Physics-technological institute metals and alloys
of the National academy of sciences of Ukraine

Casting high durability unsparkling copper alloy for the poured safe on the explosion instrument

Scientific leader
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Purpose of work:

To define the level of properties of casting titanic bronze and possibility of development on its basis of unsparkling alloy on replacement of beryllium bronze, for making of poured safe on the explosion hand ocksmithl instrument

Application domain

Making of safe on the explosion poured ocksmithl and safe on the explosion technological rigging which apply at works on production areas in which on the terms of technological process or the explosive can appear because of failure mixtures of combustible gases or steams of all categories and groups inflammability on classification of productions apartments

Task of researches

To define influencing of maintenance of titan and parameters of thermal treatments on a structure and properties of titanic bronze, and to define technological descriptions of bronze.

Properties of standard alloys for a safe on the explosion instrument

It is easily Soiled alloy	Mechanical properties of alloys			Type of the made instrument
	Durability at tension, MPa	Shock viscidity, KDg/sm2	The HB Hardness MPa	
ВБ-1 ТУ 2-18-246-83	690 - 833	19 - 30	2500 - 3100	Wrenches
ВБ-2 ТУ 2-035-1030-86			1300 - 3500	Points-Tool
ВБ-3 ТУ 2-035-1031-86	500-600	20-30	2000-2400	Hammers and sledge-hammers
БрБ2 ГОСТ 18175-78	700 – 1300	30 - 40	1500 - 3900	All types of ocksmithl instrument

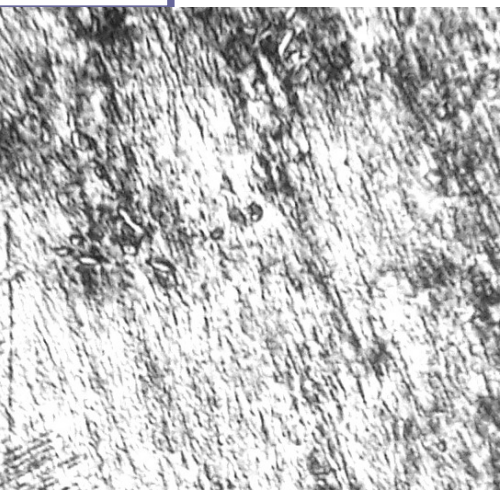
Chemical composition of standard alloys for a safe on the explosion instrument

It Is Easily Soiled Alloy	Химический состав, % мас.													
	Al	Ni	Cr	Zn	Mn	Fe	Si	Modifier		Admixtures				Cu
								Zr	Ti	Pb	P	Fe	Si	
ВБ1	11,5 -12,1	7,5 -8,2	0,5 -0,7	-	-	-	-	0,25 -0,35	-	-	0,05	0,2	-	Other
ВБ2	0,8 -1,5	19 -21	0,5	16 -20	18 -21	-	-	-	0,2	-	-	0,2	0,1	Other
ВБ3	6,4 -7,2	-	-	Ot her	0,5 -1,0	0,5 -1,0	0,2 -0,5	-	-	0,1	0,1	No more 0,5 all admixtures		67-70

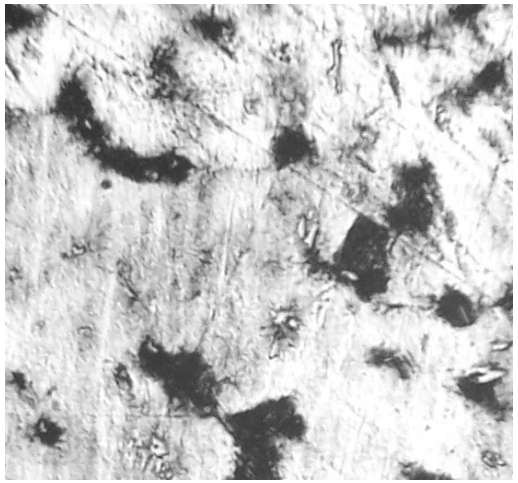
БрБ2 **Be - 1,8 ÷ 2,2** **Other**

No more 0,5 all admixtures

Structure of experimental bronze



a



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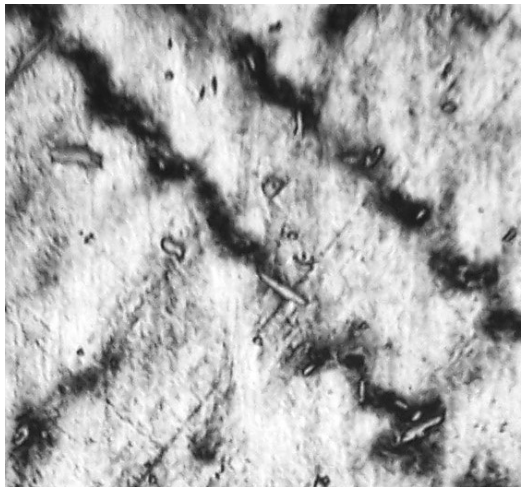

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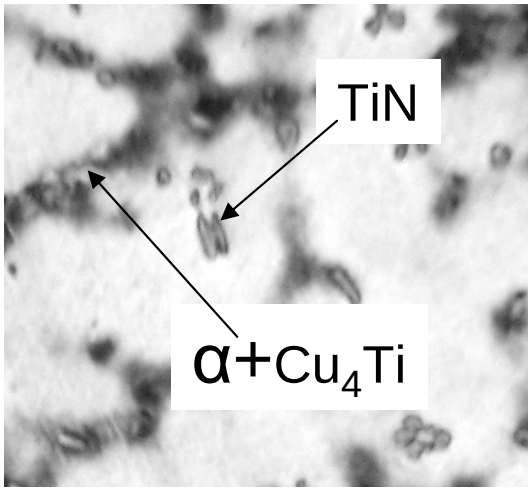
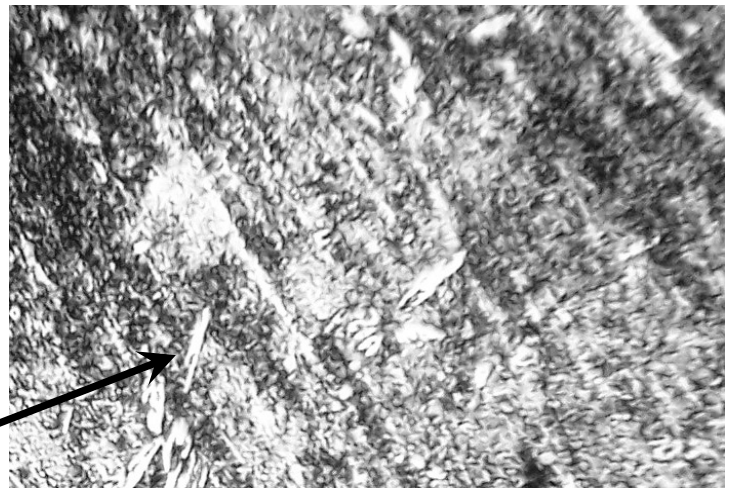
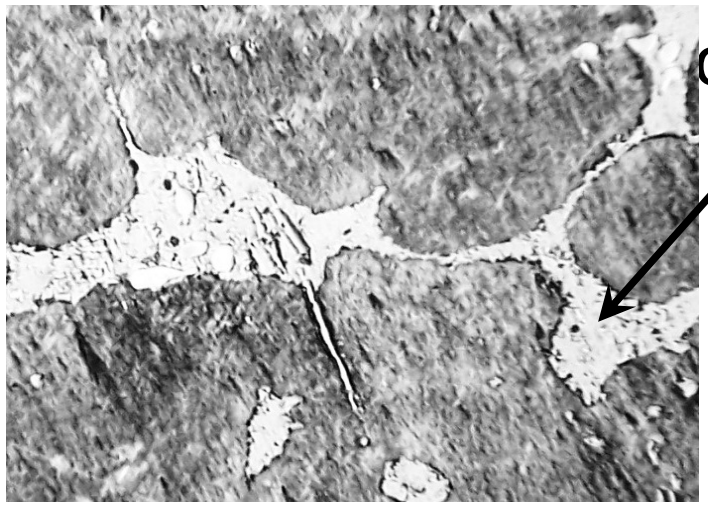


d

Microstructures of bronze in the poured state, x200
a-1,26% Ti; b-3,74% Ti; c-4,38% Ti; d-5,62% Ti.



Structure after tempering , x200 Ti – 5,62%

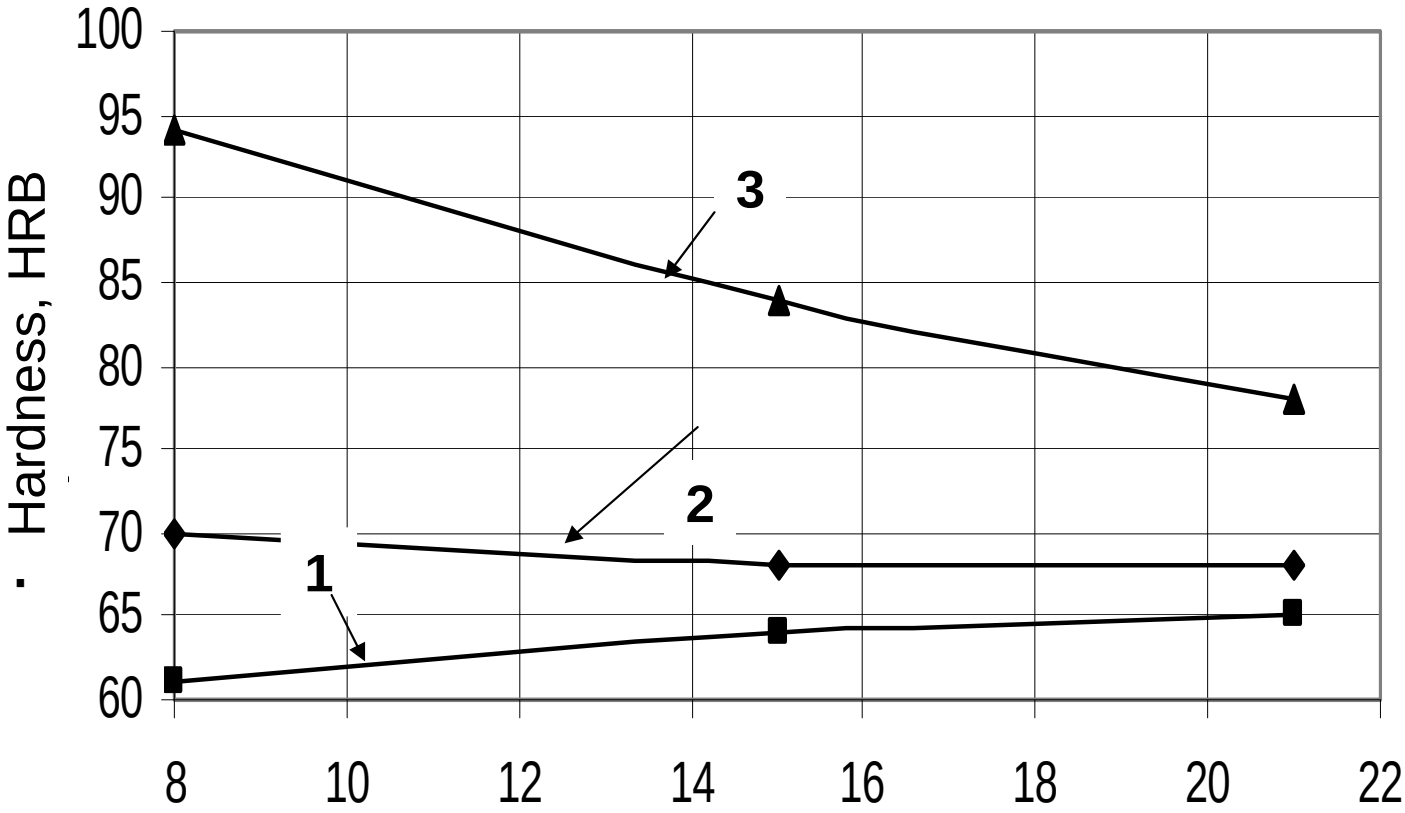


Structure of bronze (Ti-4,5%) alloyed by zirconium (0,5%) and by a chrome (0,5%) after tempering, x 200

Mechanical and technological properties experimental titanic bronze

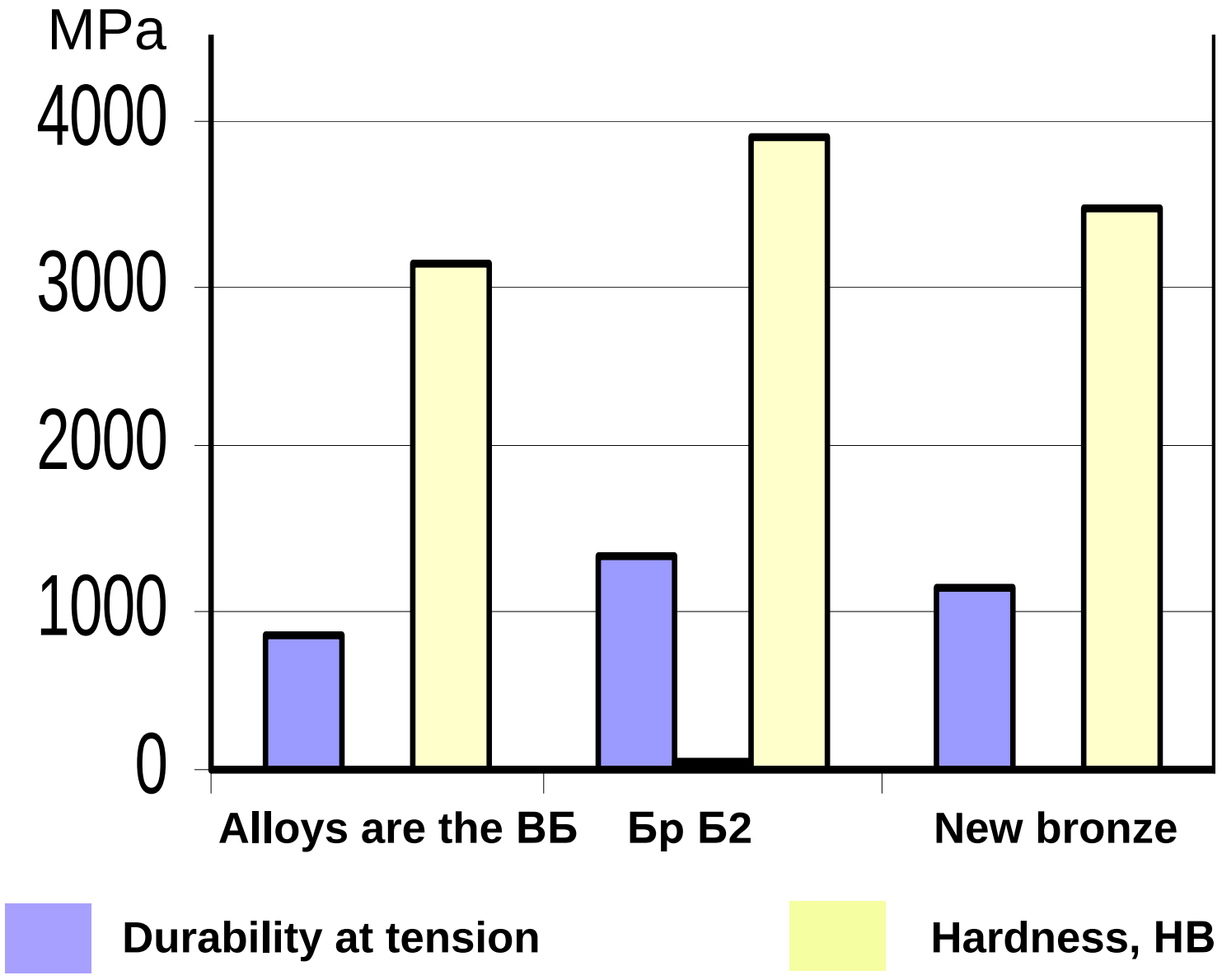
The state of standard	Mechanical properties			Technological properties	
	Durability at tension, MPa	Shock viscidity, KDg	The HB hardness MPa	Gidkotekuchest on a spiral test, mm	By A Volume(lin ear) usadka %
Poured	**740**	**31,4**	**2600**	**450**	**8,54 (2,1)**
After tempering	**540**	**21,0**	**1530**		
After the senescence and ukova on 10%	**1150**	**19,5**	**3500**		

Influencing of thickness of wall of founding on hardness of titanic bronzi



1 - the poured state 2 – after tempering 3 – after the senescence

Properties of the standard VB alloys and titanic bronze



Making of the poured purveyances from a titanic bronze

Casting models
hammer and key

Founding
of wrench of nut and hammer

Sparkling at treatment by an abrasive stone

Steel hammer

Hammer from a titanic bronze