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**COMMITTEE OF EXPERTS ON THE
TRANSPORT OF DANGEROUS GOODS**

**Sub-Committee of Experts on the
Transport of Dangerous Goods**
(Fourteenth session,
Geneva, 8-19 December 1997,
agenda item 2 (d))

**DRAFT AMENDMENTS TO THE MODEL REGULATIONS ON THE
TRANSPORT OF DANGEROUS GOODS**

Other draft amendments

**Amendment to paragraph 2.5.3.2.4
List of currently assigned organic peroxide**

Transmitted by the Expert from Japan

1. Introduction

According to the provision of paragraph 2.5.3.2.5.1, the after-mentioned organic peroxides and formulations of organic peroxides have been assigned to generic entries by the Ministry of Transport of Japan on the basis of test reports. Since these peroxide and formulations or organic peroxides have been transported in commercial amounts these years, there is a need to include these peroxides in the List of paragraph 2.5.3.2.4.

2. Proposal

Japan proposes to include the following organic peroxides and formulations of organic peroxides in the List of paragraph 2.5.3.2.4. The proposed list and the relevant supporting test data on the peroxides are given in Annexes 1 and 2 respectively.

DI-2-ETHOXYETHYL PEROXYDICARBONATE, not more than 52% in solvent

tert-HEXYL PEROXYPIVALATE, not more than 72% in solvent

DI-3-METHOXYBUTYL PEROXYDICARBONATE, not more than 52% in solvent

DI-m-TOLUOYL PEROXIDE + BENZOYL-m-TOLUOYL PEROXIDE + DIBENZOYL PEROXIDE, with concentration not more than 42% and not less than 58% of diluent Type B

DI-(2-ETHYLHEXYL)PEROXYDICARBONATE, with concentration not more than 62% as a stable dispersion in water

tert-BUTYL PEROXYNEODECANOATE, with concentration not more than 52% as a stable dispersion in water

2,2-BIS(4,4-DI-tert-BUTYLPEROXYCYCLOHEXYL)PROPANE, with concentration not more than 22% and diluent Type B

tert-HEXYL PEROXYNEODECANOATE, with concentration not more than 71% and diluent Type A

1,1-DI(tert-BUTYLPEROXY)-3,3,5-TRIMETHYLCYCLOHEXANE, with concentration not more than 77% and diluent Type B

* * * * *

(Annex 2 in English only)

Proposal
 We propose to include the following organic peroxide in 2.5.3.2.4

ORGANIC PEROXIDE	Concentration (%)	Diluent type A (%)	Diluent Type B (%)	Packing Method	Control Temperature (°C)	Emergency Temperature (°C)	Number (Generic entry)
DI-2-ETHOXYETHYL PEROXYDICARBONATE	≤ 52	≥ 48	≥ 48	OP7	-10	0	3115
tert-HEXYL PEROXYPIVALATE	≤ 72	≥ 28		OP7	10	15	3115
DI-3-METHOXYBUTYL PEROXYDICARBONATE	≤ 52	≥ 48		OP7	-5	5	3115
DI-m-TOLUOYL PEROXIDE +BENZOYL-m-TOLUOYL PEROXIDE +DIBENZOYL PEROXIDE	TOTAL ≤ 42	≥ 58		OP7	35	40	3115
DI(2-ETHYLHEXYL) PEROXYDICARBONATE	≤ 62 as a stable dispersion in water			OP8	-15	-5	3117
tert-BUTYL PEROXYNEODECANOATE	≤ 52 as a stable dispersion in water			OP8	15	20	3117
2,2-bis(4,4-DI-tert-BUTYLPEROXY-CYCLOHEXYL)PROPANE	≤ 22		≥ 78	OP8			3107
tert-HEXYL PEROXYNEODECANOATE	≤ 71	≥ 29		OP7	10	15	3115
1,1-DI(tert-BUTYLPEROXY)-3,3,5-TRIMETHYLCYCLOHEXANE	≤ 77		≥ 23	OP7			3105

ANNEX 1

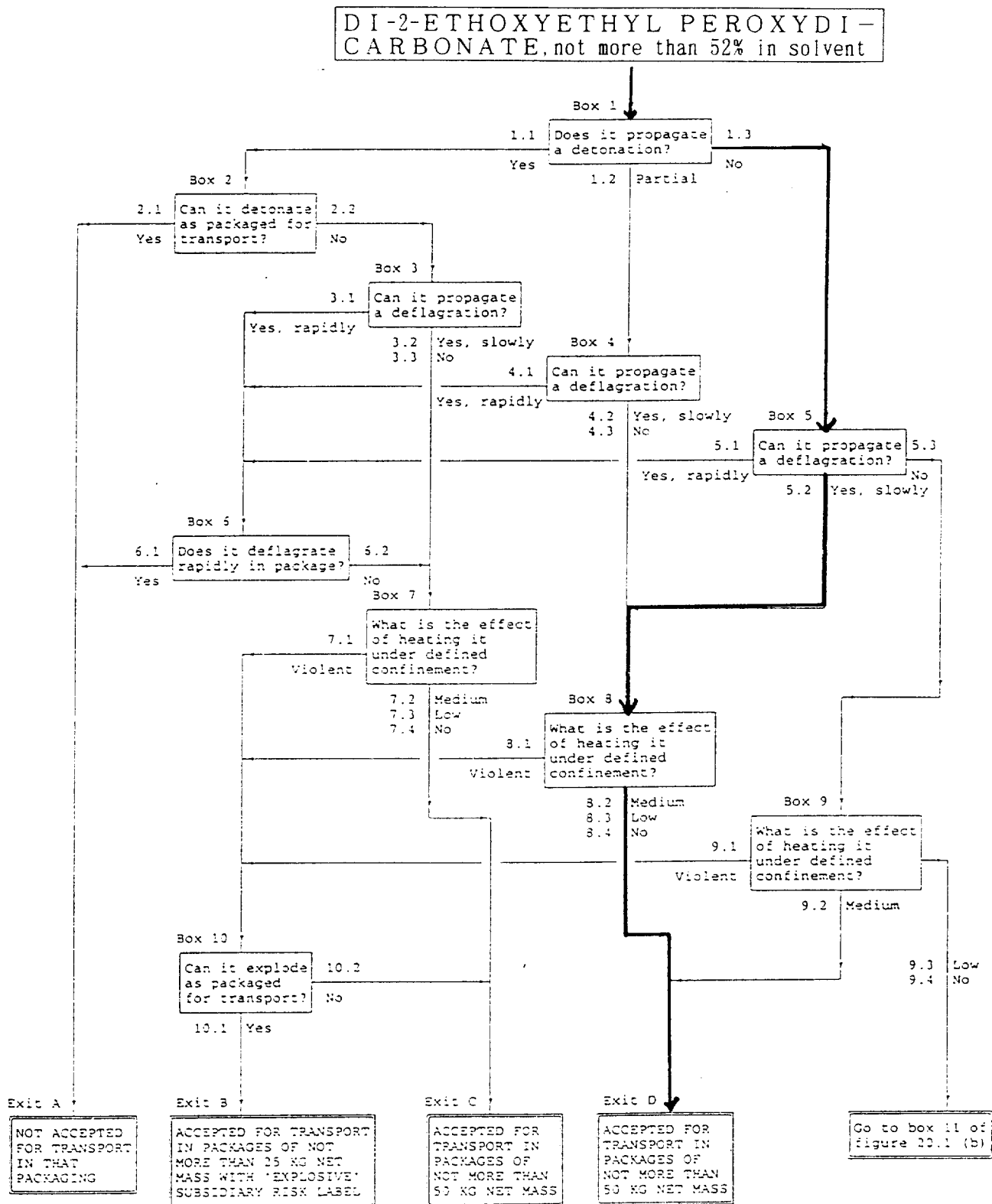
Annex 2

TEST REPORT

1. Name of the organic peroxide : DI-2-ETHOXYETHYL PEROXYDI-CARBONATE, not more than 52% in solvent
2. General data
 - 2.1 Composition : 50.3% di-2-ethoxyethyl peroxydicarbonate
49.7% diluent type B
 - 2.2 Molecular formula : $C_{10}H_{18}O_8$
 - 2.3 Active oxygen content : 3.03%
 - 2.4 Physical form : Liquid
 - 2.5 Colour : Colourless
 - 2.6 Density : $1013\text{kg/m}^3(0^\circ\text{C})$
3. Detonation(test series A)
Box 1 of the flow chart : Does the peroxide propagate a detonation?
 - 3.1 Method : BAM 50/60 steel tube test(test A.1)
 - 3.2 Sample conditions : Ambient temperature
 - 3.3 Observations : Fragmented part of the tube : 14.7, 15.4 and 15.4 cm
Only upper part was destroyed, no detonation
 - 3.4 Result : No
 - 3.5 Exit : 1.3
4. Deflagration(test series C)
Box 5 of the flow chart : Does the peroxide propagate a deflagration?
 - 4.1 Method 1 : Time/pressure test(test C.1)
 - 4.2 Sample conditions : Ambient temperature
 - 4.3 Observations : Time : 45.2ms
 - 4.4 Result : No
 - 4.5 Method 2 : Deflagration test(test C.2)
 - 4.6 Sample conditions : 2°C
 - 4.7 Observations : Deflagration rate : 2.38mm/s
 - 4.8 Result : Yes, slowly
 - 4.9 Final result : Yes, slowly
 - 4.10 Exit : 5.2
5. Heating under confinement(test series E)
Box 8 of the flow chart : What is the effect of heating it under defined confinement?
 - 5.1 Method 1 : Koenen test(test E.1)
 - 5.2 Sample conditions : Sample weight : 31.5g
 - 5.3 Observations : Limiting diameter : 1.0 mm
fragmentation type "F"
 - 5.4 Result : Low

- 5.5 Method 2 : Dutch pressure vessel test(test E.2)
- 5.6 Sample conditions : Sample weight 10g
- 5.7 Observations : Limiting diameter:5.5 mm
- 5.8 Result : Medium
- 5.9 Final result : Medium
- 5.10 Exit : 8.2
6. Thermal stability(outside of the flow chart : test series H)
- 6.1 Method : Heat accumulation strage test(test H.4)
- 6.2 Sample conditions : Mass 400 cc:
half time of cooling of dewar vessel=8.15 hours
- 6.3 Observation : at 5°C no exothermal reaction within 7 days
at 10°C temperature rise up to 168°C
- 6.4 Result : S ADT = 10°C
7. General remarks : The classification scheme is given in fig.1
8. Proposed assignment
- 8.1 Proper shipping name : ORGANIC PEROXIDE TYPE D, LIQUID
- 8.2 UN number : 3115
- 8.3 Division : 5.2
- 8.4 Technical name : DI-2-ETHOXYETHYL PEROXYDI -
CARBONATE, not more than 52% in solvent
- 8.5 Concentration : $\leq 52\%$
- 8.6 Diluent(s) : Diluent type B
- 8.7 Subsidiary risks : None
- 8.8 Packing group : II
- 8.9 Packing method : OP7
- 8.10 Control temperature : -10°C
- 8.11 Emergency temperature : 0°C

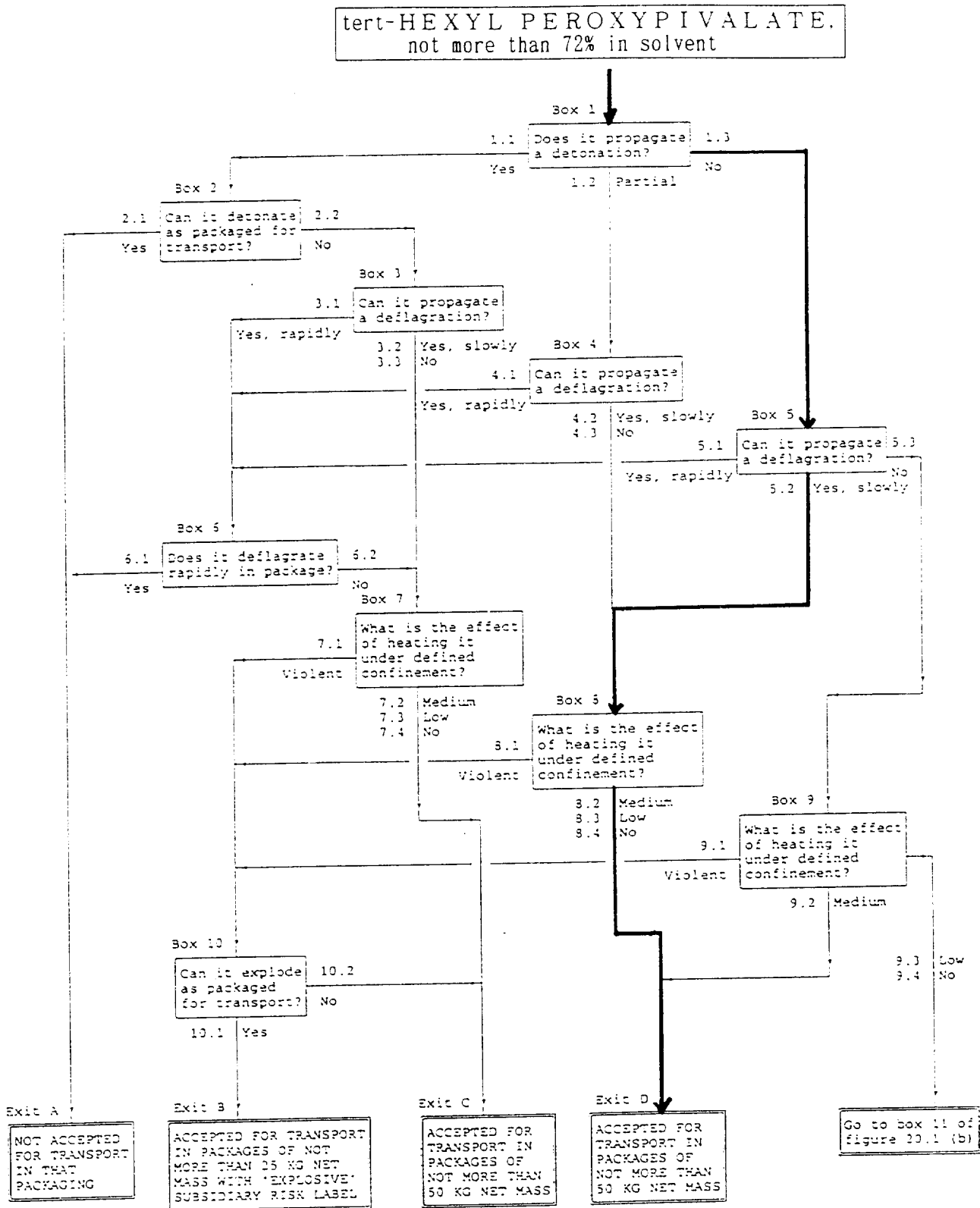
Fig.1 CLASSIFICATION OF ORGANIC PEROXIDE MIXTURE



1. Name of the organic peroxide: tert-HEXYL PEROXYPIVALATE,
not more than 72% in solvent
2. General data
 - 2.1 Composition : 70.4% t-Hexyl peroxy-pivalate
29.6% diluent type A
 - 2.2 Molecular formula : $C_{11}H_{22}O_3$
 - 2.3 Active oxygen content : 5.57%
 - 2.4 Physical form : Liquid
 - 2.5 Colour : Colourless
 - 2.6 Density : $878 \text{ kg/m}^3 (0^\circ\text{C})$
3. Detonation(test series A)
Box 1 of the flow chart : Does the peroxide propagate a detonation?
 - 3.1 Method : BAM 50/60 steel tube test(test A.1)
 - 3.2 Sample conditions : Ambient temperature
 - 3.3 Observations : Fragmented part of the tube: 11.0, 13.5 and 13.7 cm
Only upper part was destroyed, no detonation
 - 3.4 Result : No
 - 3.5 Exit : 1.3
4. Deflagration(test series C)
Box 5 of the flow chart : Does the peroxide propagate a deflagration?
 - 4.1 Method 1 : Time/pressure test(test C.1)
 - 4.2 Sample conditions : Ambient temperature
 - 4.3 Observations : Time : 145.2ms
 - 4.4 Result : Yes slowly
 - 4.5 Method 2 : Deflagration test(test C.2)
 - 4.6 Sample conditions : 15°C
 - 4.7 Observations : Deflagration rate : 2.27 mm/s
 - 4.8 Result : Yes slowly
 - 4.9 Final result : Yes slowly
 - 4.10 Exit : 5.2
5. Heating under confinement(test series E)
Box 8 of the flow chart : What is the effect of heating it under defined
confinement?
 - 5.1 Method 1 : Koenen test(test E.1)
 - 5.2 Sample conditions : Sample weight : 25.7g
 - 5.3 Observations : Limiting diameter : 1.5 mm
fragmentation type "F"
 - 5.4 Result : Medium

- 5.5 Method 2 : Dutch pressure vessel test(test E.2)
- 5.6 Sample conditions : Sample weight 10g
- 5.7 Observations : Limiting diameter : 5.0 mm
- 5.8 Result : Medium
- 5.9 Final result : Medium
- 5.10 Exit : 8.2
6. Thermal stability(outside of the flow chart : test series H)
- 6.1 Method : Heat accumulation strage test(test H.4)
- 6.2 Sample conditions : Mass 400 cc:
half time of cooling of dewar vessel=8.15 hours
- 6.3 Observation : at 20°C no exothermal reaction within 7 days
at 25°C temperature rise up to 128°C
- 6.4 Result : S A D T=25°C
7. General remarks : The classification scheme is given in fig.1
8. Proposed assignment
- 8.1 Proper shipping name : ORGANIC PEROXIDE TYPE D, LIQUID
- 8.2 UN number : 3115
- 8.3 Division : 5.2
- 8.4 Technical name : tert-HEXYL PEROXYPIVALATE, not more
than 72% in solvent
- 8.5 Concentration : $\leq 72\%$
- 8.6 Diluent(s) : Diluent type A
- 8.7 Subsidiary risks : None
- 8.8 Packing group : II
- 8.9 Packing method : O P 7
- 8.10 Control temperature : 10°C
- 8.11 Emergency temperature : 15°C

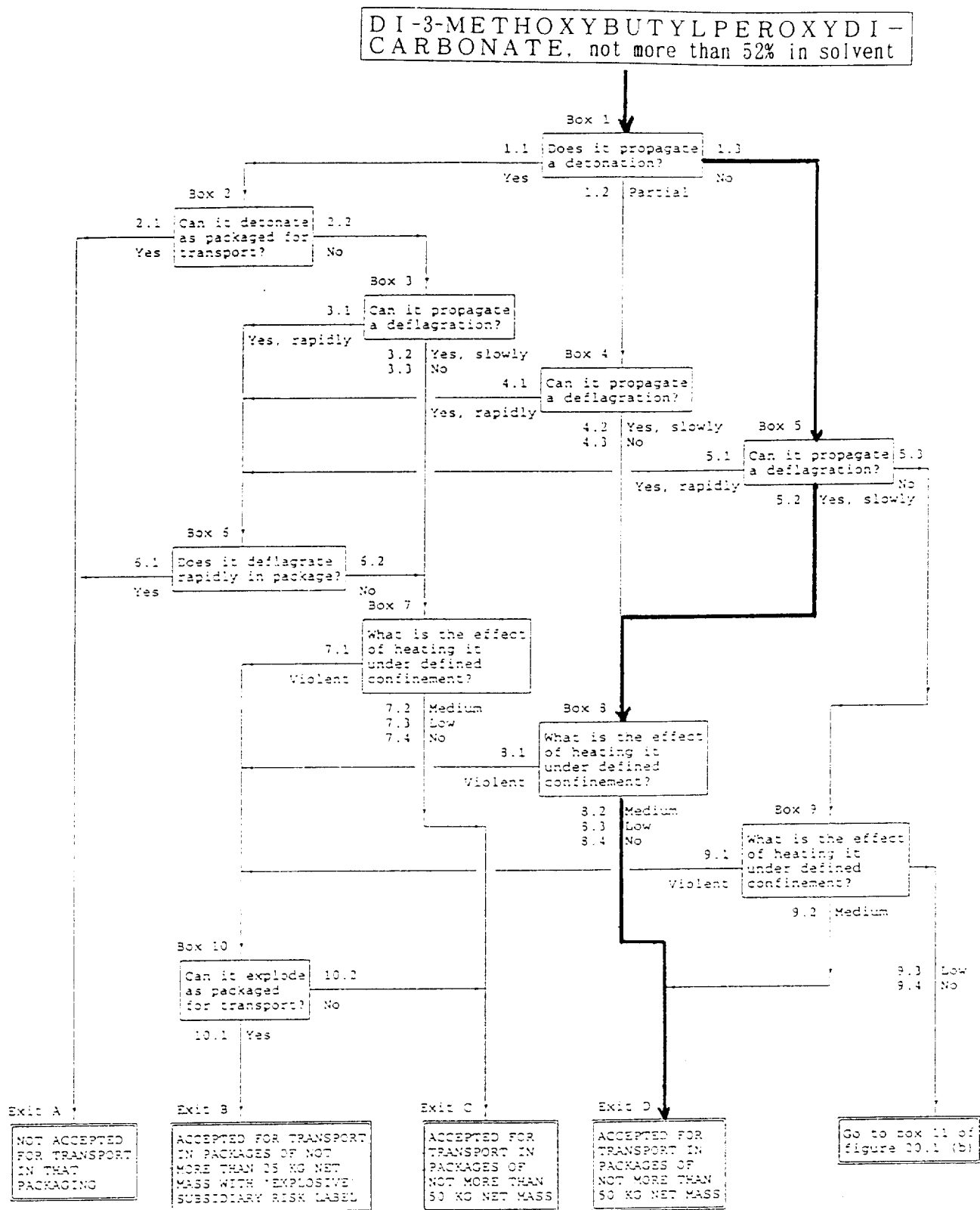
Fig.1 CLASSIFICATION OF ORGANIC PEROXIDE MIXTURE



1. Name of the organic peroxide: DI-3-METHOXYBUTYL PEROXYDI –
CARBONATE, not more than 52% in solvent
2. General data
 - 2.1 Composition : 50% di-3-methoxybutyl peroxydicarbonate
50% diluent type A
 - 2.2 Molecular formula : $C_{12}H_{22}O_8$
 - 2.3 Active oxygen content : 2.73%
 - 2.4 Physical form : Liquid
 - 2.5 Colour : Colourless
 - 2.6 Density : $995 \text{ kg/m}^3(5^\circ\text{C})$
3. Detonation(test series A)
Box 1 of the flow chart : Does the peroxide propagate a detonation?
 - 3.1 Method : BAM 50/60 steel tube test(test A.1)
 - 3.2 Sample conditions : Ambient temperature
 - 3.3 Observations : Fragmented part of the tube : 14.8, 14.9 and 15.7 cm
Only upper part was destroyed, no detonation
 - 3.4 Result : No
 - 3.5 Exit : 1.3
4. Deflagration(test series C)
Box 5 of the flow chart : Does the peroxide propagate a deflagration?
 - 4.1 Method 1 : Time/pressure test(test C.1)
 - 4.2 Sample conditions : Ambient temperature
 - 4.3 Observations : Max pressure : 1840KPa
 - 4.4 Result : No
 - 4.5 Method 2 : Deflagration test(test C.2)
 - 4.6 Sample conditions : 7°C
 - 4.7 Observations : Deflagration rate : 1.19mm/s
 - 4.8 Result : Yes slowly
 - 4.9 Final result : Yes slowly
 - 4.10 Exit : 5.2
5. Heating under confinement(test series E)
Box 8 of the flow chart : What is the effect of heating it under defined
confinement?
 - 5.1 Method 1 : Koenen test(test E.1)
 - 5.2 Sample conditions : Sample weight : 30.1g
 - 5.3 Observations : Limiting diameter : less than 1.0 mm
fragmentation type "A"
 - 5.4 Result : Low

- 5.5 Method 2 : Dutch pressure vessel test(test E.2)
- 5.6 Sample conditions : Sample weight 10g
- 5.7 Observations : Limiting diameter : 2.0 mm
- 5.8 Result : Low
- 5.9 Final result : Low
- 5.10 Exit : 8.3
6. Thermal stability(outside of the flow chart : test series H)
- 6.1 Method : Heat accumulation strage test(test H.4)
- 6.2 Sample conditions : Mass 400 cc:
half time of cooling of dewar vessel=8.15 hours
- 6.3 Observation : at 10°C no exothermal reaction within 7 days
at 15°C temperature rise up to 173°C
- 6.4 Result : SADT = 15°C
7. General remarks : The classification scheme is given in fig.1
8. Proposed assignment
- 8.1 Proper shipping name : ORGANIC PEROXIDE TYPE D, LIQUID
- 8.2 UN number : 3115
- 8.3 Division : 5.2
- 8.4 Technical name : DI-3-METHOXYBUTYLPEROXYDI-
CARBONATE, not more than 52% in solvent
- 8.5 Concentration : ≤52%
- 8.6 Diluent(s) : Diluent type A
- 8.7 Subsidiary risks : None
- 8.8 Packing group : II
- 8.9 Packing method : OP7
- 8.10 Control temperature : -5°C
- 8.11 Emergency temperature : 5°C

Fig.1 CLASSIFICATION OF ORGANIC PEROXIDE MIXTURE



1. Name of the organic peroxide : DI-*m*-TOLUOYL PEROXIDE +
BENZOYL-*m*-TOLUOYL PEROXIDE
+ DIBENZOYL PEROXIDE, with
concentration not more than 42% and not less
than 58% of diluent Type B

2. General data

2.1 Composition : 20% di-*m*-toluoyl peroxide
18% benzoyl-*m*-toluoyl peroxide
4% dibenzoyl peroxide
58% diluent type B

2.2 Molecular formula : C₁₆H₁₄O₄, C₁₅H₁₂O₄, C₁₄H₁₀O₄

2.3 Active oxygen content : 2.52%

2.4 Physical form : Liquid

2.5 Colour : Colourless or light yellow

2.6 Density : 994 kg/m³(0°C)

3. Detonation(test series A)

Box 1 of the flow chart : Does the peroxide propagate a detonation?

3.1 Method : B AM 50/60 steel tube test(test A.1)

3.2 Sample conditions : 33°C

3.3 Observations : Fragmented part of the tube : 16.8 and 16.9 cm
Only upper part was destroyed, no detonation

3.4 Result : No

3.5 Exit : 1.3

4. Deflagration(test series C)

Box 5 of the flow chart : Does the peroxide propagate a deflagration?

4.1 Method 1 : Time/pressure test(test C.1)

4.2 Sample conditions : 22°C

4.3 Observations : Time : No ignition

4.4 Result : No

4.5 Method 2 : Deflagration test(test C.2)

4.6 Sample conditions : 20°C

4.7 Observations : Deflagration rate = 0.50mm/s

4.8 Result : Yes slowly

4.9 Final result : Yes slowly

4.10 Exit : 5.2

5. Heating under confinement(test series E)

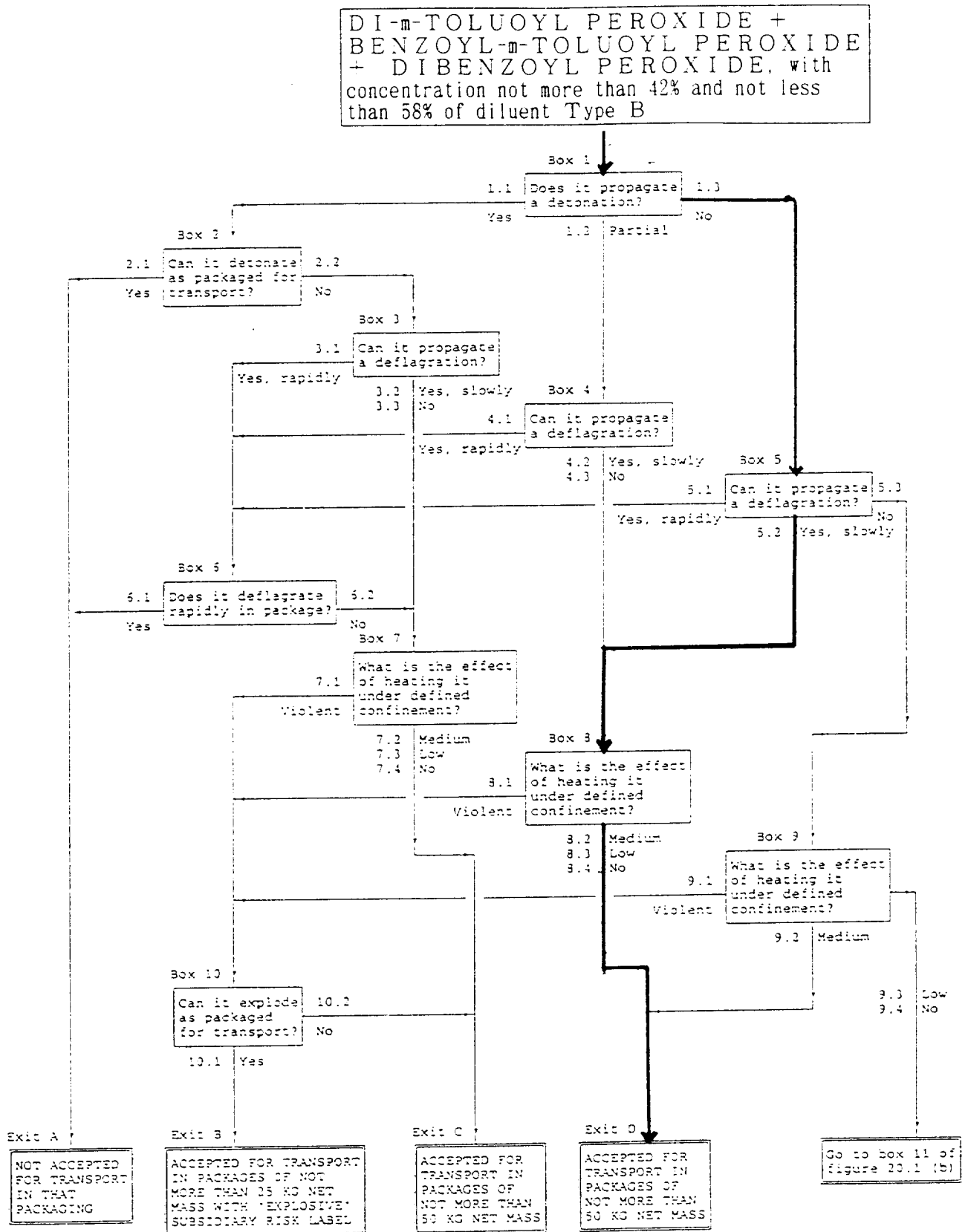
Box 8 of the flow chart : What is the effect of heating it under defined
confinement?

5.1 Method 1 : Koenen test(test E.1)

5.2 Sample conditions : -

- 5.3 Observations : Limiting diameter : less than 1.0 mm
fragmentation type "A"
- 5.4 Result : Low
- 5.5 Method 2 : Dutch pressure vessel test(test E.2)
- 5.6 Sample conditions : Sample weight 50g
- 5.7 Observations : Limiting diameter : less than 1.0 mm
- 5.8 Result : No
- 5.9 Final result : Low
- 5.10 Exit : 8.3
6. Thermal stability(outside of the flow chart : test series H)
- 6.1 Method : Heat accumulation strage test(test H.4)
- 6.2 Sample conditions : Mass 400 cc:
half time of cooling of dewar vessel=5.2 hours
- 6.3 Observation : at 40°C no exothermal reaction within 7 days
at 45°C temperature rise up to 148°C
- 6.4 Result : S A D T = 45°C
7. Corrosivity(outside of the flow chart)
- 7.1 Method 1 : Acute dermal irritation/corrosion test(rabbit)
- 7.2 Observation : After 14 days, no full destruction of intact skin is
detected
- 7.3 Result : Not corrosive
- 7.4 Method 2 : Corrosion rate on steel at 55°C
- 7.5 Observation and result : Because of decomposition, this test is impossible
- 7.6 Final result : Not corrosive
8. General remarks : The classification scheme is given in fig.1
9. Proposed assignment
- 9.1 Proper shipping name : ORGANIC PEROXIDE TYPE D, LIQUID
- 9.2 UN number : 3115
- 9.3 Division : 5.2
- 9.4 Technical name : DI-m-TOLUOYL PEROXIDE +
BENZOYL-m-TOLUOYL PEROXIDE +
DIBENZOYL PEROXIDE, with concentration
not more than 42% and not less than 58% of diluent Type B
- 9.5 Concentration : $\leq 42\%$
- 9.6 Diluent(s) : Diluent type B
- 9.7 Subsidiary risks : None
- 9.8 Packing group : II
- 9.9 Packing method : OP7
- 9.10 Control temperature : 35°C
- 9.11 Emergency temperature : 40°C

Fig. 1 CLASSIFICATION OF ORGANIC PEROXIDE MIXTURE



1. Name of the organic peroxide : DI-(2-ETHYLHEXYL)PEROXYDI-CARBONATE, not more than 62% concentration as a stable dispersion in water
2. General data
 - 2.1 Composition : 62% di-(2-ethylhexyl)peroxydicarbonate
12% diluent type B
26% water and other additives
 - 2.2 Molecular formula : $C_{18}H_{34}O_6$
 - 2.3 Active oxygen content : 2.86%
 - 2.4 Physical form : Liquid
 - 2.5 Colour : Milky white
 - 2.6 Density : $990 \text{ kg/m}^3 (0^\circ\text{C})$
3. Detonation(test series A)

Box 1 of the flow chart : Does the peroxide propagate a detonation?

 - 3.1 Method : BAM 50/60 steel tube test(test A.1)
 - 3.2 Sample conditions : 21°C
 - 3.3 Observations : Fragmented part of the tube : 11.0 and 14.5 cm
Only upper part was destroyed, no detonation, sample remained.
 - 3.4 Result : No
 - 3.5 Exit : 1.3
4. Deflagration(test series C)

Box 5 of the flow chart : Does the peroxide propagate a deflagration?

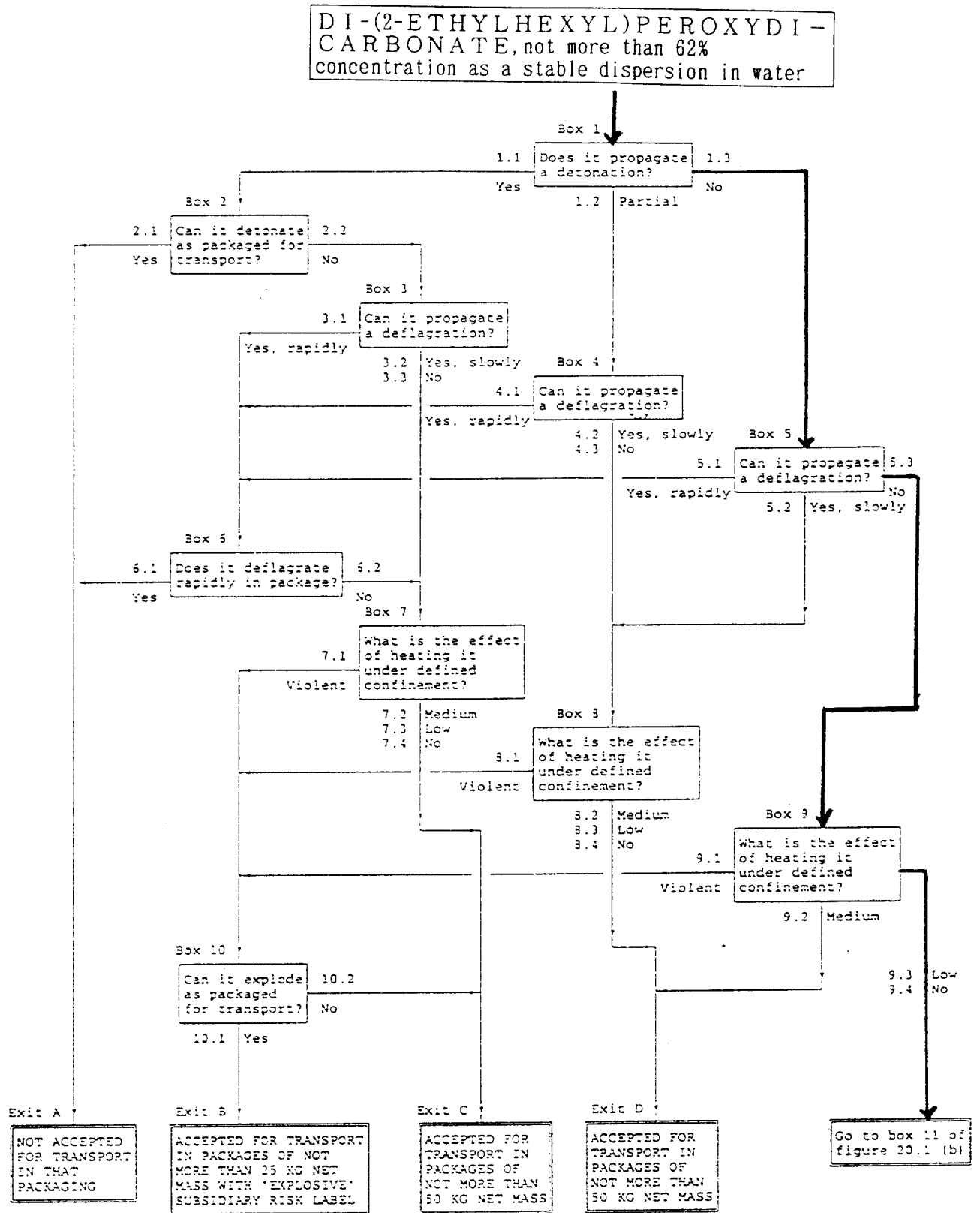
 - 4.1 Method 1 : Time/pressure test(test C.1)
 - 4.2 Sample conditions : Ambient temperature
 - 4.3 Observations : No ignition
 - 4.4 Result : No
 - 4.5 Method 2 : Deflagration test(test C.2)
 - 4.6 Sample conditions : 5.2°C
 - 4.7 Observations : No ignition
 - 4.8 Result : No
 - 4.9 Final result : No
 - 4.10 Exit : 5.3
5. Heating under confinement(test series E)

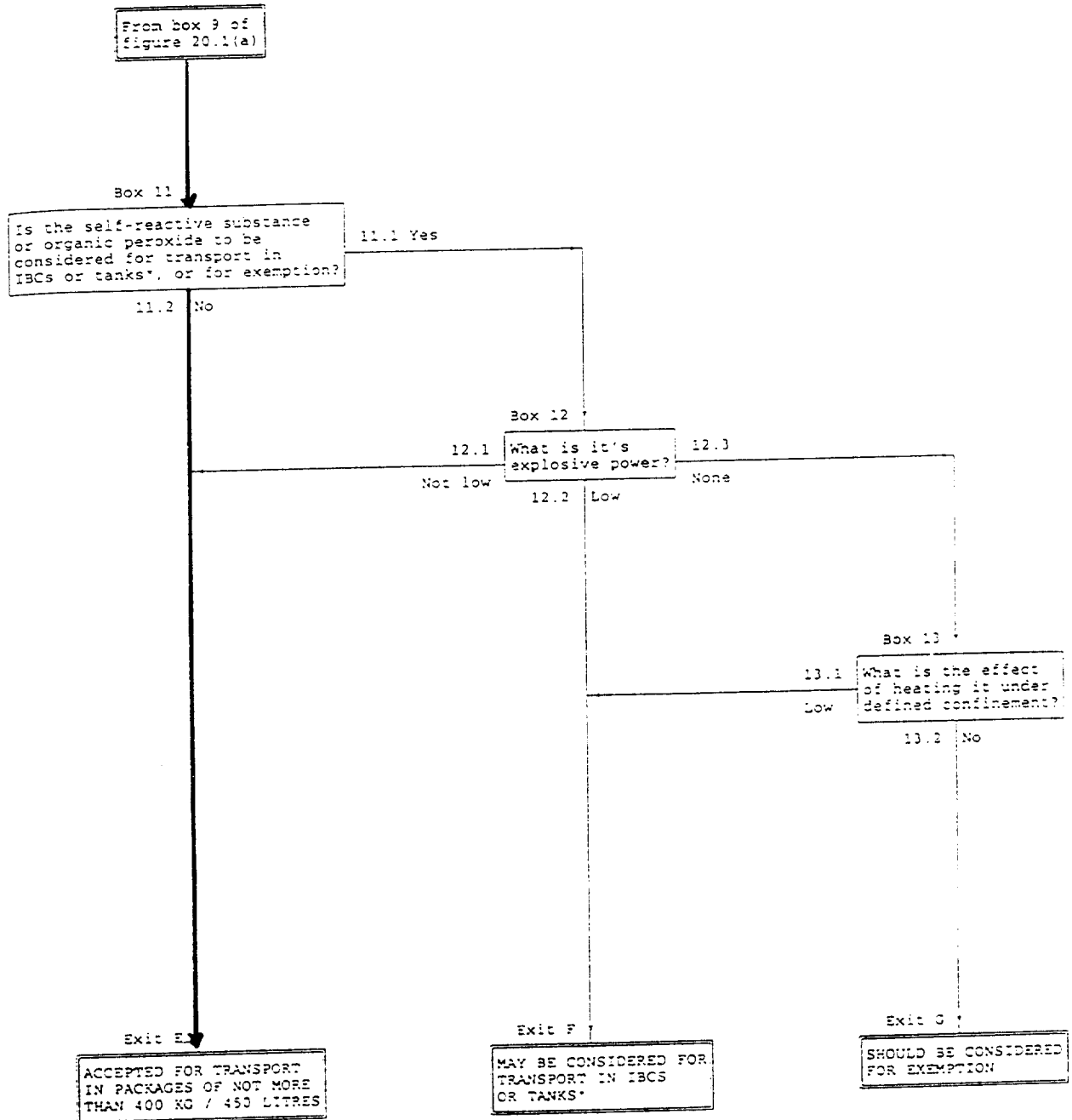
Box 9 of the flow chart : What is the effect of heating it under defined confinement?

 - 5.1 Method 1 : Koenen test(test E.1)
 - 5.2 Sample conditions : Sample weight : 27.9g
 - 5.3 Observations : Limiting diameter : less than 1.0 mm
fragmentation type "O"
 - 5.4 Result : No

- 5.5 Method 2 : Dutch pressure vessel test(test E.2)
- 5.6 Sample conditions : Sample weight 50g
- 5.7 Observations : Limiting diameter : less than 1.0 mm
- 5.8 Result : No
- 5.9 Final result : No
- 5.10 Exit : 9.4
6. Considering for transport in IBCs or tanks, or for exemption
Box 11 of the flow chart : Is the peroxide to be considered for transport in
IBC s or tanks, or for exemption?
- 6.1 Result : No
- 6.2 Exit : 11.2
7. Thermal stability(outside of the flow chart : test series H)
- 7.1 Method : Heat accumulation strage test(test H.4)
- 7.2 Sample conditions : Mass 400 cc:
half time of cooling of dewar vessel=5.2 hours
- 7.3 Observation : at 0°C no exothermal reaction within 7 days
at 5°C temperature rise up to 93°C
- 7.4 Result : S A D T = 5°C
8. Corrosivity(outside of the flow chart)
- 8.1 Method 1 : Acute dermal irritation/corrosion test(rabbit)
- 8.2 Observation : After 14 days, no full destruction of intact
skin is detected
- 8.3 Result : Not corrosive
- 8.4 Method 2 : Corrosion rate on steel at 55°C
- 8.5 Observation and result : Because of decomposition, this test is impossible
- 8.6 Final result : Not corrosive
9. General remarks : The classification scheme is given in fig.1
10. Proposed assignment
- 10.1 Proper shipping name : ORGANIC PEROXIDE TYPE E, LIQUID
- 10.2 UN number : 3117
- 10.3 Division : 5.2
- 10.4 Technical name : DI-(2-ETHYLHEXYL)PEROXYDICARBO-
NATE, not more than 62% concentration as a stable
dispersion in water
- 10.5 Concentration : $\leq 62\%$
- 10.6 Diluent(s) : Diluent type B and water
- 10.7 Subsidiary risks : None
- 10.8 Packing group : II
- 10.9 Packing method : OP8
- 10.10 Control temperature : -15°C
- 10.11 Emergency temperature : -5°C

Fig.1 CLASSIFICATION OF ORGANIC PEROXIDE MIXTURE



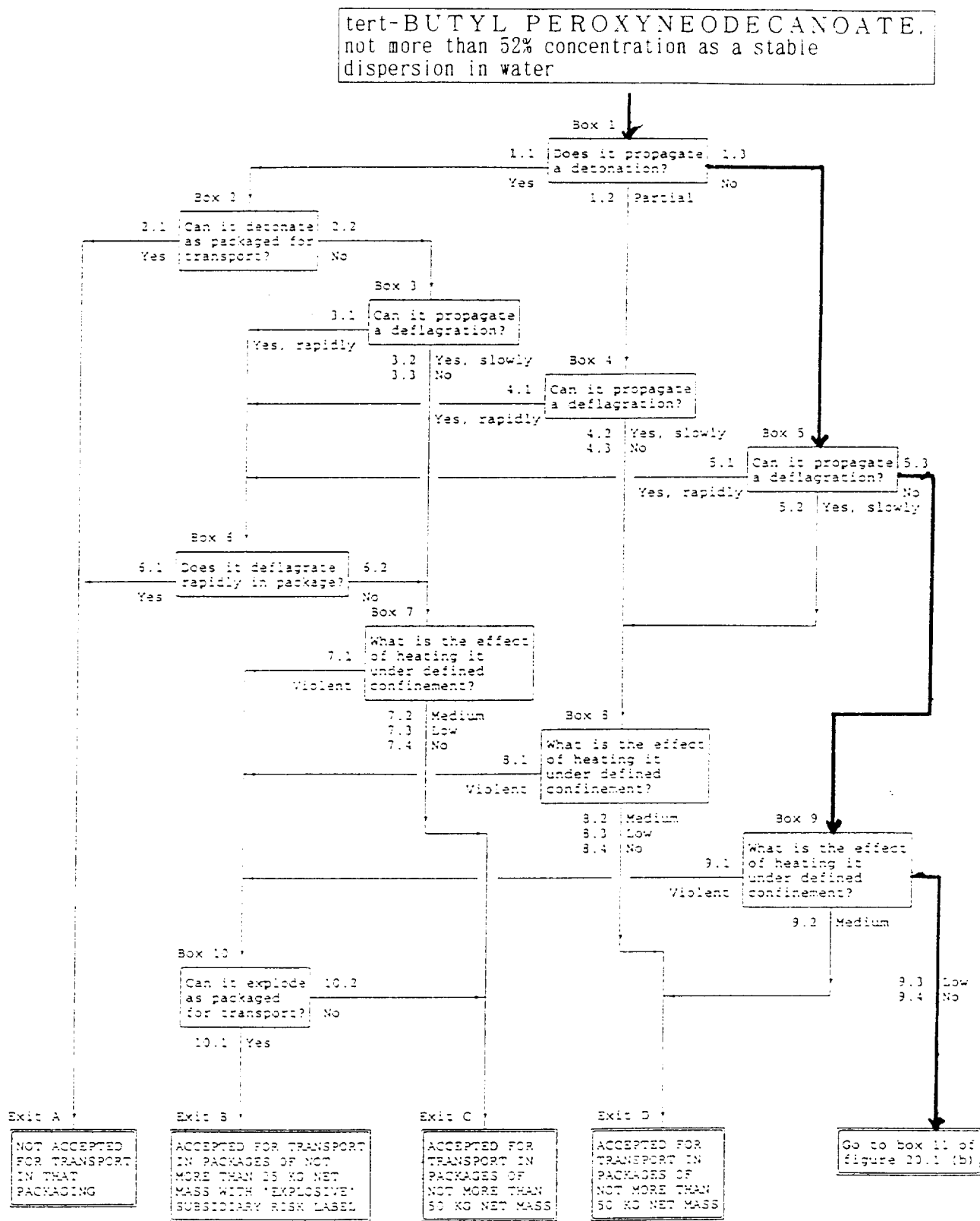


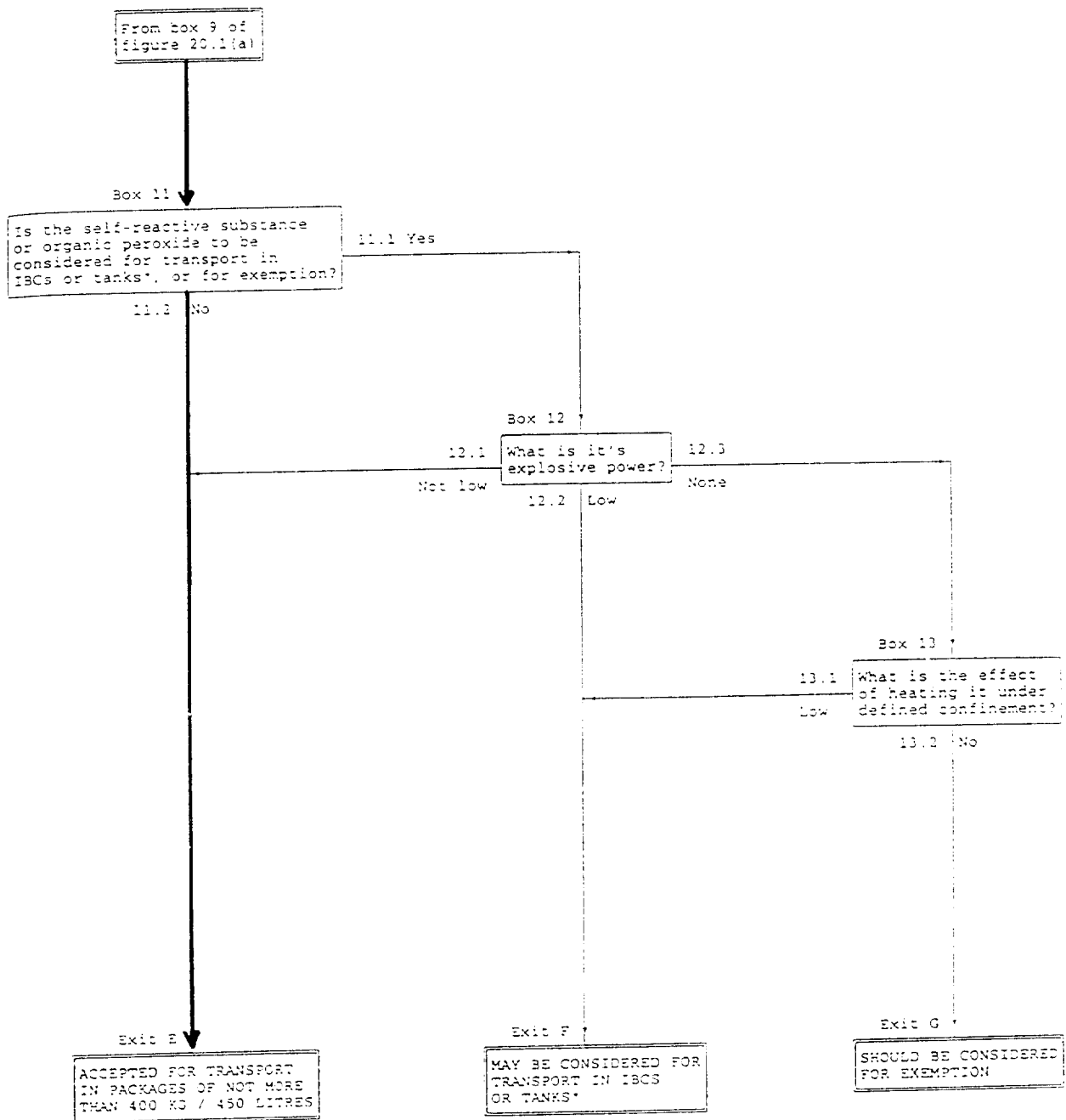
* At present, self-reactive substances may not be considered for transport in tanks

1. Name of the organic peroxide: **tert-BUTYL PEROXYNEODECANOATE**,
not more than 52% concentration as a stable
dispersion in water
2. General data
 - 2.1 Composition : 52% tert-butylperoxyneodecanoate
15% diluent type B
33% water and other additives
 - 2.2 Molecular formula : $C_{14}H_{24}O_3$
 - 2.3 Active oxygen content : 3.41%
 - 2.4 Physical form : Liquid
 - 2.5 Colour : Milky white
 - 2.6 Density : 942 kg/m³(0°C)
3. Detonation(test series A)
Box 1 of the flow chart : Does the peroxide propagate a detonation?
 - 3.1 Method : BAM 50/60 steel tube test(test A.1)
 - 3.2 Sample conditions : 21°C
 - 3.3 Observations : Fragmented part of the tube : 4.5 and 6.0 cm
Only upper part was destroyed, no detonation,
sample remained.
 - 3.4 Result : No
 - 3.5 Exit : 1.3
4. Deflagration(test series C)
Box 5 of the flow chart : Does the peroxide propagate a deflagration?
 - 4.1 Method 1 : Time/pressure test(test C.1)
 - 4.2 Sample conditions : Ambient temperature
 - 4.3 Observations : No ignition
 - 4.4 Result : No
 - 4.5 Method 2 : Deflagration test(test C.2)
 - 4.6 Sample conditions : 30.1°C
 - 4.7 Observations : No ignition
 - 4.8 Result : No
 - 4.9 Final result : No
 - 4.10 Exit : 5.3
5. Heating under confinement(test series E)
Box 9 of the flow chart : What is the effect of heating it under defined
confinement?
 - 5.1 Method 1 : Koenen test(test E.1)
 - 5.2 Sample conditions : Sample weight : 26.2g
 - 5.3 Observations : Limiting diameter : less than 1.0 mm
fragmentation type "O"
 - 5.4 Result : No

- 5.5 Method 2 : Dutch pressure vessel test(test E.2)
5.6 Sample conditions : Sample weight 50g
5.7 Observations : Limiting diameter : less than 1.0 mm
5.8 Result : No
5.9 Final result : No
5.10 Exit : 9.4
6. Considering for transport in IBCs or tanks, or for exemption
Box 11 of the flow chart : Is the peroxide to be considered for transport in
IBC s or tanks, or for exemption?
- 6.1 Result : No
6.2 Exit : 11.2
7. Thermal stability(outside of the flow chart : test series H)
- 7.1 Method : Heat accumulation strage test(test H.4)
7.2 Sample conditions : Mass 400 cc:
half time of cooling of dewar vessel=5.2 hours
7.3 Observation : at 25°C no exothermal reaction within 7 days
at 30°C temperature rise up to 31°C
7.4 Result : S A D T = 30°C
8. Corrosivity(outside of the flow chart)
- 8.1 Method 1 : Acute dermal irritation/corrosion test(rabbit)
8.2 Observation : After 14 days, no full destruction of intact skin is
detected
8.3 Result : Not corrosive
8.4 Method 2 : Corrosion rate on steel at 55°C
8.5 Observation and result : Because of decomposition, this test is impossible
8.6 Final result : Not corrosive
9. General remarks : The classification scheme is given in fig.1
10. Proposed assignment
- 10.1 Proper shipping name : ORGANIC PEROXIDE TYPE E. LIQUID
10.2 UN number : 3117
10.3 Division : 5.2
10.4 Technical name : tert-BUTYL PEROXYNEODECANOATE,
not more than 52% concentration as a stable dispersion
in water
10.5 Concentration : ≤52%
10.6 Diluent(s) : Diluent type B and water
10.7 Subsidiary risks : None
10.8 Packing group : II
10.9 Packing method : O P 8
10.10 Control temperature : 15°C
10.11 Emergency temperature : 20°C

Fig.1 CLASSIFICATION OF ORGANIC PEROXIDE DISPERSION



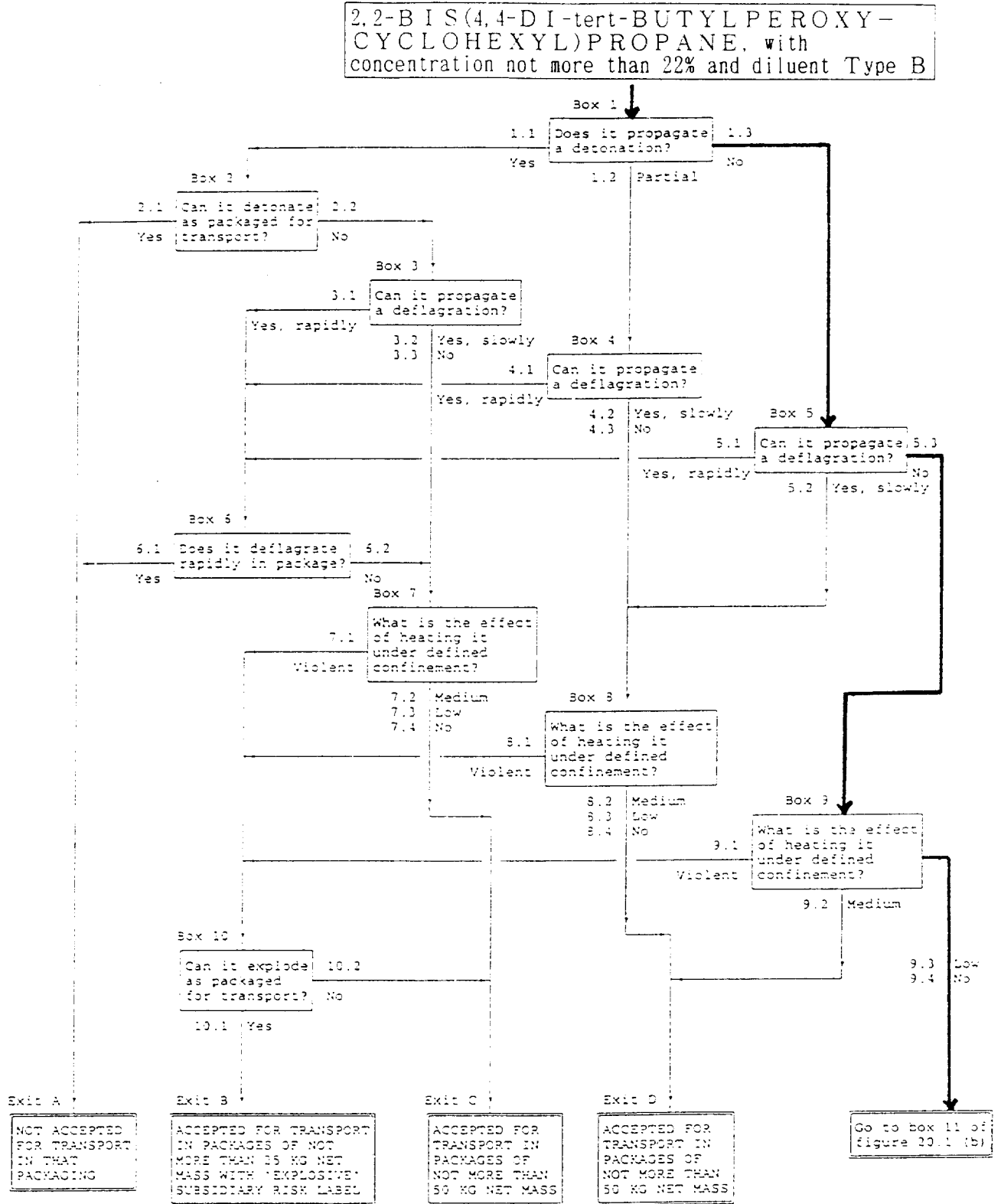


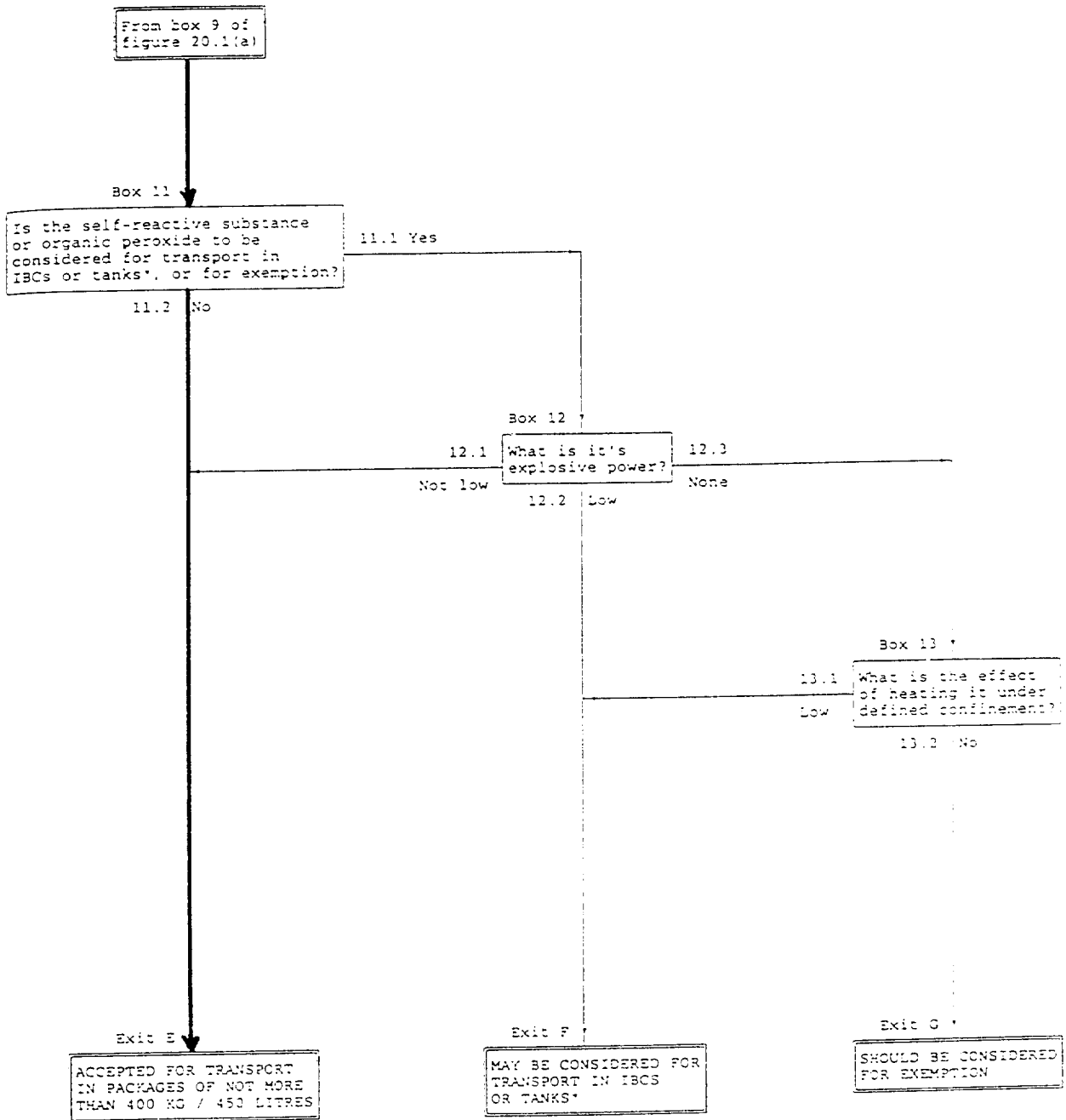
* At present, self-reactive substances may not be considered for transport in tanks

1. Name of the organic peroxide : 2,2-BIS(4,4-DI-tert-BUTYLPEROXY-CYCLOHEXYL)PROPANE, with concentration not more than 22% and diluent Type B
2. General data
 - 2.1 Composition : 22% 2,2-bis(4,4-di-tert-butylperoxycyclohexyl)propane
78% diluent type B
 - 2.2 Molecular formula : $C_{31}H_{60}O_8$
 - 2.3 Active oxygen content : 2.28%
 - 2.4 Physical form : Liquid
 - 2.5 Colour : Light yellow
 - 2.6 Density : 891 kg/m^3 (20°C)
3. Detonation(test series A)
Box 1 of the flow chart : Does the peroxide propagate a detonation?
 - 3.1 Method : BAM 50/60 steel tube test(test A.1)
 - 3.2 Sample conditions : 27°C
 - 3.3 Observations : Fragmented part of the tube : 14.4 and 16.6 cm
Only upper part was destroyed, no detonation
 - 3.4 Result : No
 - 3.5 Exit : 1.3
4. Deflagration(test series C)
Box 5 of the flow chart : Does the peroxide propagate a deflagration?
 - 4.1 Method 1 : Time/pressure test(test C.1)
 - 4.2 Sample conditions : 26°C
 - 4.3 Observations : Not reach to 2070KPa
 - 4.4 Result : No
 - 4.5 Method 2 : Deflagration test(test C.2)
 - 4.6 Sample conditions : 50°C
 - 4.7 Observations : Deflagration rate : 0.01mm/s
 - 4.8 Result : No
 - 4.9 Final result : No
 - 4.10 Exit : 5.3
5. Heating under confinement(test series E)
Box 8 of the flow chart : What is the effect of heating it under defined confinement?
 - 5.1 Method 1 : Koenen test(test E.1)
 - 5.2 Sample conditions : Sample weight : 24.1g
 - 5.3 Observations : Limiting diameter : less than 1.0 mm
fragmentation type "A"
 - 5.4 Result : Low

- 5.5 Method 2 : Dutch pressure vessel test(test E.2)
- 5.6 Sample conditions : Sample weight 50g
- 5.7 Observations : Limiting diameter : less than 1.0 mm
- 5.8 Result : No
- 5.9 Final result : Low
- 5.10 Exit : 9.3
6. Considering for transport in IBCs or tanks, or for exemption
Box 11 of the flow chart : Is the peroxide to be considered for transport
in IBCs or tanks, or for exemption?
- 6.1 Result : No
- 6.2 Exit : 11.2
7. Thermal stability(outside of the flow chart : test series H)
- 7.1 Method : Heat accumulation storage test(test H.4)
- 7.2 Sample conditions : Mass 400 cc:
half time of cooling of dewar vessel = 5.2 hours
- 7.3 Observation : at 70°C no exothermal reaction within 7 days
at 75°C temperature rise up to 135°C
- 7.4 Result : S A D T = 75°C
8. Corrosivity(outside of the flow chart)
- 8.1 Method 1 : Acute dermal irritation/corrosion test(rabbit)
- 8.2 Observation : After 14 days, no full destruction of intact skin
is detected
- 8.3 Result : Not corrosive
- 8.4 Method 2 : Corrosion rate on steel at 55°C
- 8.5 Observation : Corrosion rate is 0 mm/year
- 8.6 Result : Not corrosive
- 8.7 Final result : Not corrosive
9. General remarks : The classification scheme is given in fig.1
10. Proposed assignment
- 10.1 Proper shipping name : ORGANIC PEROXIDE TYPE E. LIQUID
- 10.2 UN number : 3107
- 10.3 Division : 5.2
- 10.4 Technical name : 2, 2-B I S(4, 4-D I-tert-BUTYL PEROXY -
CYCLOHEXYL)PROPANE, with concentration
not more than 22% and diluent Type B
- 10.5 Concentration : $\leq 22\%$
- 10.6 Diluent(s) : Diluent type B
- 10.7 Subsidiary risks : None
- 10.8 Packing group : II
- 10.9 Packing method : O P 8
- 10.10 Control temperature : Not required
- 10.11 Emergency temperature : Not required

Fig.1 CLASSIFICATION OF ORGANIC PEROXIDE DISPERSION



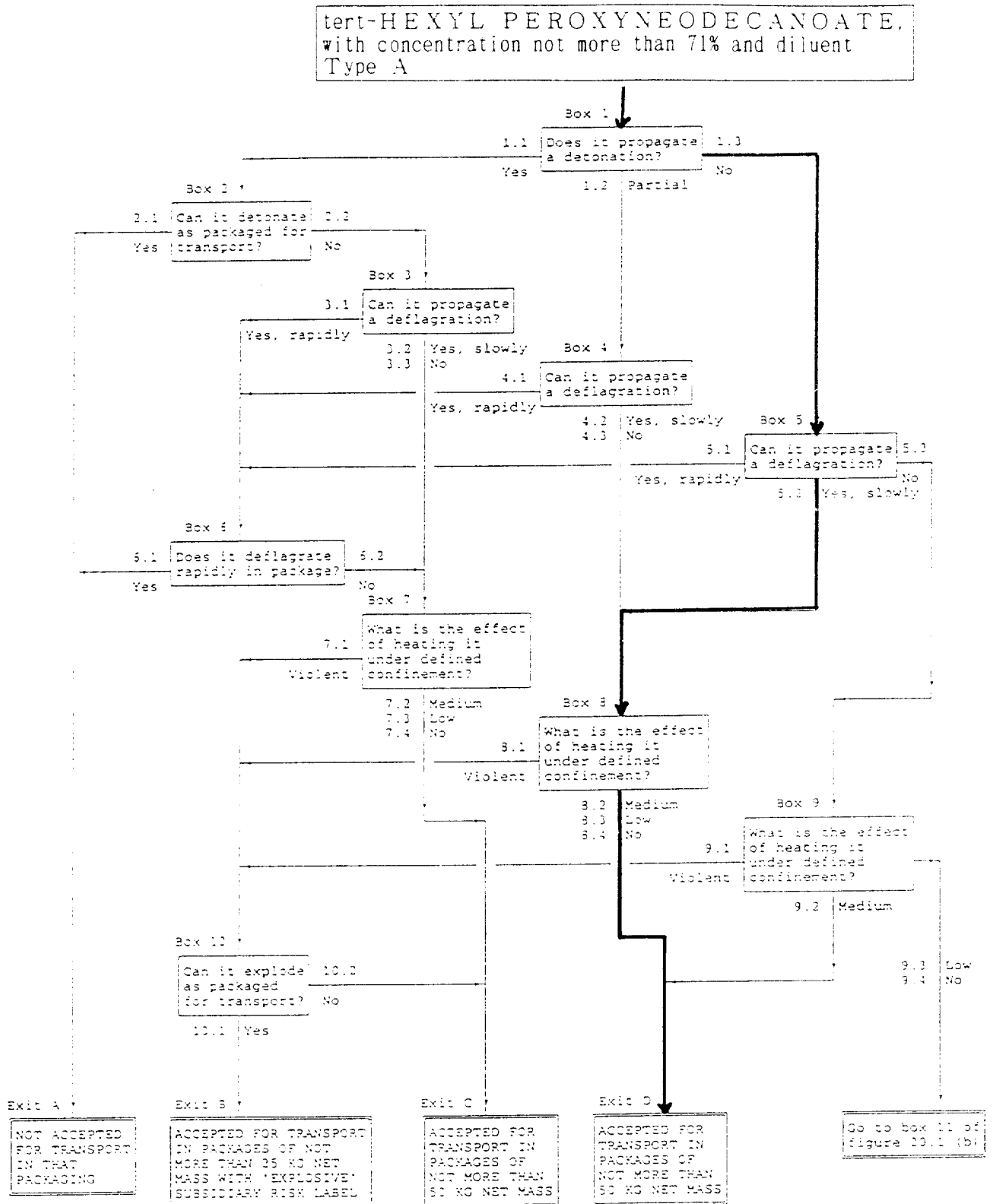


* At present, self-reactive substances may not be considered for transport in tanks

1. Name of the organic peroxide : tert-HEXYL PEROXYNEODECANOATE,
with concentration not more than 71% and
diluent Type A
2. General data
 - 2.1 Composition : 71% tert-hexyl peroxyneodecanoate
29% diluent type A
 - 2.2 Molecular formula : $C_{16}H_{42}O_3$
 - 2.3 Active oxygen content : 4.17%
 - 2.4 Physical form : Liquid
 - 2.5 Colour : Colourless or light yellow
 - 2.6 Density : 872 kg/m^3 (0°C)
3. Detonation(test series A)
Box 1 of the flow chart : Does the peroxide propagate a detonation?
 - 3.1 Method : BAM 50/60 steel tube test(test A.1)
 - 3.2 Sample conditions : Ambient temperature
 - 3.3 Observations : Fragmented part of the tube : 17.3 to 19.6cm
Only upper part was destroyed, no detonation
 - 3.4 Result : No
 - 3.5 Exit : 1.3
4. Deflagration(test series C)
Box 5 of the flow chart : Does the peroxide propagate a deflagration?
 - 4.1 Method 1 : Time/pressure test(test C.1)
 - 4.2 Sample conditions : Ambient temperature
 - 4.3 Observations : No ignition
 - 4.4 Result : No
 - 4.5 Method 2 : Deflagration test(test C.2)
 - 4.6 Sample conditions : 16.5°C
 - 4.7 Observations : Deflagration rate : 0.37mm/s
 - 4.8 Result : Yes slowly
 - 4.9 Final result : Yes slowly
 - 4.10 Exit : 5.2
5. Heating under confinement(test series E)
Box 8 of the flow chart : What is the effect of heating it under defined
confinement?
 - 5.1 Method 1 : Koenen test(test E.1)
 - 5.2 Sample conditions : Sample weight : 26.1g
 - 5.3 Observations : Limiting diameter : less than 1.0 mm
fragmentation type "A"
 - 5.4 Result : Low

- 5.5 Method 2 : Dutch pressure vessel test(test E.2)
- 5.6 Sample conditions : Sample weight : 10g
- 5.7 Observations : Limiting diameter : 3.5 mm
- 5.8 Result : Medium
- 5.9 Final result : Medium
- 5.10 Exit : 8.2
6. Thermal stability(outside of the flow chart : test series H)
- 6.1 Method : Heat accumulation strage test(test H.4)
- 6.2 Sample conditions : Mass 400 cc:
half time of cooling of dewar vessel=8.15 hours
- 6.3 Observation : at 20°C no exothermal reaction within 7 days
at 25°C temperature rise up to 137°C
- 6.4 Result : S A D T = 25°C
7. Corrosivity(outside of the flow chart)
- 7.1 Method 1 : Acute dermal irritation/corrosion test(rabbit)
- 7.2 Observation : After 14 days, no full destruction of intact
skin is detected
- 7.3 Result : Not corrosive
- 7.4 Method 2 : Corrosion rate on steel at 55°C
- 7.5 Observation and result : Because of decomposition, this test is impossible
- 7.6 Final result : Not corrosive
8. General remarks : The classification scheme is given in fig.1
9. Proposed assignment
- 9.1 Proper shipping name : ORGANIC PEROXIDE TYPE D. LIQUID
- 9.2 UN number : 3115
- 9.3 Division : 5.2
- 9.4 Technical name : tert-HEXYL PEROXYNEODECANOATE,
with concentration not more than 71% and diluent Type A
- 9.5 Concentration : $\leq 71\%$
- 9.6 Diluent(s) : Diluent type A
- 9.7 Subsidiary risks : None
- 9.8 Packing group : II
- 9.9 Packing method : OP7
- 9.10 Control temperature : 10°C
- 9.11 Emergency temperature : 15°C

Fig. 1 CLASSIFICATION OF ORGANIC PEROXIDE SOLUTION



1. Name of the organic peroxide : 1,1-DI (tert-BUTYLPEROXY)-3,3,5-TRI -
METHYLCYCLOHEXANE, with
concentration not more than 77% and diluent Type B
2. General data
 - 2.1 Composition : 77% 1,1-di(tert-butylperoxy)-3,3,5-trimethylcyclohexane
23% diluent type B
 - 2.2 Molecular formula : $C_{17}H_{34}O_4$
 - 2.3 Active oxygen content : 8.15%
 - 2.4 Physical form : Liquid
 - 2.5 Colour : Colourless or light yellow
 - 2.6 Density : 903 kg/m^3 (20°C)
3. Detonation(test series A)
Box 1 of the flow chart : Does the peroxide propagate a detonation?
 - 3.1 Method : BAM 50/60 steel tube test(test A.1)
 - 3.2 Sample conditions : 28°C
 - 3.3 Observations : Fragmented part of the tube : 15.1 and 16.2cm
Only upper part was destroyed, no detonation
 - 3.4 Result : No
 - 3.5 Exit : 1.3
4. Deflagration(test series C)
Box 5 of the flow chart : Does the peroxide propagate a deflaglation?
 - 4.1 Method 1 : Time/pressure test(test C.1)
 - 4.2 Sample conditions : Ambient temperature
 - 4.3 Observations : No ignition
 - 4.4 Result : No
 - 4.5 Method 2 : Deflagration test(test C.2)
 - 4.6 Sample conditions : Ambient temperature
 - 4.7 Observations : Deflaglation rate : 0.45mm/s
 - 4.8 Result : Yes slowly
 - 4.9 Final result : Yes slowly
 - 4.10 Exit : 5.2
5. Heating under confinement(test series E)
Box 8 of the flow chart : What is the effect of heating it under defined
confinement?
 - 5.1 Method 1 : Koenen test(test E.1)
 - 5.2 Sample conditions : Sample weight : 24.4g
 - 5.3 Observations : Limiting diameter : 1.5 mm
fragmentation type "F"
 - 5.4 Result : Medium

- 5.5 Method 2 : Dutch pressure vessel test(test E.2)
- 5.6 Sample conditions : 23°C, mass : 50 g
- 5.7 Observations : Limiting diameter : 1.0 mm
- 5.8 Result : Low
- 5.9 Final result : Medium
- 5.10 Exit : 8.2
6. Thermal stability(outside of the flow chart : test series H)
- 6.1 Method : Heat accumulation strage test(test H.4)
- 6.2 Sample conditions : Mass 400 cc:
half time of cooling of dewar vessel=5.2 hours
- 6.3 Observation : at 65°C no exothermal reaction within 7 days
at 70°C temperature rise up to 165°C
- 6.4 Result : S ADT = 70°C
7. Corrosivity(outside of the flow chart)
- 7.1 Method 1 : Acute dermal irritation/corrosion test(rabbit)
- 7.2 Observation : After 14 days, no full destruction of intact
skin is detected
- 7.3 Result : Not corrosive
- 7.4 Method 2 : Corrosion rate on steel at 55°C
- 7.5 Observation : Corrosion rate is 0 mm/year
- 7.6 Result : Not corrosive
- 7.7 Final result : Not corrosive
8. General remarks : The classification scheme is given in fig.1
9. Proposed assignment
- 9.1 Proper shipping name : ORGANIC PEROXIDE TYPE D, LIQUID
- 9.2 UN number : 3105
- 9.3 Division : 5.2
- 9.4 Technical name : 1,1-D I (tert-BUTYLPEROXY)-3,3,5-TRI -
METHYLCYCLOHEXANE, with concentration
not more than 77% and diluent Type B
- 9.5 Concentration : $\leq 77\%$
- 9.6 Diluent(s) : Diluent type B
- 9.7 Subsidiary risks : None
- 9.8 Packing group : II
- 9.9 Packing method : OP7
- 9.10 Control temperature : Not required
- 9.11 Emergency temperature : Not required

Fig.1 CLASSIFICATION OF ORGANIC PEROXIDE SOLUTION

