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# Formulations for the "Characterization of unique compounds in explosives" project

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**To:** Nikolai Taibinov

**From :** Armando Alcaraz

**Subject:** Formulations for the “Characterization of unique compounds in explosives” project.

Below are Semtex-H and Semtex-A formulations that can be utilized for the “Characterization of unique compounds in explosives” project. Table 1 outlines some of the dyes, binders, and antioxidants used in these formulations. Perhaps, you can formulate two more Semtex formulations utilizing commonly used Russian explosive dyes, binders, and antioxidants, see Table 2. We should have at least 4 different formulations for this project.

TABLE 1. Summary of Semtex Analysis

Component	Semtex H	Semtex A
% PETN	49.8	94.3
% RDX	50.2	5.7
Dye	Sudan I	Sudan IV
Antioxidant	N-phenyl-2-naphthalamine	N-phenyl-2-naphthalamine
Plasticizer	n-octyl Phthalate Butyl Citrate	n-octyl Phthalate Butyl Citrate
Binder	Styrene-butadiene rubber	Styrene-butadiene rubber

Yinon, Jehuda, *Advances in Analysis and Detection of Explosives*, Kluwer Publishing, p 416, 1992.

Below are the SEMTEX formulas RFNIIF-VNIITF has provided as test compounds:

The Statement of Work is hereby amended to add the following. Task 2C Added:  
The Institute shall procure starting materials and synthesize 4' types of SEMTEX explosives and TATP for analysis by the specifications provided in Table 1 and Table 2 for the SEMTEM formulation and utilize a reference article for the synthesis of TATP. We shall name the first two SEMTEX explosives - Livex (**L**ivermore **E**xplosive), and the next two ones – Snex (**S**nezhinsk **E**xplosive).

**Table 1**

<b>Semtex H (Livex H)</b>			<b>Semtex A (Livex A)</b>		
PETN	49.8	39.3	PETN	94.3	76
RDX	50.2	39.7	RDX	5.7	4.6
Sudan I	0.9	0.7	Sudan IV	0.7	0.6
N-phenyl-2-naphtalamine	1.3	1.0	N-phenyl-2-naphtalamine		
n- octyl -phthalate butyl-citrate	11.5	9.1	n- octyl -phthalate butyl-citrate	11.7	9.4
Styrene-butadiene rubber	12.9	10.2	Styrene-butadiene rubber	11.7	9.4
	126.9	100%		124.1	100%

**Table 2**

<b>Semtex X (Snex H)</b>			<b>Semtex Y (Snex A)</b>		
PETN	49.8	43.2	PETN	94.3	79.9
RDX	50.2	43.6	RDX	5.7	4.8
Sudan II	0.01	0.01	Fat-soluble, red	0.01	0.01
Agidol-2	0.1	0.1	2,2-methylene-bis-(4-methyl-butylphenol)	0.1	0.1
Polyisobutylene 15 000 – 25,000	15.0	13.0	Polyisobutylene 15 000 – 25,000	18	15.2
Dimethyl dinitrobutane	0.1	0.1			
	115.2	100%		118.1	100%

The tiracetone triperoxide will be synthesized utilizing the following reference article:  
“**Decomposition of Triacetone Triperoxide Is an Entropic Explosion**”

Faina Dubnikova, Ronnie Kosloff, Joseph Almog, Yehuda Zeiri, Roland Boese,| Harel Itzhaky,X Aaron Alt,X and Ehud Keina.