



Analysis of Components from Gamucci Electronic Cigarette Cartridges, Tobacco Flavour Regular Smoking Liquid

Report Number: E98D

Howard Coulson
3rd March 2009

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1. Background

A sample of Gamucci Electronic Cigarette Zero, Ultra Light, Light, and Regular Nicotine solutions were supplied for analysis by Gamucci as part of their due diligence to confirm the components currently found within the nicotine solution formulation. This report is concerned with the **Tobacco Flavour 'Regular'**.

Solutions of this type can be used in an electronic cigarette which replicates the action of smoking, producing a tobacco aromatized smoke which when inhaled quickly delivers the nicotine to the lung.

The Electronic Cigarette does not emit a tarry smoke, or produce an ash deposit, and can be used to wean the smoker off 'cigarette smoking' in a controlled manner.

2. Sample

The samples were received on the 27/03/2009.

1. 5 Electronic Cigarette Cartridges; **ZERO** (0 mg of Nicotene) **Report E98A**
2. 5 Electronic Cigarette Cartridges; **ULTRA LIGHT** (6 mg Nicotene) **Report E98B**
3. 5 Electronic Cigarette Cartridges; **LIGHT** (11 mg Nicotene) **Report E98C**
4. 5 Electronic Cigarette Cartridges; **REGULAR** (16 mg Nicotene) **This Report**

The boxes of cartridges were opened on the 27/02/2009 by Howard Coulson, and for each case all five cartridges were used to extract a solution on the liquid.

All five cartridges had been heat sealed in a clear plastic sachet, and consisted of a black mouthpiece and white cap. When the white cap was removed a chamber was revealed that contained a piece of 'felt' loaded with the nicotine solution.

A total of 5 cartridges were opened, and the nicotine solution extracted and subsequently collected in small septum capped glass vial for GC-MS analysis.

A total of 4.57g of nicotine solution was recovered from 5 cartridges, an average of 0.91g per cartridge.

3. Sample Extraction for GC-MS

During previous analyses of this type of cartridge, recovering sufficient nicotine solution for filling a 2 ml GC-MS auto sampler vial had proved difficult from just 1 cartridge without diluting the sample. So a general procedure was determined to extract between 3.0 – 5.0 g of nicotine solution from between 3 - 6 ES cartridges.

All equipment was washed at least six times with pure acetone then air dried before use; this included the septum capped vials, steel tweezers. A disposable polypropylene syringe was also employed in the procedure, and this was cleaned six times with pure acetone and blue roll.

Samples of 'Felt' loaded with the nicotine solution from 5 cartridges were placed in the barrel of the clean 10 ml disposable polypropylene syringe. The plunger was then inserted into the syringe barrel and depressed. The combined 'Felt' samples were squeezed to release the nicotine solution out of the syringe nozzle, and into the clean septum capped vial. The vial was then immediately labelled with the reference number provided.

4. GC-MS Method

The sample was analyzed by an external flavour laboratory to determine the components present by GC-MS (gas chromatography mass-spectrometry).

Column: Alltech Flavour & Essences Capillary Column – 30 m x 250 µm x 0.5 µm
Temperature: 50°C 4 min, ramp 10°C/min to 210°C
Analysis Time: 81 min
Injection: Split
Carrier gas: Helium

The GC method employed may not detect some less volatile components that may be found in the sample, or where components are present in such low levels that they are below detection limits for the GC-MS method.

The GC method employed was of the 'normalisation type' where the detector response for each eluted component was set at the default value of 1.000, and the peak area normalised to evaluate nominal area percentages for each eluted component

5. GC-MS Results Tobacco Flavour 'Regular'

The sample was not diluted for analysis, and the results relate to the sample as received.

Table 1 Tobacco Flavour 'Regular'– Summary of GC-MS peak identification, CAS Number, and associated Risk Phrases

No	Name	Nominal Area %	CAS No.	Effects to Humans of pure product in isolation via inhalation route R23 = Toxic by inhalation R24 = Toxic in contact with skin R25 = Toxic if swallowed R26 = Irritating to respiratory system R39/23 = Danger of serious irreversible effects through inhalation R51/53 = Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.
1	Propylene Glycol	77.51	57-55-6	Not currently recognized as giving any health hazards. However, it is listed as a suspected respiratory toxicant, suspected skin or sense organ toxicant, suspected neurotoxicant, and a suspected immunotoxicant.
2	2-hydroxy-3-methyl-2-Cyclopenten-1-one	0.08	80-71-7	Classified as harmful Flavouring/odourant
6	Nicotine	8.45	23950-04-01	R23 = Toxic by inhalation R24 = Toxic in contact with skin R25 = Toxic if swallowed R51/53 = Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment. Poison - maybe fatal if inhaled
7	Glycerin	13.96	56-81-5	Non Hazardous

6. Discussion

The composition of the Gamucci 'Regular' nicotine solution has been investigated by LPD Laboratory Services, in order to try and re-affirm that the nicotine solution is a much safer alternative when used in the electronic cigarette, when compared to smoking with traditional cigarettes.

The Gamucci 'Regular' nicotine solution contains the addictive yet poisonous nicotine component, as do traditional cigarettes.

The nicotine solution does appear to contain propylene glycol aerosol forming solvent. Different suppliers of this chemical appear to offer differing hazard ratings on their respective MSDS's. Some indicate no ill effects from inhalation which is fine, while others indicate CNS and spleen health issues may exist from prolonged inhalation of the chemical.

Researching the chemical profile for propylene glycol¹ indicates that although there would appear to be 'no current recognized health hazards', the chemical is 'suspected to be a respiratory toxicant'. If Propylene Glycol subsequently becomes 'recognized as a respiratory toxicant' following the launch of the product in Europe, then Gamucci Ltd should be looking for an even safer alternative such as Glycerol.

The GC-MS results also indicate that "2-hydroxy-3-methyl-2-Cyclopenten-1-one" is also present in the nicotine solution, this is also known as cyclotene hydrate, and gives an odour of Caramel. It is classed as harmful, and has a toxicity of 1400.00mg/kg (Oral Guinea pig), however the levels seen in the cartridges are very low, and therefore is unlikely to ever reach this toxicity level from everyday usage.

7. Conclusion

On balance, the Gamucci Ltd 'Regular' nicotine solution appears to offer a much safer alternative to the traditional cigarette.

Using this nicotine solution, the artificial smoke generated by the Electronic Cigarette does not appear to contain the toxic cocktail of toxic carcinogenic compounds found in traditional tobacco smoke. Some 600+ chemicals have been identified in traditional tobacco smoke, of which many are carcinogenic.

The primary aerosol forming solvent (Propylene Glycol) used in the preparation of the nicotine solution is listed as a suspected respiratory toxicant. should look at changing the aerosol forming solvent from the suspected respiratory toxicant 'Propylene Glycol', to an even safer solvent such as Glycerol.

8. Recommendations

- a) Gamucci should take a pro-active look at replacing the propylene glycol component completely with an alternative such as glycerol, in the event that the solvent becomes added to the list of respiratory toxicants in the foreseeable future

9. References

1. www.scorecard.org/chemical-profiles; The Pollution Information Site for chemical "Propylene Glycol"
2. www.thegoodscentscompany.com/data/rw1064211.html; The reference for Cyclotene Hydrate
3. <http://ecb.jrc.ec.europa.eu/esis/>; European Commission for Health and Public Safety
4. <http://msds.chem.ox.ac.uk/NI/nicotine.html>; MSDS sheet for nicotine
5. http://www.sciencelab.com/xMSDS-L_Nicotine-9926222; MSDS sheet for nicotine inclusive of risk phrases R51/53

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Report Number: E98D

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Analysis of Components from Gamucci Electronic Cigarette Cartridges; Tobacco Flavour Light Smoking Liquid

Report Number: E98C

Howard Coulson
3rd March 2009

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1. Background

A sample of Gamucci Electronic Cigarette Zero, Ultra Light, Light, and Regular Nicotine solutions were supplied for analysis by Gamucci as part of their due diligence to confirm the components currently found within the nicotine Solution formulation.

Solutions of this type can be used in an electronic cigarette which replicates the action of smoking, producing a tobacco aromatized smoke which when inhaled quickly delivers the nicotine to the lung.

The electronic cigarette does not emit a tarry smoke, or produce an ash deposit, and can be used to wean the smoker off 'cigarette smoking' in a controlled manner.

2. Sample

The samples were received on the 27/03/2009.

1. 5 Electronic Cigarette Cartridges; **ZERO** (0 mg of Nicotene); **Report E98A**
2. 5 Electronic Cigarette Cartridges; **ULTRA LIGHT** (6 mg Nicotene); **Report E98B**
3. 5 Electronic Cigarette Cartridges; **LIGHT** (11 mg Nicotene); **This Report**
4. 5 Electronic Cigarette Cartridges; **REGULAR** (16 mg Nicotene); **Report E98D**

The boxes of cartridges were opened on the 27/02/2009 by Howard Coulson, and for each case all five cartridges were used to extract a solution on the liquid.

All five cartridges had been heat sealed in a clear plastic sachet, and consisted of a black mouthpiece and white cap. When the white cap was removed a chamber was revealed that contained a piece of 'felt' loaded with the nicotine solution.

A total of 5 cartridges were opened, and the nicotine solution extracted and subsequently collected in small septum capped glass vial for GC-MS analysis.

A total of 4.65g of nicotine solution was recovered from 5 cartridges, an average of 0.93g per cartridge

3. GC-MS Method

The sample was analyzed by an external flavour laboratory to determine the components present by GC-MS (gas chromatography mass-spectrometry).

Column: Alltech Flavour & Essences Capillary Column – 30 m x 250 µm x 0.5 µm

Temperature: 50°C 4 min, ramp 10°C/min to 210°C

Analysis Time: 81 min

Injection: Split

Carrier gas: Helium

The GC method employed may not detect some less volatile components that may be found in the sample, or where components are present in such low levels that they are below detection limits for the GC-MS method.

The GC method employed was of the 'normalisation type' where the detector response for each eluted component was set at the default value of 1.000, and the peak area normalised to evaluate nominal area percentages for each eluted component

4. GC-MS Results

The sample was not diluted for analysis, and the results relate to the sample as received.

Table 1 Tobacco Flavour Light – Summary of GC-MS peak identification, CAS Number, and associated Risk Phrases

No	Name	Nominal Area %	CAS No.	Effects to Humans of pure product in isolation via inhalation route R20 = harmful by inhalation R23 = Toxic by inhalation R26 = Irritating to respiratory system R39/23 = Danger of serious irreversible effects through inhalation
1	Propylene Glycol	80.38	57-55-6	Not currently recognized as giving any health hazards. However, it is listed as a suspected respiratory toxicant, suspected skin or sense organ toxicant, suspected neurotoxicant, and a suspected immunotoxicant.
2	Nicotine	5.27	54-11-5	R23 = Toxic by inhalation R24 = Toxic in contact with skin R25 = Toxic if swallowed Poison - maybe fatal if inhaled
3	Glycerin	14.35	56-81-5	

5. Discussion

The composition of the Gamucci Light nicotine solution has been investigated by LPD Laboratory Services, in order to try and re-affirm that the nicotine solution is a much safer alternative when used in the electronic cigarette, when compared to smoking with traditional cigarettes.

The Gamucci Light nicotine solution contains the addictive yet poisonous nicotine component, as do traditional cigarettes.

The nicotine solution does appear to contain propylene glycol aerosol forming solvent. Different suppliers of this chemical appear to offer differing hazard ratings on their respective MSDS's. Some indicate no ill effects from inhalation which is fine, while others indicate CNS (Central Nervous System) and spleen health issues may exist from prolonged inhalation of the chemical.

Researching the chemical profile for propylene glycol¹ indicates that although there would appear to be 'no current recognized health hazards', the chemical is 'suspected to be a respiratory toxicant'. If propylene glycol subsequently becomes 'recognized as a respiratory toxicant' following the launch of the product in Europe, then Gamucci should be looking for an even safer alternative such as glycerol.

6. Conclusion

On balance, the Gamucci Light nicotine solution appears to offer a much safer alternative to the traditional cigarette.

Using this nicotine solution, the artificial smoke generated by the Electronic Cigarette does not appear to contain the toxic cocktail of toxic carcinogenic compounds found in traditional tobacco smoke. Some 600+ chemicals have been identified in traditional tobacco smoke, of which many are carcinogenic.

The primary aerosol forming solvent (propylene glycol) used in the preparation of the nicotine solution is listed as a suspected respiratory toxicant. Gamucci should look at changing the aerosol forming solvent from the suspected respiratory toxicant 'Propylene Glycol', to an even safer solvent such as glycerol.

7. Recommendations

- a) Gamucci should take a pro-active look at replacing the propylene glycol component completely with an alternative such as glycerol, in the event that the solvent becomes added to the list of respiratory toxicants in the foreseeable future.

8. References

1. www.scorecard.org/chemical-profiles; The Pollution Information Site for chemical "Propylene Glycol"
2. Reference to 100 fatal poisonings in Panama resulting from a Chinese factory falsifying records in order to export the cheaper but toxic Diethylene Glycol as the more expensive Glycerol.

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Function: Senior Applications Scientist

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Report Number: E98C

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Analysis of Components from Gamucci Electronic Cigarette Cartridges, Ultra Light Smoking Liquid

Report Number: E98B

Howard Coulson
3rd March 2009

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1. Background

A sample of Gamucci Electronic Cigarette Zero, Ultra Light, Light, and Regular Nicotine solutions was supplied for analysis by Gamucci as part of their due diligence to confirm the components currently found within the nicotine solution formulation.

Solutions of this type can be used in an electronic cigarette which replicates the action of smoking, producing a tobacco aromatized smoke which when inhaled quickly delivers the nicotine to the lung.

The Electronic Cigarette does not emit a tarry smoke, or produce an ash deposit, and can be used to wean the smoker off 'cigarette smoking' in a controlled manner.

2. Sample

The Gamucci samples were received on the 27/03/2009.

1. 5 Electronic Cigarette Cartridges; **ZERO** (0 mg of Nicotene); **Report E98A**
2. 5 Electronic Cigarette Cartridges ;**ULTRA LIGHT** (6 mg Nicotene) **This Report**
3. 5 Electronic Cigarette Cartridges; **LIGHT** (11 mg Nicotene); **Report E98C**
4. 5 Electronic Cigarette Cartridges; **REGULAR** (16 mg Nicotene); **Report E98D**

The boxes of cartridges were opened on the 27/02/2009 by Howard Coulson, and for each case all five cartridges were used to extract a solution on the liquid.

All five cartridges had been heat sealed in a clear plastic sachet, and consisted of a black mouthpiece and white cap (with label on indicating flavour). When the white cap was removed a chamber was revealed that contained a piece of 'felt' loaded with the nicotine solution.

A total of 5 cartridges were opened, and the nicotine solution extracted and subsequently collected in small septum capped glass vial for GC-MS analysis.

A total of 4.84g of nicotine solution was recovered from 5 cartridges, an average of 0.97g per cartridge

3. GC-MS Method

The sample was analyzed by an external flavour laboratory to determine the components present by GC-MS (gas chromatography mass-spectrometry).

Column: Alltech Flavour & Essences Capillary Column – 30 m x 250 µm x 0.5 µm

Temperature: 50°C 4 min, ramp 10°C/min to 210°C

Analysis Time: 81 min

Injection: Split

Carrier gas: Helium

The GC method employed may not detect some less volatile components that may be found in the sample, or where components are present in such low levels that they are below detection limits for the GC-MS method.

The GC method employed was of the 'normalisation type' where the detector response for each eluted component was set at the default value of 1.000, and the peak area normalised to evaluate nominal area percentages for each eluted component.

4. GC-MS Results

The sample was not diluted for analysis, and the results relate to the sample as received.

Table 1 Tobacco Flavour Ultra Light – Summary of GC-MS peak identification, CAS Number, and associated Risk Phrases

No	Name	Nominal Area %	CAS No.	Effects to Humans of pure product in isolation via inhalation route R20 = harmful by inhalation R23 = Toxic by inhalation R26 = Irritating to respiratory system R39/23 = Danger of serious irreversible effects through inhalation
1	Propylene Glycol	85.54	57-55-6	Not currently recognized as giving any health hazards. However, it is listed as a suspected respiratory toxicant, suspected skin or sense organ toxicant, suspected neurotoxicant, and a suspected immunotoxicant.
2	Nicotine	3.29	54-11-5	R23 = Toxic by inhalation R24 = Toxic in contact with skin R25 = Toxic if swallowed Poison - maybe fatal if inhaled
7	Glycerin	11.17	56-81-5	Non Hazardous

5. Discussion

The composition of the Gamucci Ultra Light Electronic Cigarette nicotine solution has been investigated by LPD Laboratory Services, in order to try and re-affirm that the nicotine solution is a much safer alternative when used in the electronic cigarette, when compared to smoking with traditional cigarettes.

The Gamucci Ultra Light nicotine solution contains the addictive yet poisonous nicotine component, as do traditional cigarettes.

The nicotine solution does appear to contain propylene glycol aerosol forming solvent. Different suppliers of this chemical appear to offer differing hazard ratings on their respective MSDS's. Some indicate no ill effects from inhalation which is fine, while others indicate CNS (Central Nervous System) and spleen health issues may exist from prolonged inhalation of the chemical.

Researching the chemical profile for propylene glycol¹ indicates that although there would appear to be 'no current recognized health hazards', the chemical is 'suspected to be a respiratory toxicant'. If propylene glycol subsequently becomes 'recognized as a respiratory toxicant' following the launch of the product in Europe, then Gamucci should be looking for an even safer alternative such as Glycerol.

6. Conclusion

On balance, the Gamucci Ultra Light nicotine solution appears to offer a much safer alternative to the traditional cigarette.

Using this nicotine solution, the artificial smoke generated by the Electronic Cigarette does not appear to contain the toxic cocktail of toxic carcinogenic compounds found in traditional tobacco smoke. Some 600+ chemicals have been identified in traditional tobacco smoke, of which many are carcinogenic.

The primary aerosol forming solvent (propylene glycol) used in the preparation of the nicotine solution is listed as a suspected respiratory toxicant. Gamucci should look at changing the aerosol forming solvent from the suspected respiratory toxicant 'propylene glycol', to an even safer solvent such as glycerol.

7. Recommendations

- a) Gamucci should take a pro-active look at replacing the propylene glycol component completely with an alternative such as glycerol, in the event that the solvent becomes added to the list of respiratory toxicants in the foreseeable future

8. References

1. www.scorecard.org/chemical-profiles; The Pollution Information Site for chemical "Propylene Glycol"
2. Reference to 100 fatal poisonings in Panama resulting from a Chinese factory falsifying records in order to export the cheaper but toxic Diethylene Glycol as the more expensive Glycerol.

Analysts Name: Howard Coulson

Function: Senior Applications Scientist

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Report Number: E98B

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Analysis of Components from Gamucci Electronic Cigarette Cartridges, Tobacco Flavour Zero, Smoking Liquid

Report Number: E98A

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3rd March 2009

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1. Background

A sample of Gamucci Electronic Cigarette Zero, Ultra Light, Light, and Regular Nicotine solutions was supplied for analysis by Gamucci as part of their due diligence to confirm the components currently found within the Nicotine Solution formulation.

Solutions of this type can be used in an electronic cigarette which replicates the action of smoking, producing a tobacco aromatized smoke which when inhaled quickly delivers the nicotine to the lung.

The Electronic Cigarette does not emit a tarry smoke, or produce an ash deposit, and can be used to wean the smoker off 'cigarette smoking' in a controlled manner.

2. Sample

The samples were received on the 27/02/2009.

1. 5 Electronic Cigarette Cartridges; **ZERO** (0 mg of Nicotene); **This Report**
2. 5 Electronic Cigarette Cartridges; **ULTRA LIGHT** (6 mg Nicotene); **Report E98B**
3. 5 Electronic Cigarette Cartridges; **LIGHT** (11 mg Nicotene); **Report E98C**
4. 5 Electronic Cigarette Cartridges; **REGULAR** (16 mg Nicotene); **Report E98D**

The boxes of cartridges were opened on the 27/02/2009 by Howard Coulson, and for each case all five cartridges were used to extract a solution on the liquid.

All five cartridges had been heat sealed in a clear plastic sachet, and consisted of a black mouthpiece and white cap. When the white cap was removed a chamber was revealed that contained a piece of 'felt' loaded with the nicotine solution.

A total of 5 cartridges were opened, and the nicotine solution extracted and subsequently collected in small septum capped glass vial for GC-MS analysis.

A total of 4.64g of nicotine solution was recovered from 5 cartridges, an average of 0.93g per cartridge

3. GC-MS Method

The sample was analyzed by an external flavour laboratory to determine the components present by GC-MS (gas chromatography mass-spectrometry).

Column: Alltech Flavour & Essences Capillary Column – 30 m x 250 µm x 0.5 µm

Temperature: 50°C 4 min, ramp 10°C/min to 210°C

Analysis Time: 81 min

Injection: Split

Carrier gas: Helium

The GC method employed may not detect some less volatile components that may be found in the sample, or where components are present in such low levels that they are below detection limits for the GC-MS method.

The GC method employed was of the 'normalisation type' where the detector response for each eluted component was set at the default value of 1.000, and the peak area normalised to evaluate nominal area percentages for each eluted component.

4. GC-MS Results

The sample was not diluted for analysis, and the results relate to the sample as received.

Table 1 Tobacco Flavour Zero – Summary of GC-MS peak identification, CAS Number, and associated Risk Phrases

No	Name	Nominal Area %	CAS No.	Effects to Humans of pure product in isolation via inhalation route R20 = harmful by inhalation R23 = Toxic by inhalation R26 = Irritating to respiratory system R39/23 = Danger of serious irreversible effects through inhalation
1	1, 3-bis(3-phenoxyphenoxy) Benzene	6.95	2455-71-2	Non Hazardous
2	Propylene Glycol	84.34	57-55-6	Not currently recognized as giving any health hazards. However, it is listed as a suspected respiratory toxicant, suspected skin or sense organ toxicant, suspected neurotoxicant, and a suspected immunotoxicant.
5	3-Isopropoxy- 1, 1, 1, 7, 7, 7-hexamethyl -3, 5, 5-tris(trimethylsiloxy)tetra siloxane	0.77	71579-69-6	No Information
6	alpha, 3, 4- tris [(trimethylsilyl)oxy] Benzeneacetic acid	0.39	55268-65-0	No Information
7	Glycerin	7.55	56-81-5	Non Hazardous

5. Discussion

The composition of the Gamucci zero nicotine solution has been investigated by LPD Laboratory Services, in order to try and re-affirm that the nicotine solution is a much safer alternative when used in the electronic cigarette, when compared to smoking with traditional cigarettes.

The zero nicotine solution contains no nicotine component, as do traditional cigarettes.

The nicotine solution does appear to contain propylene glycol aerosol forming solvent. Different suppliers of this chemical appear to offer differing hazard ratings on their respective MSDS's. Some indicate no ill effects from inhalation which is fine, while others indicate CNS (Central Nervous System) and spleen health issues may exist from prolonged inhalation of the chemical.

Researching the chemical profile for propylene glycol¹ indicates that although there would appear to be 'no current recognized health hazards', the chemical is 'suspected to be a respiratory toxicant'. If propylene glycol subsequently becomes 'recognized as a respiratory toxicant' following the launch of the product in Europe, then Gamucci should be looking for an even safer alternative such as glycerol.

The GC-MS results indicate the presence of 3-Isopropoxy- 1, 1, 1, 7, 7, 7- hexamethyl -3, 5, 5- tris (trimethylsiloxy) tetrasiloxane, for which there is no information. Due to lack of information on this chemical it is difficult to classify and know its potential risk. Nominally the amount of this chemical in the cartridge is low.

The GC-MS results indicate the presence of alpha, 3, 4- tris [(trimethylsilyl)oxy] Benzeneacetic acid, for which there is no information. Due to lack of information on this chemical it is difficult to classify and know its potential risk. Nominally the amount of this chemical in the cartridge is low.

6. Conclusion

On balance, the Gamucci Zero. nicotine solution appears to offer a much safer alternative to the traditional cigarette.

Using this nicotine solution, the artificial smoke generated by the Electronic Cigarette does not appear to contain the toxic cocktail of toxic carcinogenic compounds found in traditional tobacco smoke. Some 600+ chemicals have been identified in traditional tobacco smoke, of which many are carcinogenic.

The primary aerosol forming solvent (propylene glycol) used in the preparation of the nicotine solution is listed as a suspected respiratory toxicant. Gamucci should look at changing the aerosol forming solvent from the suspected respiratory toxicant 'propylene glycol', to an even safer solvent such as glycerol.

7. Recommendations

- a) Gamucci should take a pro-active look at replacing the propylene glycol component completely with an alternative such as glycerol, in the event that the solvent becomes added to the list of respiratory toxicants in the foreseeable future.

8. References

1. www.scorecard.org/chemical-profiles; The Pollution Information Site for chemical "Propylene Glycol"
2. Reference to 100 fatal poisonings in Panama resulting from a Chinese factory falsifying records in order to export the cheaper but toxic Diethylene Glycol as the more expensive Glycerol.

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