



Secrétariat

Distr.
GENERALE

ST/SG/AC.10/C.3/1997/53
23 septembre 1997

FRANCAIS
Original : ANGLAIS

COMITE D'EXPERTS EN MATIERE DE TRANSPORT
DES MARCHANDISES DANGEREUSES

Sous-Comité d'experts du transport
de marchandises dangereuses

(Quatorzième session,
Genève, 8-19 décembre 1997,
point 2 d) de l'ordre du jour)

**PROJETS D'AMENDEMENT AU REGLEMENT TYPE SUR LE TRANSPORT
DES MARCHANDISES DANGEREUSES**

Autres projets d'amendement

Amendement au paragraphe 2.5.3.2.4

Liste des peroxydes organiques déjà classés

Transmis par l'expert du Japon

1. Introduction

Selon les dispositions du paragraphe 2.5.3.2.5.1, les peroxydes organiques et préparations de peroxydes organiques ci-après ont été affectés à des rubriques générales par le Ministère japonais des transports, sur la base des procès-verbaux d'épreuve. Etant donné que ces peroxydes et préparations de peroxydes organiques ont été transportés en quantités commerciales au cours des dernières années, il est nécessaire de les ajouter à la liste du paragraphe 2.5.3.2.4.

2. Proposition

Le Japon propose d'inclure les peroxydes organiques et préparations de peroxydes organiques ci-après dans la liste du paragraphe 2.5.3.2.4. La liste proposée et les données d'épreuve correspondantes figurent dans les annexes 1 et 2, respectivement.

PEROXYDICARBONATE DE BIS(ÉTHOXY-2 ÉTHYLE), pas plus de 52 % en solvant

PEROXYPIVALATE DE tert-HEXYLE, pas plus de 72 % en solvant

PEROXYDICARBONATE DE BIS(MÉTHOXY-3 BUTYLE), pas plus de 52 % en solvant

PEROXYDE DE DI-m-TOLUOYLE + PEROXYDE DE BENZOYL-m-TOLUOYLE + PEROXYDE DE DIBENZOYLE avec une concentration ne dépassant pas 42 % et pas moins de 58 % de diluant de type B

PEROXYCARBONATE DE BIS(ÉTHYL-2 HEXYLE), avec une concentration ne dépassant pas 62 % en dispersion stable dans l'eau

PEROXYNÉODÉCANOATE de tert-BUTYLE, avec une concentration ne dépassant pas 52 % en dispersion stable dans l'eau

BIS(DI-tert-BUTYLPEROXY-4,4 CYCLOHEXYL)-2,2 PROPANE, avec une concentration ne dépassant pas 22 % et un diluant de type B

PEROXYNÉODÉCANOATE de tert-HEXYLE, avec une concentration ne dépassant pas 71 % et un diluant de type A

DI-(tert-BUTYLPEROXY)-1,1 TRIMÉTHYL-3,3,5 CYCLOHEXANE, avec une concentration ne dépassant pas 77 % et un diluant de type B

* * *

(Annexe 2 en anglais seulement)

Annexe 1

Proposition

Nous proposons que les peroxydes organiques ci-après soient inclus dans la liste du 2.5.3.2.4

PEROXYDE ORGANIQUE	Concentration (%)	Diluant type A (%)	Diluant type B (%)	Méthode d'emballage	Température de régulation (°C)	Température critique (°C)	Numéro ONU (rubrique générale)
PEROXYDICARBONATE DE BIS(ÉTHOXY-2 ÉTHYLE)	≤ 52		≥ 48	OP7	- 10	0	3115
PEROXYPIVALATE DE tert-HEXYLE	≤ 72	≥ 28		OP7	10	15	3115
PEROXYDICARBONATE DE BIS(MÉTHOXY-3 BUTYLE)	≤ 52	≥ 48		OP7	- 5	5	3115
PEROXYDE DE DI-m-TOLUOYLE + PEROXYDE DE BENZOYL-m-TOLUOYLE + PEROXYDE DE DIBENZOYLE	TOTAL ≤ 42		≥ 58	OP7	35	40	3115
PEROXYCARBONATE DE BIS(ÉTHYL-2 HEXYLE)	≤ 62 en dispersion stable dans l'eau			OP8	- 15	- 5	3117
PEROXYNÉODÉCANOATE de tert-BUTYLE	≤ 52 en dispersion stable dans l'eau			OP8	15	20	3117
BIS(DI-tert-BUTYLPEROXY-4,4 CYCLOHEXYL)-2,2 PROPANE	≤ 22		≥ 78	OP8			3107
PEROXYNÉODÉCANOATE de tert-HEXYLE	≤ 71	≥ 29		OP7	10	15	3115
DI-(tert-BUTYLPEROXY)-1,1 TRIMÉTHYL-3,3,5 CYCLOHEXANE	≤ 77		≥ 23	OP7			3105

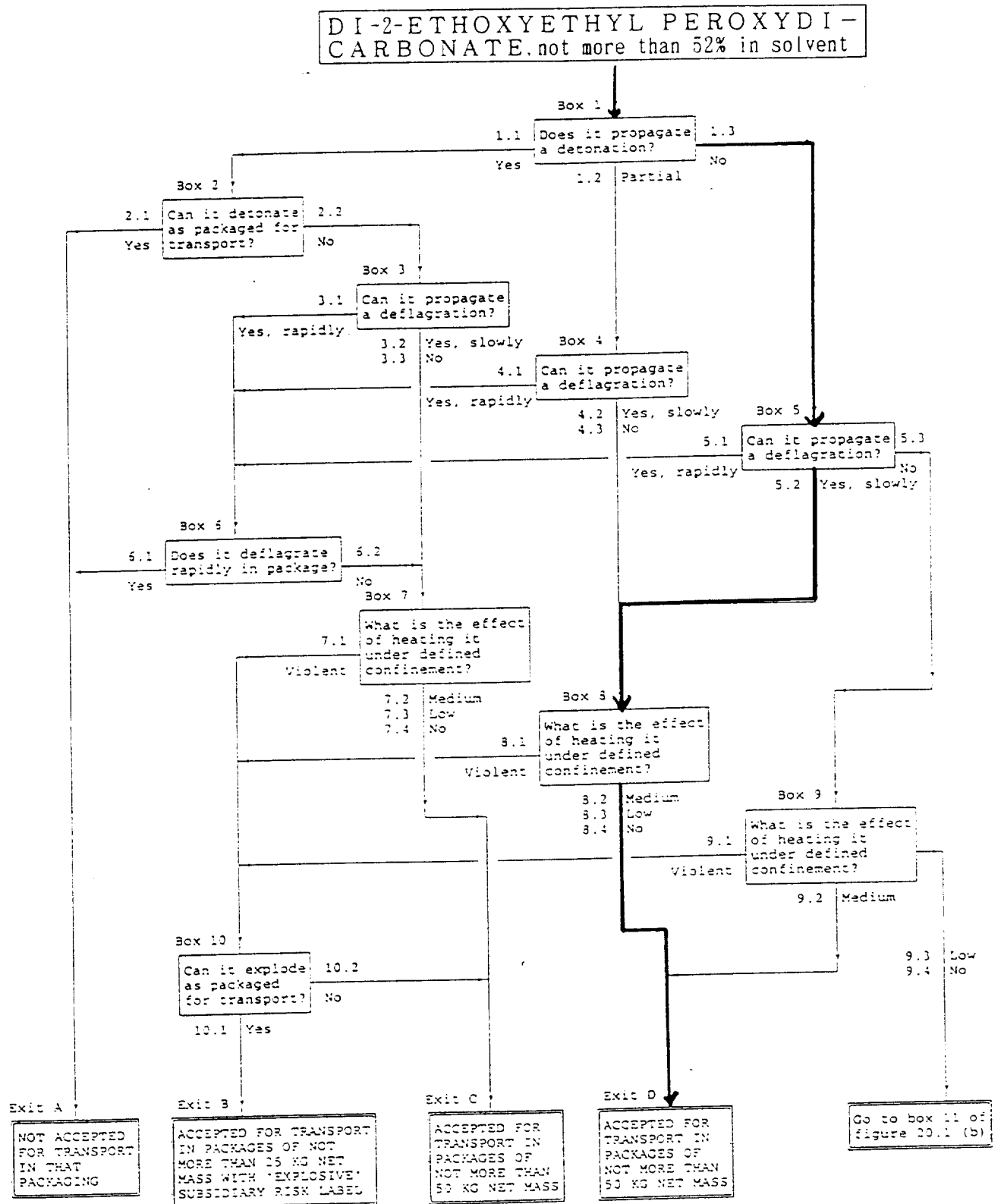
Annex 2

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 A D T = 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 : O P 7
- 8.10 Control temperature : -10°C
- 8.11 Emergency temperature : 0°C

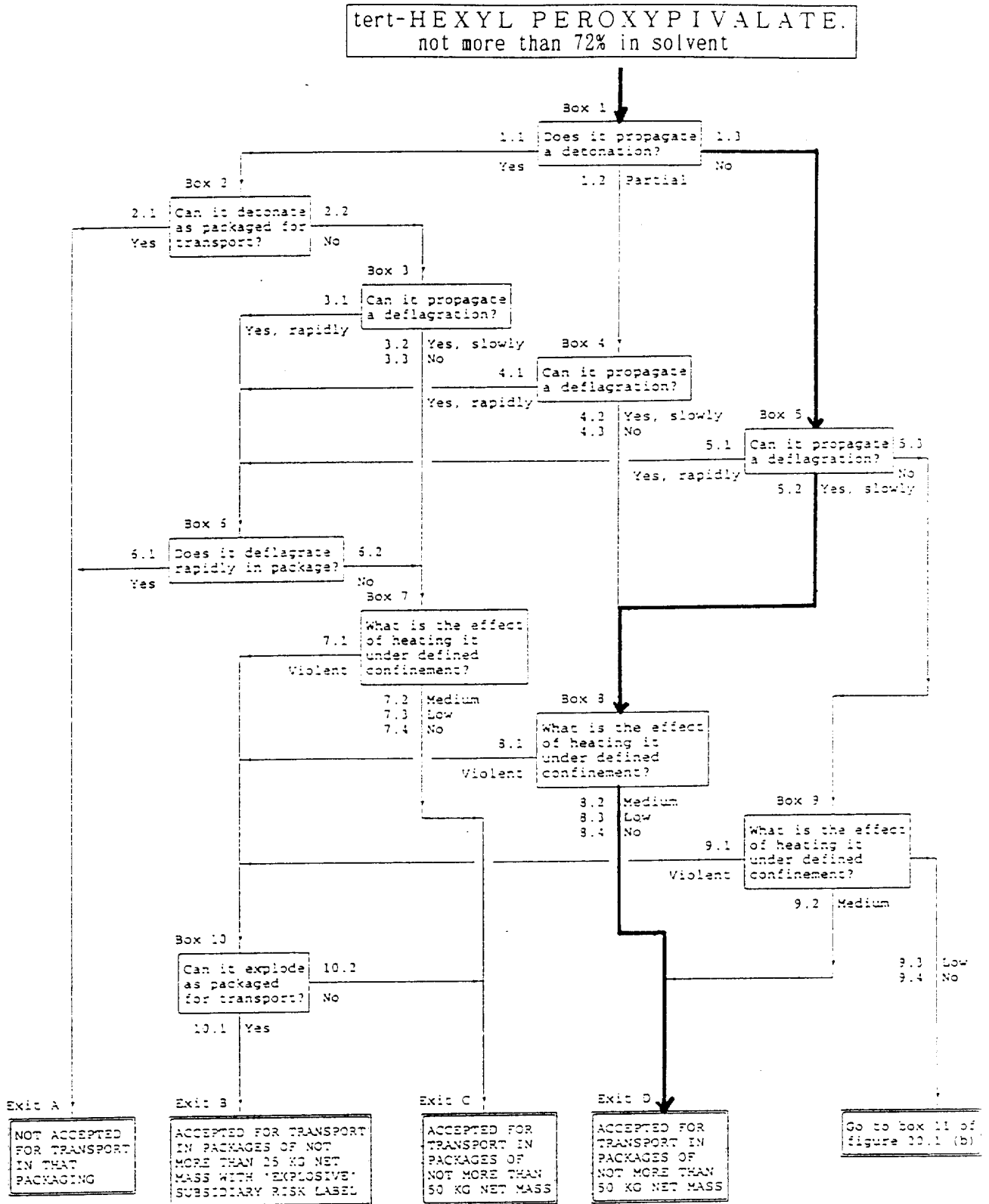
Fig.1 CLASSIFICATION OF ORGANIC PEROXIDE MIXTURE



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 : 2.27mm/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 : OP7
- 8.10 Control temperature : 10°C
- 8.11 Emergency temperature : 15°C

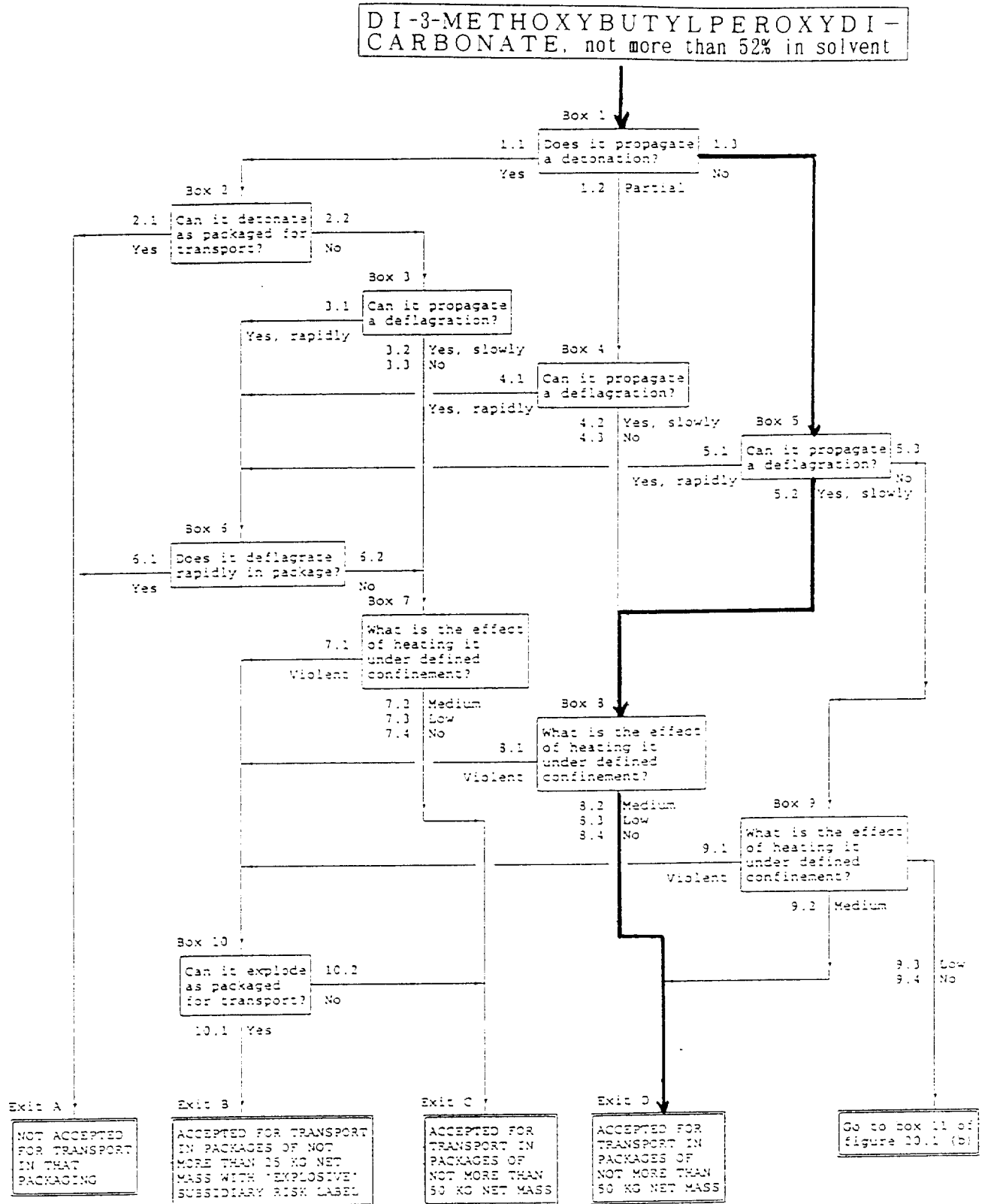
Fig.1 CLASSIFICATION OF ORGANIC PEROXIDE MIXTURE



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 : S ADT = 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 : $\leq 52\%$
- 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

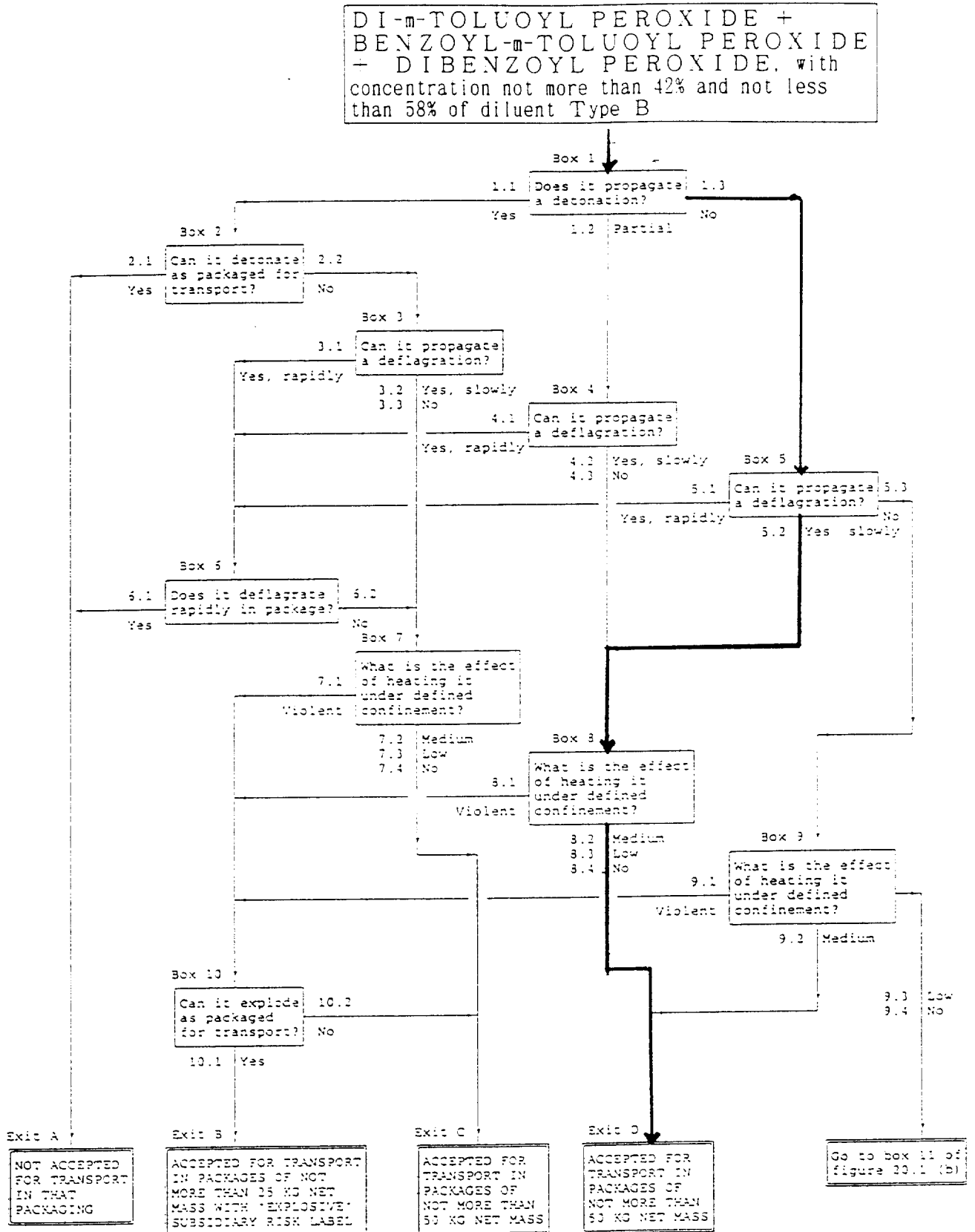
Fig. 1 CLASSIFICATION OF ORGANIC PEROXIDE MIXTURE



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 : $C_{16}H_{14}O_4$, $C_{15}H_{12}O_4$, $C_{14}H_{10}O_4$
 - 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 : BAM 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?

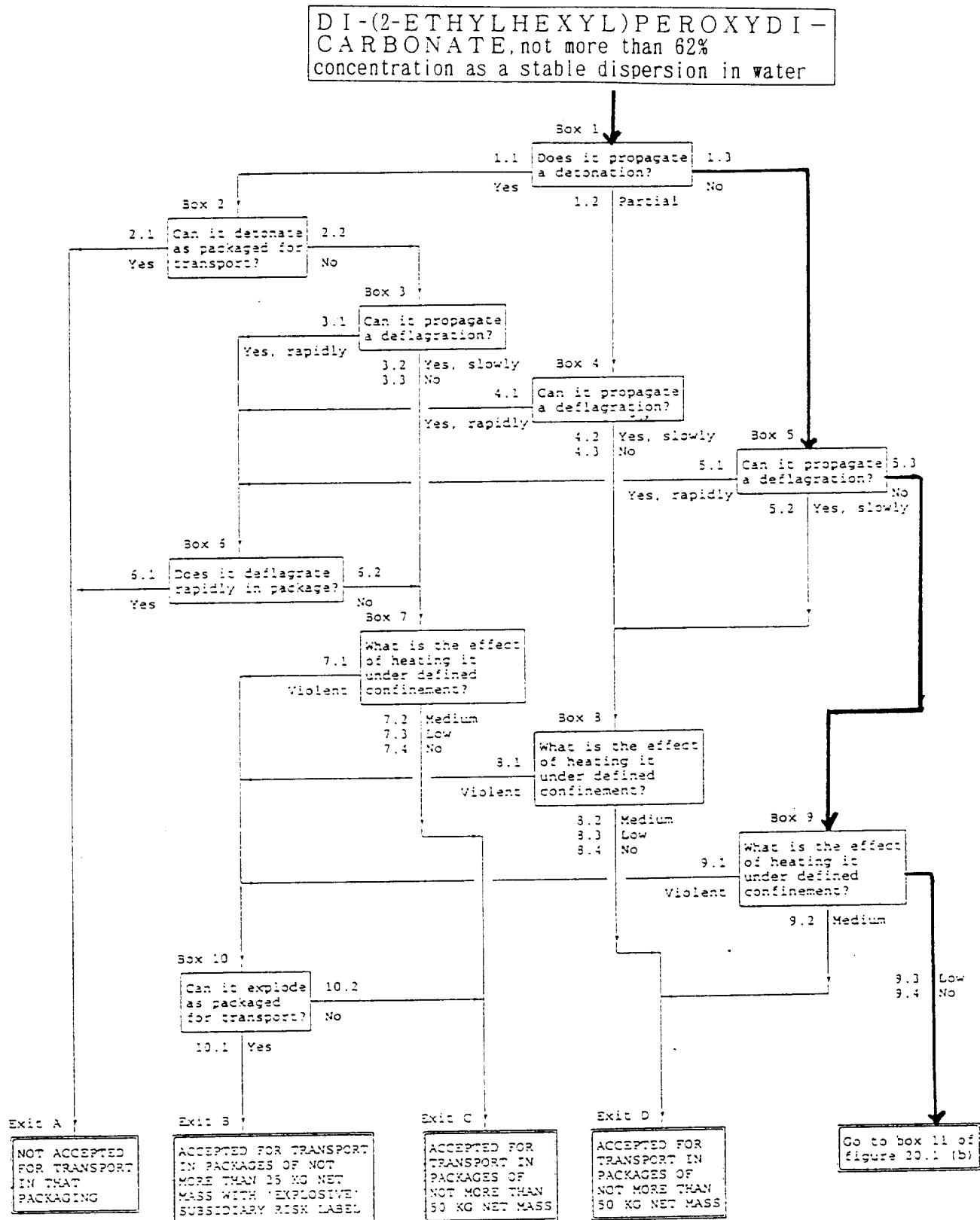
 - 4.1 Method 1 : Time/pressure test(test C.1)
 - 4.2 Sample conditions : Ambient temperature
 - 4.3 Observations : No ignition
 - 4.4 Result : No
 - 4.5 Method 2 : Deflagration test(test C.2)
 - 4.6 Sample conditions : 5.2°C
 - 4.7 Observations : No ignition
 - 4.8 Result : No
 - 4.9 Final result : No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

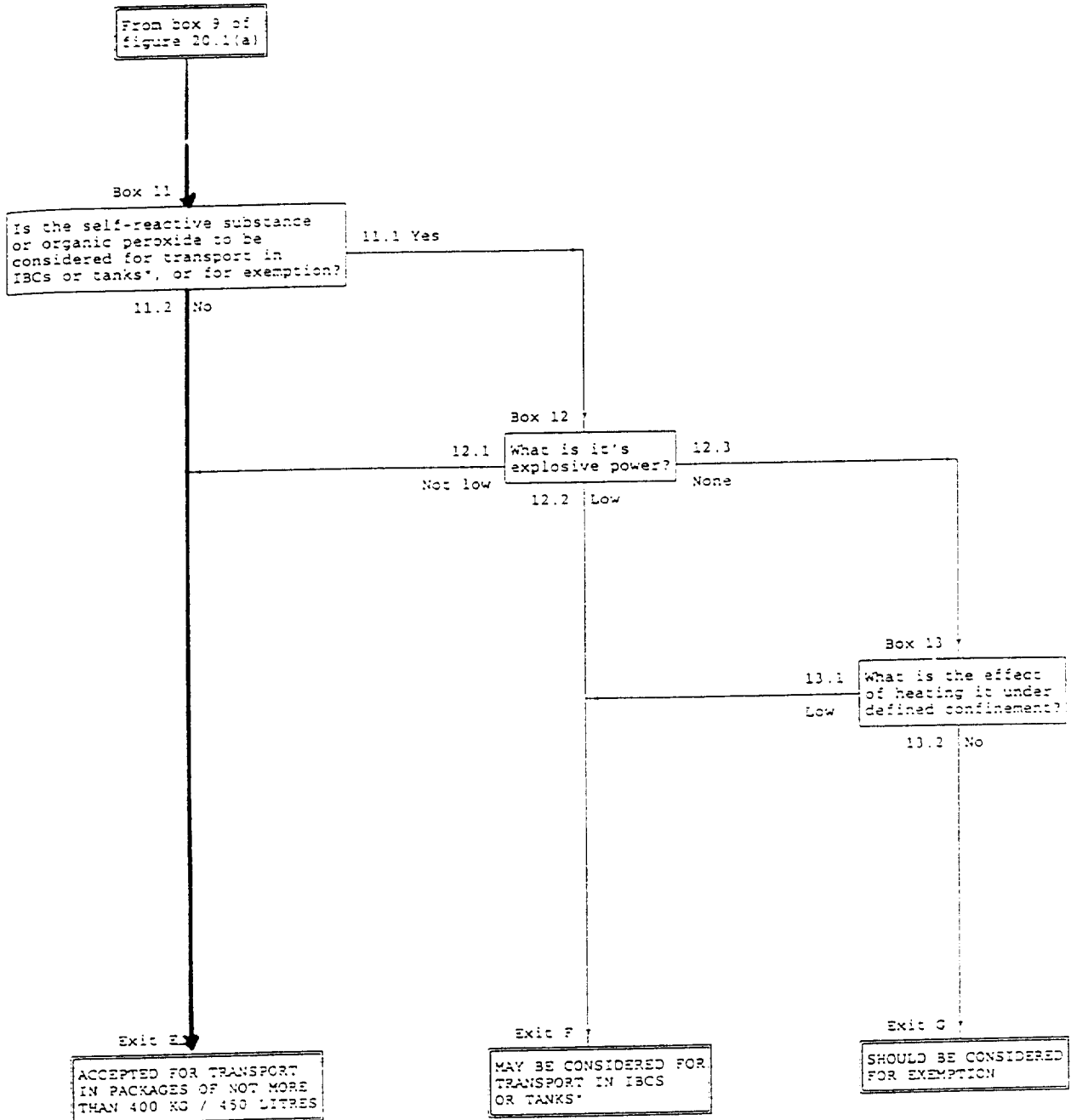
Box 9 of the flow chart : What is the effect of heating it under defined confinement?

 - 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 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 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)PEROXYDICARBONATE, 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



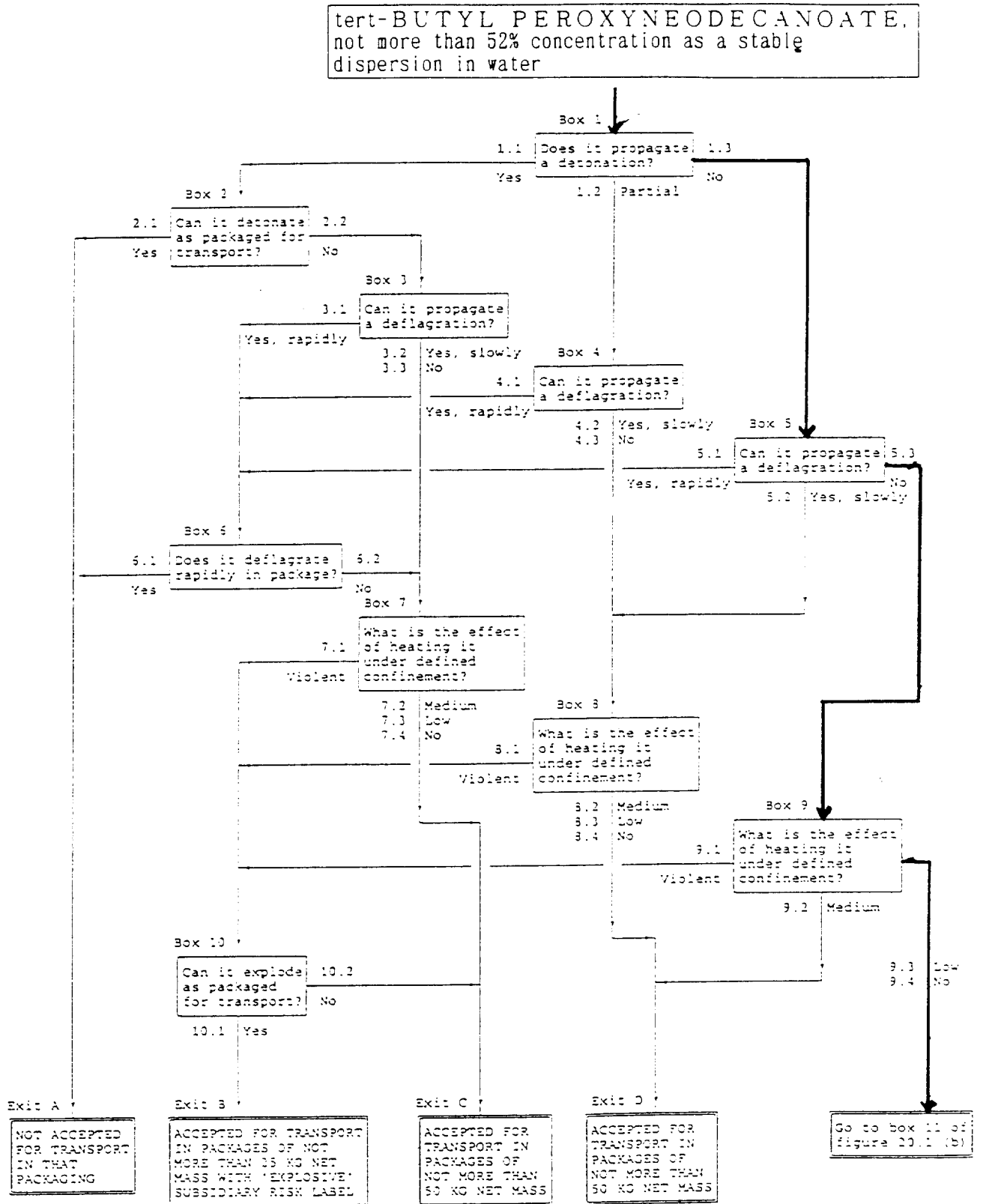


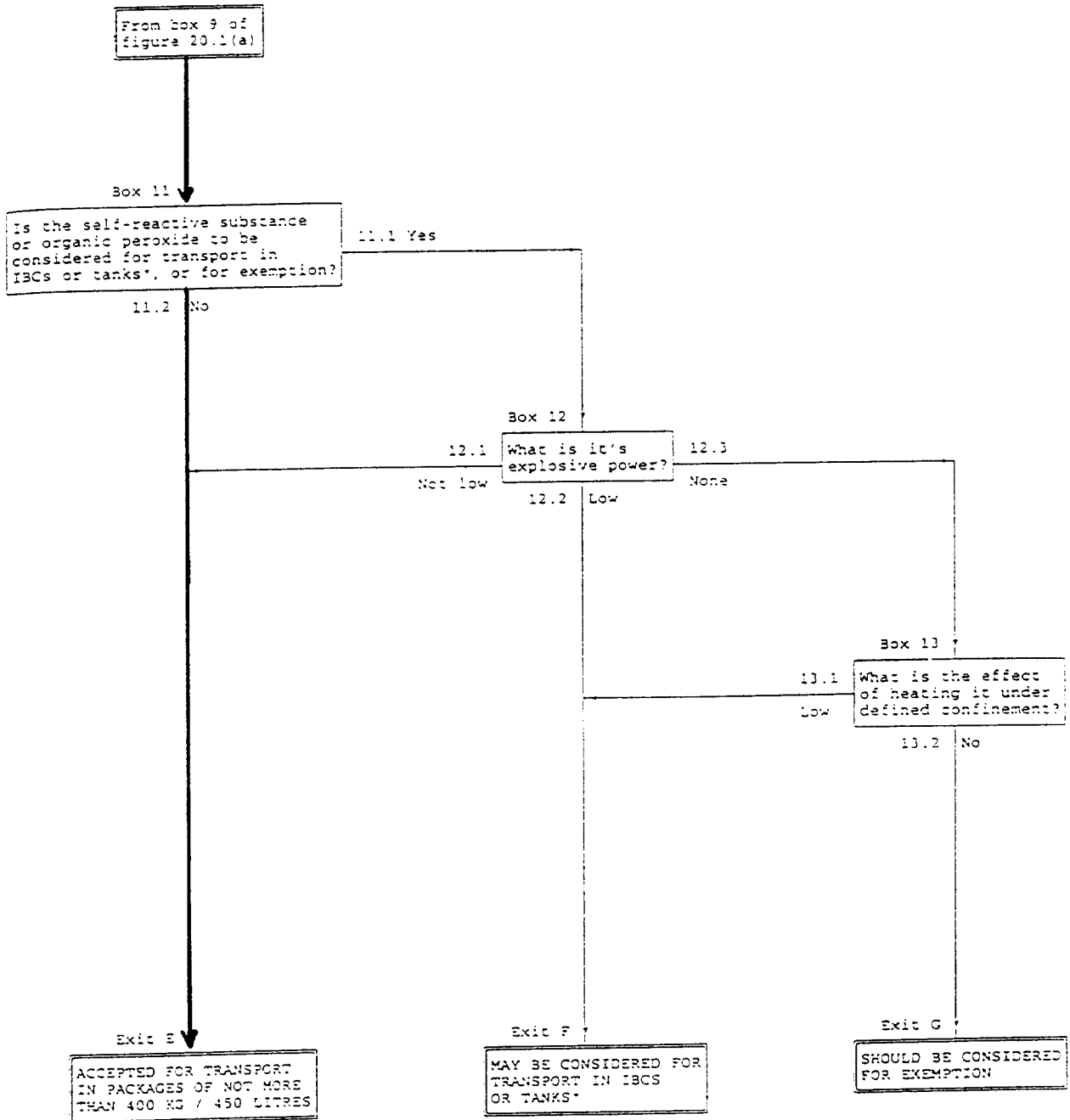
* At present, self-reactive substances may not be considered for transport in tanks

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 81°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 : $\leq 52\%$
- 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-B I S(4,4-D I -tert-B U T Y L P E R O X Y - C Y C L O H E X Y L) P R O P A N E, 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/m³ (20°C)
3. Detonation(test series A)

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

 - 3.1 Method : B A M 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?

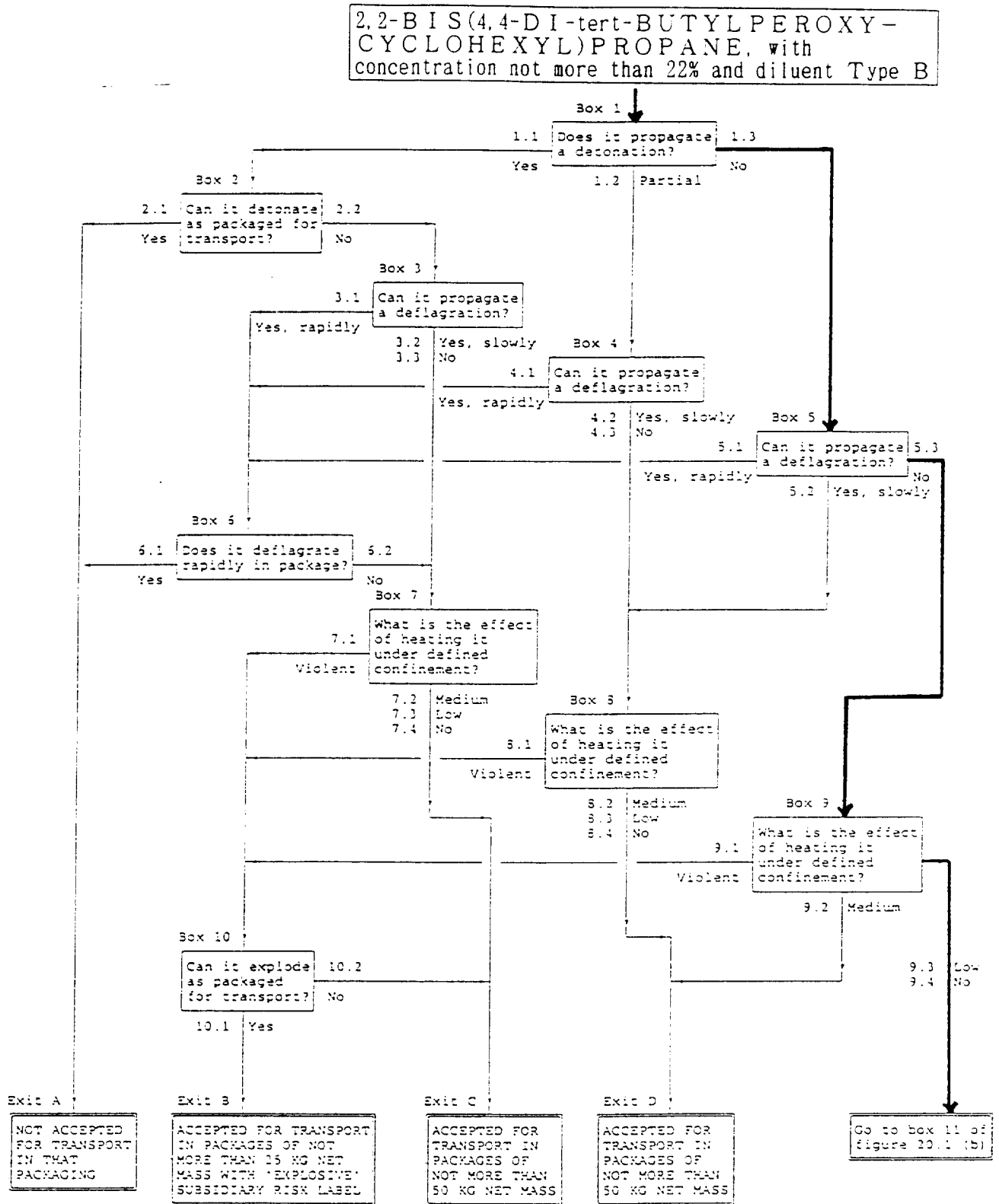
 - 4.1 Method 1 : Time/pressure test(test C.1)
 - 4.2 Sample conditions : 26°C
 - 4.3 Observations : Not reach to 2070KPa
 - 4.4 Result : No
 - 4.5 Method 2 : Deflagration test(test C.2)
 - 4.6 Sample conditions : 50°C
 - 4.7 Observations : Deflagration rate : 0.01mm/s
 - 4.8 Result : No
 - 4.9 Final result : No
 - 4.10 Exit : 5.3
5. Heating under confinement(test series E)

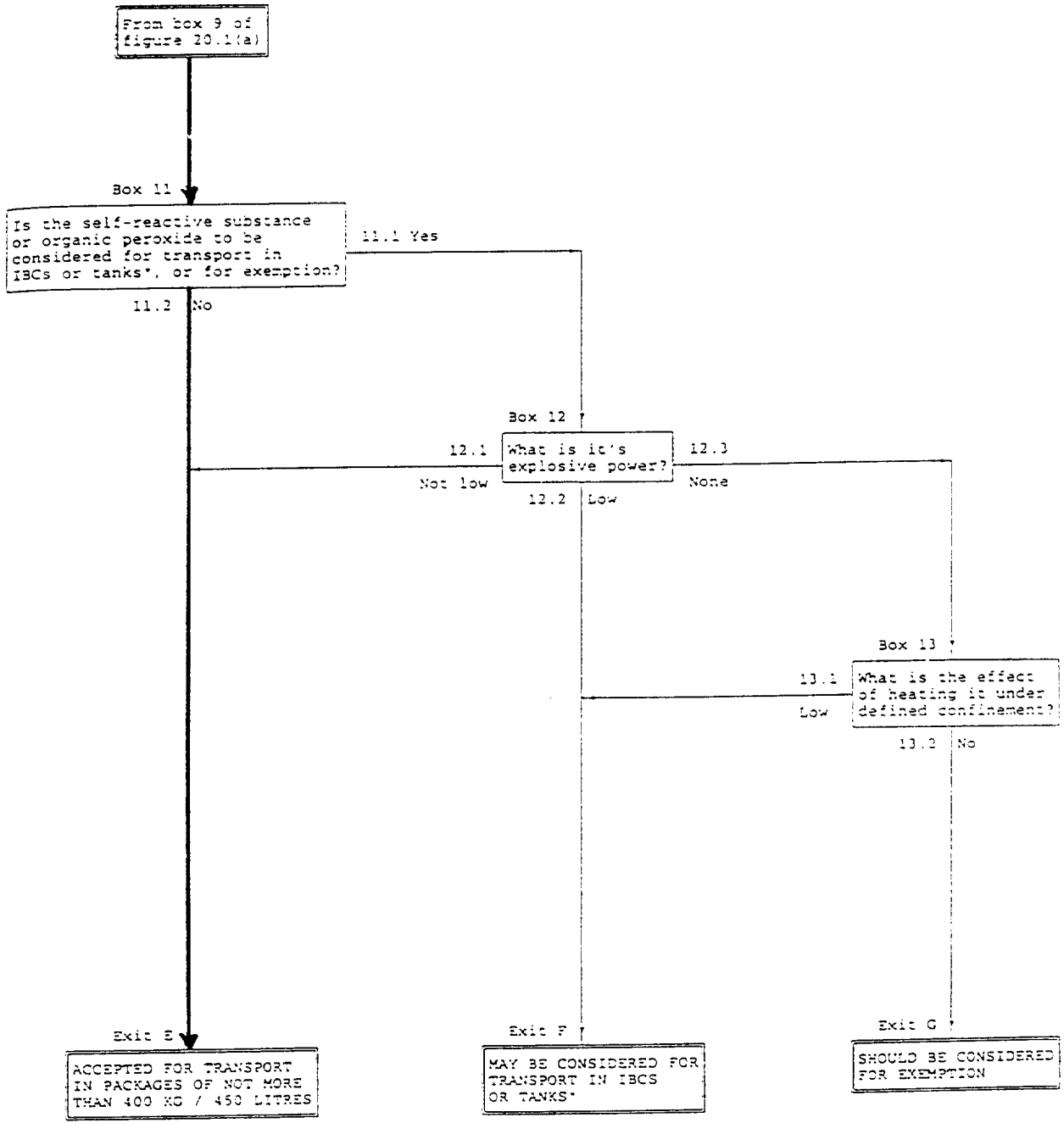
Box 8 of the flow chart : What is the effect of heating it under defined confinement?

 - 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 exothermic 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 : OP8
- 10.10 Control temperature : Not required
- 10.11 Emergency temperature : Not required

Fig.1 CLASSIFICATION OF ORGANIC PEROXIDE DISPERSION



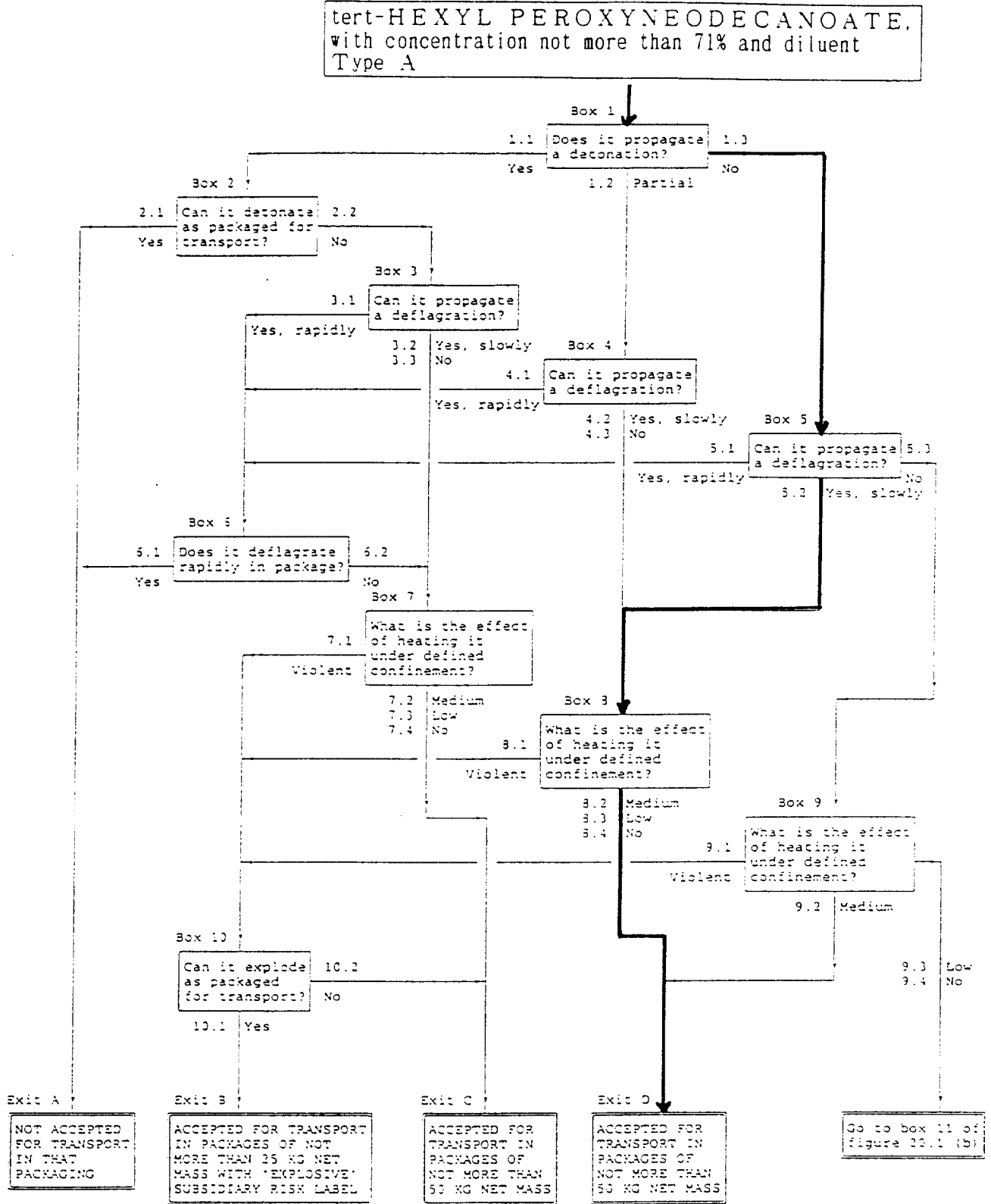


* At present, self-reactive substances may not be considered for transport in tanks

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
flagmentation 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-BUTYL PEROXY)-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/m³ (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 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 : Ambient temperature
 - 4.7 Observations : Deflagration 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 A D T = 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-DI(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

