	Examiner's use only
<u>Construction</u>	
1.1 – "A sprinkler" – sets the scene, an apparatus that sprinkles water or other fluid from a nozzle. (line 5, pg 3 states a sprinkler is a nozzle).	½
1.2 – "for automatically expelling a fire extinguishing liquid" – "for" = suitable for	½
"automatically" means the action of extinguishing a fire occurs without human intervention → common meaning	½
"a fire extinguishing liquid" means a fluid that retards a fie, i.e to aid putting out a fire (line 1, pg 6) ∴ 1.2 means that the sprinkler is suitable for use to put out fires, using a fluid, without human intervention	½
1.3 – "the sprinkler comprising a frame" "comprising" = including but not limited to the following features. means that	½
the sprinkler has a unit that supports another entity (in this case a thermally responsive member). May allow the sprinkler to be mounted to a surface, such as a ceiling (line 7, pg 6).	½
1.4 "and a thermally responsive member" → means an element that reacts to the application of heat. Its purpose is to automatically release the sprinkler, to allow extinguishing fluid to flow. – lines 14 – 16, page 3 states their purpose. Two examples are given (fusible solder + glass bulbs). → "reacting" to heat, could mean it transfers heat and breaks (line 24, pg 3).	½
1.5 – "the frame having an opening" → means the frame has an outlet through which fire extinguishing fluid can pass through (see line 36, pg 5 – line 1 pg 6)	½
1.6 – "which is connectable to a source of fire extinguishing fluid" "which" refers to the frame as a whole, because line 36, pg 5 – line 1, pg 6 states that the inlet of the frame is connectable to the source. This means that the opening is indirectly connectable to the source. Hence, 1.6 means that the opening is in fluid communication with a source of fluid, in use. "connectable" means it does not need to be connected – just that it can be connected.	½

	Examiner's use only
1.7 – "and a valve closing the opening" → means that the sprinkler (or frame) has a member that seals the opening to stop the extinguishing fluid from escaping. Because: lines 2-3 states that a cap (i.e a valve) closes and seals the outlet (opening) in normal use.	½
1.8 – "the thermally responsive member being held by the frame to bear against the valve" → means that the frame secures the thermally responsive member TRM in abutment with the valve.	½
– movement of the TRM away from this position causes the valve to open (line 3-5, pg 6)	½
1.9: "and containing a first and second fluid" – it is the TRM that contains the fluids (line 10, pg 6) – a fluid is a liquid or a gas. lines 17, pg 6 states that a gas bubble is a fluid. Line 28, pg 6 states that the fluid is a liquid.	½
→ hence, the TRM contains two <u>separate</u> (i.e different) liquids or gases. (line 4 pg 7 states that the liquids are separate)	½
→ To be a liquid or gas, these are defined as being so at normal room temperature.	½
→ a solid at room temp ≠ fluid.	
→ may comprise more than two fluids (see air bubble)	
1.10 – "that when exposed to heat, at least one of the species will expand" → error with antecedent: I will construe species as being "fluid".	½
→ means that one, or both, of the fluids increase in volume as they start to heat (line 9, pg 7).	½
1.11 – "to break the thermally responsive member to activate the valve" → means that the expansion of one, or both fluids increases the internal pressure of the TRM to cause it to shatter (line 9, pg 7) thereby allowing the valve to move to an open configuration (line 4, pg 6, line 10, pg 3)	½
1.12 – "and to allow fire extinguishing fluid to flow" → means that movement of the valve to the open position allows the fire extinguishing fluid to pass through the opening to aid extinguishing of the fire. (line 4, pg 6, line 10, pg 3)	½
1.13 – "the actuation time being less than 12s at 75°C <u>and</u> less than 7s at 120°C" → "the actuation time" means the time taken for the TRM to break when exposed to a particular temperature. (lines 10-12, pg 4)	½

Examiner's use only

– the examples provided on lines 15 – 16, page 4 relate to less than 10s at 75°C and <5s at 120°C and 9s at 75°C and 4s at 120°C.

– I will construe all temperatures as being ±5°C
– I will construe all time measurements as being ± 1°C. – Lines 14 – 21 state that empiracle testing is needed to accurately determie these values.
– given this, temperatures are accurate to ~ 5°C and time can reasonably be measured as being accurate to 1s.

∴	75°C	=	70 – 80°C
	120°	=	115° – 125°C
	12s	=	11 – 13s
	7s	=	6s – 8s.

to infringe both criteria must be met due to "<u>and</u>" being present.

<u>Claim 2</u>

2.1 – "A sprinkler … claim 1"
– dependent on claim 1. Has all features of claim 1, + the following:
2.2 – "wherin the first species is a fluid and the second species is a liquid"
antecedent error: species = fluid. ½
→ means that the first fluid may be a liquid <u>OR</u> gas, and the second fluid is a liquid.

<u>Claim 3</u>

3.1 – "A sprinkler according to claim 2"
– includes feature of claim 1 + 2 + the following.

3.2 – "wherin the first species and the third species are immiscible liquids"
→ antecedent error : third should be "second" ½
3.2 means that the first and second fluids are liquids that cannot be mixed (line 21, pg 4). ½
– this allows accurate control over operating characteristics.

<u>Claim 4</u>

4.1 – "A sprinkler … claim 3"
– comprises all features of claims 1 + 2 + 3 + the following
4.2 – "wherin the first liquid has a boiling point <u>and</u> density less than the second liquid"
→ means that the heavier liquid (second liquid) also boils at a higher temperature. The first liquid floats on top of the second fluid. (line 26 – 29, pg 4) ½

In the examples : CH = first liquid, DMF = second

	Examiner's use only
Claim 5	
5.1 – "A sprinkler … claim 1" – has features of claim + the following.	
5.2 – "wherin the thermally responsive member is a glass bulb with an upper pointed end and a lower rounded end"	½
→ means that the TRM is made of glass and is comprised of an outer shell (line 10, pg 6)	
→ the bulb has two opposing end regions (R_2, R_3) – See figures.	
"upper" means the end uppermost, once installed in a room (line 17, pg 7), and "lower" therefore means the end facing the room.	
"pointed" means that the end tapers, and reduces in diameter when compared to the lower end (line 21 – 23, pg 6)	
"rounded" means that the end is curved, or spherical-like. Line 13, pg 6 mentions "spherical" but "rounded" is broader.	
5.3 "the upper pointed end being for accomodating an air bubble" → means that the air bubble will fill the upper pointed end <u>when installed</u>. (line 16 – 17, pg 7)	½
Claim 6	
6.1 – "A sprinkler … claim 5" – has features of claim 1 + 5 + the following.	
6.2 – "wherin the glass bulb has a wall between the two ends" → the glass bulb has an outer boundary that extends between the two ends (ie the pointed and rounded ends) (lines 4 – 5, pg 5)	½
→ this boundary wall is the central region R1.	
6.3 – "which wall is thinner than the lower rounded end" → means the thickness of the wall (i.e inner dimensions) is less than that of the rounded end (line 4 – 7, page 5).	½
→ this allows the glass to break, and means that the rounded end transfers heat more effectively.	
MARKS AWARDED 14.5	

	Examiner's use only
<u>Infringement</u>	
<u>"Sprinkle-eeze Pro"</u>	
1.1 – Present – line 5 states that a sprinkler is supplied with each bulb.	½
1.2 – present – lines 5-10 dissuss an automatic action for expelling fire extinguishant.	
1.3 – present – the "fitting" attaches to a surface. ∴ is a frame that supports the sprinkler + bulb.	½
1.4 – present – glass bulb breaks to allow fluid to flow upon heat application (lines 10-14, pg 11, lines 9–10, pg 12)	
1.5 – present – the valve closes an "opening" through which flows fire extinguishant.	½
1.6 – present – the <u>fitting</u> is attach<u>able</u> to a source of fire extinguishant (line 5–6, pg 12)	
1.7 – present – valve is a member that seals an opening. (line 7, pg 12)	
1.8 – present – "glass bulb retains valve in closed position" (line 9, pg 12). Movement from this position causes extinguishant to flow.	½
1.9 – present – air pocket = fluid (first) – gas – water is a fluid. – liquid. – PC is not a liquid or fluid at room temp.	½ ½
1.10 – present – water expands to break bulb (line 14, pg 11)	
1.11 – present	
1.12 – present – bulk breaking causes extinguisher to flow – line 11–12, pg 11.	
1.13 – present – reaction time is 1s at 80°C - 100°C (flat response) ∴ according to my construction has an activation time of less than 12s (11-13s) at 75° (70 – 80°C) 1s is less than 12s. → presumably remains <1s (or less than 7s at 120°C) need to check!	½
∴ Claim 1 infringed. ↳ but need to check this.	½

	Examiner's use only
<u>Claim 2</u>	
2.1 – Present – see claim 1	
2.2 – present – air is a gas (∴ fluid)	½
– Water is a liquid.	½
Claim 2 is infringed.	
<u>Claim 3</u>	
3.1 – present – Cl. 1 + 2 infringed	
3.2 – absent – PC is a solid at room temp (only melts at 60°C ∴ not a liquid according to my construction. air bubble is a gas, not a liquid. ∴ only liquid is water.	½
Claim 3 is not infringed.	
<u>Claim 4</u>	
4.1 – absent – See claim 3	
4.2 – absent – only one liquid. – PC however floats PC could be first liquid, however is only liquid at >60°C. Unsure of what temp PC boils. I expect higher than 100°C (water) – check.	½
Claim 4 not infringed	
<u>Claim 5</u>	
5.1 – present – claim 1 infringed	½
5.2 – absent – both ends are rounded and at same diameter (see figure)	
∴ claim 5 not infringed	
<u>Claim 6</u>	
6.1 – absent – see claim 5.	
6.2 – absent – no disclosure of middle section being thinner than end section – however check this.	½
Claim 6 not infringed.	
Sale or offer of sale, manufacture, keeping, importing, using "Pro" would infringe claims 1 + 2.	

	Examiner's use only
<u>Sprinkle-eeze lite.</u>	
1.1 – 1.8 → same features as Pro version so all 1.1 – 1.8 are <u>present</u>. See above, these apply equally to both products. (lines 5–10, pg 12).	½
1.9 – Air pocket is a first fluid (gas) – PC is not a fluid according to my construction. It is a solid at room temperature. It only becomes fluid at 60°C (line 4, pg 11)	½ ½
– lite product is absent water (line 33, pg 11) ∴ lite product only has one fluid.	
∴ feature absent. ∴ Claim 1 not infringed.	
1.10 – once melted, PC does expand (line 11, pg 11) ∴ present (if PC is a "fluid")	
1.11 – present (if PC is a fluid) – line 11, pg 11	
1.12 – present – line 11-12, pg 11.	
1.13 – present – "less than 7s at 80°C") is less than 12s (taking 75°C ≈ 80°C)	½
<u>Claim 2</u>	
2.1 – absent	
2.2 – absent – air is a gas (fluid) – no water. PC is solid at <60°C	½
Claim 2 not infringed	
<u>Claim 3</u>	
3.1 – absent	
3.2 – absent – PC not a liquid. No second liquid – claim 3 not infringed	½
<u>Claim 4</u>	
4.1 – absent	
4.2 – absent – no second liquid.	½
<u>Claim 5</u>	
5.1 – absent – see claim 1	
5.2 – TRM is glass bulb (line 8, pg 12) – present – has upper pointed end (upper because it contains air bubble), and lower opposite end that is curved (rounded).	½

	Examiner's use only
5.3 – Present – see figure (air bubble)	½
Not infringed because of Claim 1 not being infringed.	
<u>Claim 6</u>	
6.1 – absent – claim 1 not infringed.	
6.2 – absent – walls of glass bulb in central region appear to be same thickness as rest of bulb – check this however.	½
Claim 6 not infringed.	
	2
	2
MARKS AWARDED 16	
<u>Novelty</u> – doc C – published around summer 2011 ∴ full prior art.	
<u>Mark I</u>	
1.1 – absent – the product is a bulb "usable with all standard sprinklers" ∴ does not disclose a sprinkler.	
1.2 – absent – see above	
1.3 – absent – see 1.1. Although frames are common (Client letter)	
1.4 – present – has a glass bulb.	½
1.5 – absent – no frame.	
1.6 – absent – no frame	
1.7 – absent – no frame	
1.8 – absent – no frame.	
1.9 – present – contains CH <u>OR</u> DMF which are liquids according to doc A. – contains gas, which is second fluid.	½
1.10 – present – CH or BMF does expand under application of heat (doc A).	½
1.11. – present – see 1.10.	
1.12 – absent – not connected to extinguisher source.	
1.13 – absent – 15s is out of my ±1s range for 75°C – 80°C. No disclosure of higher temperature activation time. Also with DMF, 10s is outside of my 7s ±1s range. ∴ absent.	½
claim 1 is therefore novel.	

	Examiner's use only
<u>Claim 2</u>	
2.1 – absent	
2.2 – present. gas is a fluid. CH, DMF is liquid.	½
Claim 2 novel by virtue of claim 1.	
<u>Claim 3</u>	
3.1 – absent	
3.2 – no second liquid ∴ absent	½
claim 3 is novel.	
<u>Claim 4</u>	
4.1 – absent	
4.2 – absent – no second liquid. – claim 4 novel	½
<u>Claim 5</u>	
5.1 – absent. – see claim 1	
5.2 – present – has pointed end and rounded end.	½
5.3 – present – upper end has air bubble	
Claim 5 novel by virtue of claim 1	
<u>Claim 6</u>	
6.1 – absent	½
6.2 – present – side walls are thin (see figure)	
Claim 6 novel only by virtue of claim 1.	
<u>The Bespoke Bulb</u>	
1.1 – 1.8 – absent – see Mark I discussion apart from 1.4 → glass bulb present.	
1.9 – present – contains a blend of liquids. ∴ has more than one fluids.	
1.10 – present – implicit.	
1.11 – present	
1.12 – absent	

Examiner's use only

1.13 – absent – no discussion of ranges.

Claim 1 is novel.

Claim 2

2.1 – absent

2.2 – present – blends of liquids
∴ one fluid (liquid) + one liquid.
– no gas (100% liquids)

Claim 2 is novel by virtue of claim 1.

Claim 3

3.1 – absent – claim 1 novel.

3.2 – absent – "homogenous blend" means they have mixed.

Claim 3 novel.

Claim 4

4.1 – absent – claim 1

4.2 – absent? Present? Likely present.
– unclear from disclosure. Although Probably likely that they will differ.
– figure doesnt show one floating on the other.

– claim 4 novel by virtue of claim 1

Claim 5

5.1 – absent

5.2 – absent – both rounded ends.

Claim 5 novel.

Claim 6

6.1 – absent – see 5.2.

6.2 – absent – side walls appear same thickness as end walls.

Claim 6 is novel

	Examiner's use only
<u>Doc D</u> – filed Jan 2011, published 2012. ∴ novelty only prior art in UK because it is a GB application.	
1.1 – present – line 31–32: "used with sprinkler systems"	½
1.2 – present – line 1–2 page 14. used in fire extinguishers.	
1.3 – present – line 7 – "frame"	½
1.4 – present – glass vessel bursts upon heating (line 29, pg 14).	
1.5 – present – frame has opening – line 9, pg 14.	
1.6 – present – line 4 –	
1.7 – present – line 8 – opening + valve.	½
1.8 – present – line 29–30. release member closes the sprinkler.	
1.9 – present – liquid 5 – – air bubble 5 } both fluids. the member 6, is solid plastic. ∴ not a fluid.	
1.10 – present – liquid 5 expands upon heating – line 28, pg 14.	½
1.11 – present – "bursts" the vessel – line 28, pg 14.	
1.12 – present – 29–28, pg 14 – causes sprinkler to open.	½
1.13 – absent – 10s is less than 12s (and 70°C is within 75±5°C' according to my construction. – however, time to open at 120°C is not disclosed. Would it reduce to 7s at 120°C? ∴ absent.	½
Claim 1 is novel.	
<u>Claim 2</u>	
2.1 – absent	
2.2 – present – gas is fluid, liquid 5 is a liquid.	½
Claim 2 novel by virtue of claim 1.	
<u>Claim 3</u>	
3.1 – absent	
3.2 – absent – no second liquid.	½
Claim 3 is novel.	

	Examiner's use only
<u>Claim 4</u>	
4.1 – absent	
4.2 – absent – only one liquid.	½
Claim 4 is novel	
<u>Claim 5</u>	
5.1 – absent	
5.2 – present? – see figure.	
5.3 – present? – unclear which end of the bulb is fitted closest to the surface (ceiling). ∴ unclear which end is upper + lower end.	½
air bubble shown in pointed end. → on balance, feature probably present. – Claim 5 novel by virtue of claim 1.	½
<u>Claim 6</u>	
6.1 – absent	
6.2 – absent – wall thickness 3 is constant at rounded end and at the sides.	½
∴ claim 6 is novel.	
	1 2
MARKS AWARDED 14	
<u>Inventive Step</u>	
– use the Pozzoli test.	
– Person skilled in the art is a designer or manufacturer of sprinkler fire suppression systems (line 8–11 – page 2).	1
– Their common general knowledge includes : standard sprinkler + frame parts (line 17–19, pg 2) because these are commonplace. also: lines 1 – 25 in document D, discussing glass vessels that break, and lines 1 – 26, pg 3.	1
<u>Claim 1</u>	
Closest prior art is doc C. bespoke bulb embodiment. Document D is novelty only as it was filed before doc A, but published after doc A was filed.	1

	Examiner's use only
– difference over bespoke bulb of doc C and Claim 1, is the disclosure of specific timings and temperature ranges, as well as the device not being part of the sprinkler.	
The inventive concept is the use of two or more fluids to achieve a sensitive, activity range that can be tuned (line 6 – 9, pg 4).	1
Starting from doc C, the skilled person would install the device (bulb) within standard sprinkler frames having an opening and a valve. This is within their common general knowledge. Further, doc C states the bulbs are for use in standard sprinkler heads.	1
doc C does not disclose the specific activation timings. Would the skilled person arrives at those disclosed in claim 1.13?	1
– doc C states the mixture of liquids allows bespoke activation profiles, and they will work with you to achieve your needs. Therefore, it is perhaps likely that the activation profile as claimed may be arrived at, without undue burdon.	1
On the other hand, these values (ranges) are specific – would they be arrived at? I need expert evidence to conclude.	1
on balance, I believe claim 1 lacks inventive step.	1
<u>Claim 2</u>	
Claim 2 is novel only by virtue of claim 1s novelty over doc C (both embodiments). Therefore, I believe claim 2 lacks inventive step for the same reason as claim 1.	1
<u>Claim 3</u>	
– novel feature is the use of immiscible liquids. – these provide accurate control (line 22, pg 4).	
→ none of the documents or embodiments teach immiscible fluids. doc C teaches "homogenous" → so I believe claim 3 would be inventive.	1
<u>Claim 4</u>	
→ doc C doesn't explicitly disclose lower boiling point + lower density. However, I expect that when mixing two liquids (CH, DMF) perhaps, this would likely be the case.	1
∴ claim 4 lacks inventive step.	

	Examiner's use only
Claim 5	
The bespoke bulb, of doc C does not have the point / rounded ends. However, the Mark I does. Would these be combined? – Possibly → however to achieve 100% liquid, the construction may need to be that shown in "Bespoke bulb" → so may not modify in this way.	1
However, mix of fluids could be incorporated into Mark I, (with air bubble).	
On balance claim 5 may lack inventive step.	1
Claim 6	
This feature is disclosed in the Mark I. – would this embodiment be combined with the Bespoke Bulb? – Possibly not, due to different manufacturing technique.	1
– however mix of fluids could be incorporated into Mark I.	
∴ lacks inventive step.	1
MARKS AWARDED 16	
Amendment	
→ amend to claim 3 – novel + inventive.	1
→ but not infringed.	
MARKS AWARDED 1	
Sufficiency	
– no issues?	
MARKS AWARDED 0	
Client letter.	
– doc A is granted and in force, (renewal fee should have been paid in March 2016).	
– therefore can be asserted against your brother. He appears to infringe claims 1 + 2. However, as I mention, these appear to lack inventive step.	
– the patent is in the name of your brother. As an exclusive licencee, you are entitled to work the invention (he is not). How long does that licence last? Is it likely he will renew this?	1

	Examiner's use only
– did your brother actually sell you the patent? He may not choose to do so, given the circumstances.	1
– are you entitled to the patent? Did you invent the invention, or contribute to it? If so, you should seek entitlement of the application, to claim ownership, or part ownership.	1
– as an exclusive licencee, you can enforce the patent.	
– you could obtain an interim injunction. He does not yet appear to have sold the product. May be useful if you are experiencing dip in sales. Courts maintain the status quo – so act soon (before Nov).	1
→ Keep searching for patents by Bulb-US, once they have published. Use of PC material seems inventive in itself. Could you take another licence?	1
→ ask your brother to assign the application soon, before asserting it against him.	½
MARKS AWARDED 5.5	

Examiner's use only

Claims

nozzle *1.1* *suitable for* *1.2* *to connect to cieling* *disk? Doc D* *outlet* *1.3*

1. A sprinkler for automatically expelling a fire extinguishing fluid, the sprinkler comprising a frame and a thermally responsive member, the frame having an opening which is connectable to a source of fire extinguishing fluid and a valve closing the opening, the thermally responsive member being held by the frame to bear against the valve and containing a first and a second fluid that when exposed to heat, at least one of the species will expand to break the thermally responsive member to actuate the valve and allow fire extinguishing fluid to flow, the actuation time being less than 12 s at 75 °C and less than 7 s at 120 °C.

1.4 *1.5* *1.6* *1.7* *the frame?* *1.8* *liquid/gas? – see c12.* *1.9* *1.10* *any more* *species* *fire exting fluid? Three fluids?* *1.11* *1.12* *1.13*

2. A sprinkler according to Claim 1, wherein the first species is a fluid and the second species is a liquid.

gas *antecedent*

3. A sprinkler according to Claim 2, wherein the first species and third species are immiscible liquids.

antecedent *?* *Cant be mixed.*

4. A sprinkler according to Claim 3, wherein the first liquid has a boiling point and density less than the second liquid.

will float

5. A sprinkler according to Claim 1, wherein the thermally responsive member is a glass bulb with an upper pointed end and a lower rounded end, the upper pointed end being for accommodating an air bubble.

See doc C, pointed bottom *top? – no, see fig 2* *spherical* *suitable for* *stem*

6. A sprinkler according to Claim 5, wherein the glass bulb has a wall between the two ends, which wall is thinner than the lower rounded end.

?