	0.90-1.10	0.99	0.9992±0.0013	100.9
	SWV			1.0036±0.0013	101.4
	GC-FID			1.019±0.016	102.9
"Atropine sulphate" (GNCLS Experimental Plant Ltd)	DPV	0.90-1.10	0.99	0.9671±0.0005	97.7
	SWV			0.9687±0.0021	97.8
	GC-FID			1.029±0.005	103.9
eye drops					
"Atropine Sulphate" (GNCLS Experimental Plant Ltd)	DPV	10.00-11.00	10.40	10.02±0.07	96.4
	SWV			10.070±0.009	96.8
	GC-FID			10.19±0.05	97.9

Analytical performance

Linearity and range



Voltammograms and calibration graphs of ATR solutions on BDDE with diameter of 1 mm by DPV in the concentration range from 4.0 to 200.0 μM (a), on BDDE with diameter of 3 mm by SWV in the concentration range from 0.2 to 29 μM (b).

The limits of detection and quantification

Value	1 mm		2 mm		3 mm	
	DPV	SWV	DPV	SWV	DPV	SWV
LOD, μM	1.35	1.32	0.09	0.10	0.08	0.10
LOQ, μM	4.11	6.21	0.23	0.30	0.24	0.28

Results of the linearity, accuracy and precision validation of ATR in drugs.

Parameter	Value	Critical values	Conclusion
Linearity			
Slope b	0.9825	0.975–1.025	Maintained
S_b	0.0149		
Intercept a	1.6156	2.6	Maintained
S_a	1.5073	–	
Residual standard deviation S_0	0.5789	0.84	Maintained
The correlation coefficient r	0.99919	–	
Criterion for the linear correlation coefficient R_c	0.99908	0.99810	Maintained
Accuracy and precision			
Average value Z , %	99.89		
Relative standard deviation S_z , %	0.53		
Relative reliable interval, $\Delta_{A, \%} = t(95 \%, 8) \cdot S_z$	0.98	1.6	Maintained
Systematic error δ	-0.115	0.51	Maintained