



E-Cigarette Task Force

Reference Report

A Brief Description of History, Operation and Regulation

February 2014

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1. Introduction

Electronic cigarettes, also known as e-cigarettes e-cigs or Electronic Nicotine Delivery Systems (ENDS), are battery-powered electronic devices that produce an aerosol which users inhale.

The aerosol is generated by an electric heating element which is activated manually or when the user draws air through the device. The heating element vaporizes a liquid formulation, often referred to as ‘e-liquid’ or ‘e-juice’, and the vapour then condenses to form the aerosol. This formulation is held in a reservoir and typically contains nicotine, propylene glycol and/or glycerol and flavourings. Usually, a coloured LED is illuminated when the device is activated.

E-cigarettes are regulated differently in different jurisdictions, ranging from complete bans, via tobacco product or medicinal product regulation, to no regulation. However, the regulatory requirements in many countries are currently under discussion.

2. An overview of the history of e-cigarettes

Awareness of e-cigarettes as consumer products has risen substantially since they were introduced in China in the mid-2000s. Although the first e-cigarette patent was filed by Herbert A Gilbert in the USA in 1963 the first market-relevant e-cigarette was invented by the pharmacist Hon Lik in China in 2003. Hon Lik worked for Golden Dragon Holdings, which later became Ruyan. The modern e-cigarettes were first marketed in China in 2004, as well as being exported. The first international patent was granted to Ruyan in 2007. E-cigarettes have since become available globally¹²³.

Initially, battery performance and reliability of the automatic switches to trigger heating did not match the expectations of users. In 2008, a version with an enlarged battery section and a manual switch, was developed by a consumer which became known as the screwdriver style e-cigarette. This invention led manufacturers to develop e-cigarettes with user-selectable components: batteries, heating elements/atomizers and e-liquid reservoirs. In 2009, the 510 atomizer and the eGo battery was developed, which brought the power of the screwdriver model and manual switches to the mass market. The 510 eGo e-cigarette type employs a 7mm x 0.5 mm thread pitch for component compatibility. The 510 eGo e-cigarettes appear to be one of the most popular types with available batteries that range from approximately 3.2 – 4.8 volts DC with 220 mAh- 1100 mAh capacities. Resistance of the atomizers range from approximately 1.5 – 2.2 ohms. Until late 2010, most e-cigarettes used pre-filled cartridges of e-liquid. In 2010, the eGo-T atomizer was introduced, which incorporated the eGo battery and 510 atomizer designs in a device with a refillable e-liquid reservoir or tank. Since early 2012, devices with so-called clearomizers—atomizers and tanks in a single transparent plastic component—and eGo batteries have become the best-selling products in the customizable e-cigarette market.

¹ Etter J-F (2013) The electronic cigarette: an alternative to tobacco? Scotts Valley, CA: CreateSpace Independent Publishing Platform.

² Gilbert HA (1963). Smokeless non-tobacco cigarette. <http://www.google.de/patents/US3200819> (accessed 9 Aug, 2013).

³ Electronic atomization cigarette. (2007). US2007267031. http://worldwide.espacenet.com/publicationDetails/biblio?CC=US&NR=2007267031&KC=&FT=E&locale=en_EP (accessed 9 Aug, 2013).

The rapidly growing e-cigarette market is currently (August 2013) estimated to be €1.5 billion (around US\$2.1 billion) globally with the European market worth €400–500 million (around US\$550-700 million) and the US market worth nearly \$1 billion (around €700 million). Although most manufacturing remains predominantly in China, e-liquids are increasingly being manufactured in Europe and the USA⁴.

Trade associations have been formed by e-cigarette distributors and manufacturers in a number of countries and this trend is expected to continue. For example in the UK, the Electronic Cigarette Industry Trade Association (ECITA) has more than 20 e-cigarette companies as members⁵. ECITA has developed an industry standard of excellence based on European Union guidelines, regulations and legal statutes, including guidance on e-liquid testing, child-proof testing and weights and measures. The Tobacco Vapour Electronic Cigarettes Association (TVECA⁶) represents more than 30 members in Europe and North America. In Germany the Verband des eZigarettenhandels (VdeH⁷) was formed in 2011 that represents around 100 companies.

3. Operation of e-cigarettes

As previously stated before, an electronic cigarette is typically a battery-powered heating device that is designed to create an inhalable aerosol by vaporizing a liquid through a controlled heating process that does not lead to combustion.

3.1 Components

There are many designs, some with cigarette-like formats with various lengths and circumferences, but devices with completely different shapes are also available. E-cigarettes are generally available as one, two, three or multiple component products and characteristics of the different types of devices are shown in Table 1.

The one piece products are usually disposable. In the two-piece versions, one section typically has a mouthpiece, heater and e-liquid cartridge, and the other contains a rechargeable battery, control circuitry, an indicator light and a switch. In three-piece e-cigarettes the heater and e-liquid reservoir are in separate sections. In cartridges and cartomizers (combined heater and cartridge) the e-liquid is adsorbed on a substrate, whereas in tank systems it remains as liquid. The reservoirs may be disposable or refillable. The resistive metal heater heats the e-liquid to vaporization. The battery is typically a lithium ion type. The control circuitry determines the provision of the current to the heating coil and charging, and may include a safety shut off, for instance if the temperature rises too high because puffs are too frequent or of excessive duration. The indicator light typically remains alight during use, and flashes to signal that the device has run out of power or the need to recharge the battery. The device can either be triggered by an automatic sensor (e.g. pressure, airflow) or a manual button. This is shown schematically in Figure 1. Nomenclature for components and other terms are explained in Appendix A, and examples of some types of e-cigarettes can be seen in Appendix B.

⁴ Library of the European Parliament (2013). Library briefing: electronic cigarettes. <http://www.europarl.europa.eu/eplibrary/Electronic-cigarettes.pdf> (accessed 9 Aug, 2013).

⁵ <http://www.ecita.org.uk/index.html> (accessed 15 Aug, 2013)

⁶ <http://www.tveca.com/?q=node/1> (accessed 15 Aug, 2013)

⁷ <http://www.vd-eh.de/de> (accessed 15 Aug, 2013)

Table 1: Characteristics of commonly used e-cigarette formats

Type of device	Construction	Voltage	Comments
Disposable	Single piece	Fixed voltage	Not rechargeable
Rechargeable	Two- or three-piece device	Fixed voltage	Three-piece version uses separate heater and cartridge
Rechargeable with refillable or replaceable cartridge	Multiple components	Fixed voltage	
Tank based	Multiple components	Fixed voltage	Tank enables larger amounts of e-liquid to be used.
eGo	Multiple components	Fixed or variable voltage as well as variable battery capacities	Some allow user control of voltage
Cigars	Multiple components	Fixed voltage	Large battery

As well as many different types of hardware, e-liquids with a wide variety of flavours and various nicotine concentrations (including no nicotine) are available for use in refillable devices. The option to buy components and e-liquids separately gives users the ability to configure devices that appeal to their personal tastes.

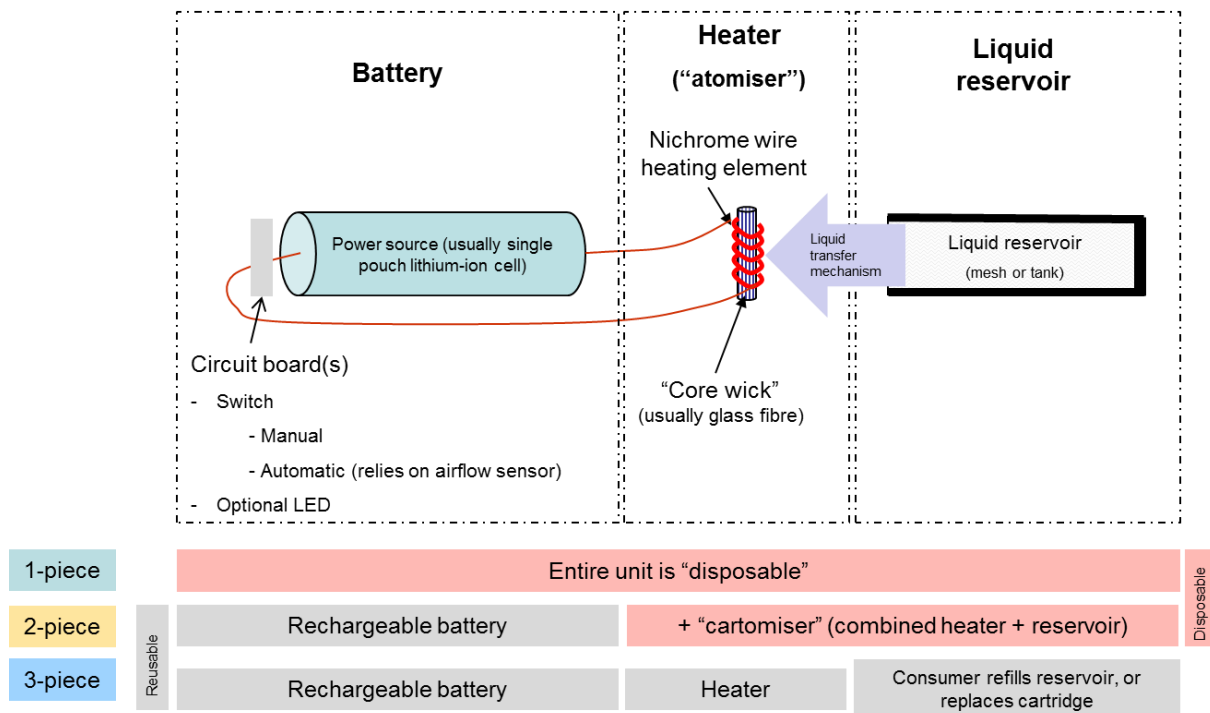


Figure 1: Common components of an e-cigarette and principles of operation

4. Chemical and physical processes in e-cigarette use

4.1 Vaporization of e-liquid

In e-cigarettes aerosol generation is a function of the device (battery, coil resistance, e-liquid) and puffing behaviour. The vaporization process is dependent on the fundamental properties (vapour pressure) for each constituent of the liquid and the temperature achieved by the heating coil. The composition of the resultant vapour is determined by the vapour pressure for each component of the e-liquid at a given pressure and temperature. Thus, the e-liquid properties can be approximated by Raoult's law, which states that the resulting vapour pressure is the sum of the partial pressures of the individual components. Values are calculated with the following formula:

Equation 1:
$$P = \sum_{i=1}^n X_i * P_i^0$$

Where P indicates total vapour pressure, X_i the mole fraction of component i in the solution and P_i^0 the vapour pressure of pure component i . Raoult's Law relies on the assumption that the solution is ideal—i.e., that the intermolecular forces in the solution are the same for similar and dissimilar molecular species.

Any deviation from Raoult's law provides information on the strength of the intermolecular forces in the solution. In order to compensate for the non-ideal solution, a fugacity coefficient ($\gamma_{p,i}$) and an activity coefficient (γ_i) are added to the partial pressure equation, as shown in Equation 2:

Equation 2:
$$P_i * \gamma_{p,i} = P_i^0 * \gamma_i * X_i$$

When a multicomponent solution is heated, the vapour pressure of each component increases. When the total vapour pressure equals that of the surrounding liquid, boiling occurs and the liquid turns to vapour throughout the entire solution. If the components of the solution are mutually soluble, the solution will have one boiling point and the light components (i.e., those with highest partial pressures), will be concentrated in the vapour phase. In e-cigarettes the e-liquid is heated by three mechanisms in varying amounts: thermal radiation, thermal convection and thermal conduction. Thermal radiation is the transfer of heat via electromagnetic energy transmission, commonly observed as infrared energy transfer. Thermal convection is accomplished by diffusion and advection, or forced convection, which results from the flow of air around the heating coils. Thermal conduction is the process of heat transfer from direct contact with the solution or the wick containing the e-liquid. The heat flow is described in Equation 3:

Equation 3:
$$Q = v * \rho * C_p * \Delta T$$

where Q indicates heat flow, v velocity, ρ density, C_p heat capacity and ΔT change in temperature.

In an e-cigarette the temperature of the heating coil is determined by the resistance of the coil and the voltage applied to it. The typical maximum temperature of an e-cigarette heating coil is 180–220°C.

The coil resistance is the product of the resistivity, which is dependent on composition (typically a nickel chromium alloy) and temperature, and the length divided by the surface area. For metals, resistivity generally increases with temperature. The heat transferred from the heating coil to the e-liquid determines the degree of vaporization and the composition of

the final aerosol by the heat-dependent distillation of the liquid and the partial pressures of the individual constituents in the solution.

4.2 Aerosol formation

The aerosol generated by an e-cigarette is a mass of droplets that are formed after the phase change of the e-liquid constituents from the supersaturated vapour phase to the condensed phase downstream of the heating coil. After leaving the mouthpiece the aerosol droplets continue to change in size in a dynamic manner with growth by further condensation and coagulation, and shrinkage by constituent evaporation. Particle diameter and concentration data have been reported in the 270-460nm range (diameter of average mass) and $1,6-3,7 \times 10^9 \text{cm}^{-3}$ respectively⁸

4.3 Deposition of constituents

Particles less than 1.000 nm in diameter are known to be delivered very effectively into the lung, but the deposition efficiency is generally low and they are also readily exhaled. Deposition is notably driven by mechanisms of sedimentation and Brownian diffusion; not impaction⁹.

When the e-cigarette aerosol is drawn into the mouth and lungs, the nicotine and other constituents can be absorbed from the particles depositing on the various tissue surfaces. The constituents can also evaporate from the aerosol particles and be absorbed from the gas phase through the same tissues.

5. Overview of regulation

As a relatively new category of products, e-cigarettes are subject to different regulatory frameworks in different jurisdictions and the situation is evolving rapidly. Consequently, this overview can only represent a snapshot at the time of writing and is not inclusive of all countries (August 2013).

5.1 E-cigarette regulation in the European Union

Regulation in the Member States of the European Union is currently heterogeneous (Table 2).¹⁰ Some countries, such as Ireland, do not yet regulate e-cigarettes, whereas others, such as Finland, no longer allow any new products containing tobacco or nicotine on the market.¹¹ This heterogeneity results from regulators' difficulty in classification of e-cigarettes. E-cigarettes may be classified as consumer products, tobacco products, medical devices or medical products. Each of these options has been employed by one or more Member States, but most frequently they are classified as medical products, especially if the product contains nicotine or is promoted for smoking cessation or treatment of nicotine addiction. Because no e-cigarette has undergone the assessments required to be approved as medicinal products they are banned within these specific markets.

⁸ BJ Ingebrethsen *et al* (2012) Electronic cigarette aerosol particle size distribution measurements *Inhal Toxicol.* 24(14):976-84

⁹ Human Respiratory Tract Model for Radiological Protection : ICRP Publication 66. (1994) Ann. ICRP 24

¹⁰ European Commission. Commission staff working document: impact assessment, part 1.

http://ec.europa.eu/health/tobacco/docs/com_2012_788_ia_en.pdf (accessed 9 Aug, 2013).

¹¹ Tupakan esilläpitokielto voimaan - Sähkötupakan mainonta lainvastaista.

http://www.valvira.fi/valvira/ajankohtaista/tupakan_esillaipitokielto_voimaan_-_sahkotupakan_mainonta_lainvastaista (accessed 9 Aug, 2013).

Table 2: Summary of national approaches to sales of e-cigarettes in the European Region.

Countries	Current access status*	Observations
Austria	Restricted	Electronic cigarettes are deemed medical devices and nicotine cartridges as medicinal products, thus nicotine cartridges may not be sold without a license
Belgium	Restricted	Considered as tobacco products if contain tobacco extract, and as medicinal products if contain nicotine but no tobacco extract. Consumption is banned in enclosed public places (bars, restaurants, workplaces etc.)
Bulgaria	Permitted	No specific rules, existing consumer product safety legislation applies
Cyprus	Permitted	No specific rules, existing consumer product safety legislation applies
Czech Republic	Permitted	No specific rules, existing consumer product safety legislation applies
Denmark	Restricted	Considered as medicinal products (marketing and distribution banned)
Estonia	Restricted	Were subject to a state pharmaceutical ban, but was overturned in March, 2013. Might be considered as medicinal product
France	Restricted	E-cigarettes and nicotine liquid are deemed consumer goods regulated by general product safety regulations, unless they claim to be for smoking cessation, the cartridge nicotine content is ≥ 10 mg or the nicotine strength in a refill is ≥ 20 mg/ml, when medicines licensing is required
Finland	Restricted	Nicotine-free liquids and e-cigarettes can be sold freely and are not subject to any clear legal stipulations, where those containing nicotine are classified as medicines and cannot be sold or advertised
Germany	Restricted	Import, sale and use are permitted. Classified as non-pharmaceuticals that require no regulation
Greece	Banned/restricted	Prohibited unless specifically approved by the Ministry of Health
Hungary	Restricted	Considered a medicinal product
Ireland	Permitted	Not considered tobacco products and sale and use are subject only to consumer product safety legislation
Italy	Permitted	Only consumer product safety legislation applies. Any manufacturer can sell products, but Categoria, e-cigarette brand has official approval after extensive product testing
Latvia	Permitted	Only consumer product safety legislation applies
Lithuania	Banned	Banned as imitation tobacco products, regardless of nicotine content
Luxembourg	Restricted	Considered as tobacco products if it contains tobacco extract and as medicinal products if it contains nicotine without tobacco extract
Malta	Permitted	Sale and use permitted for adults (≥ 18 years), but cannot be advertised. Use not allowed in enclosed public spaces and workplaces
Netherlands	Permitted	Import, sale and use are permitted.
Poland	Regulated	Import, sale and use are permitted, but prohibition of sales is being considered and advertising is not allowed
Portugal	Restricted	Sale and use are permitted, but considered as medicinal products
Romania	Restricted	Considered as medicinal products
Russia	Permitted	No regulations currently in place
Countries	Current access	Observations

	status*	
Slovakia	Restricted	Considered as medicinal products and consumption banned in enclosed public places and workplaces
Slovenia	Permitted	Only consumer product safety legislation applies
Spain	Permitted	Only consumer product safety legislation applies
Sweden	Restricted	Considered as medicinal products
(Switzerland)	Restricted	Nicotine-free liquids and e-cigarettes can be sold (exempt from tax) subject to consumer product safety legislation and adequate product safety testing and providing no therapeutic claims are made. Products containing nicotine may not be marketed but an e-cigarette and 40 replacement cartridges may be bought for personal use
Ukraine	Permitted	Sales permitted but use restrictions
United Kingdom	Permitted	Import, sale, advertising and use are permitted subject to consumer product safety legislation with restrictions on advertising

*Banned=sales and/or import of e-cigarettes is banned

*Restricted=e-cigarettes fall under medicinal device, food or tobacco regulation, dependent on function, possible use of tobacco and claims; which means the nicotine content or delivery can be regulated separately; which might mean that sales, import, product design or a combination of are restricted by the requirement of approvals and/or registrations of materials, deliveries, claims etc.

*Permitted=sales and/or import of e-cigarettes is permitted by law, unregulated or not controlled according to the sources currently used.

The European Commission is currently in the process of amending the Tobacco Products Directive (2001/37/EC) that was adopted in 2001.^{12,13} Revisions are intended to harmonize tobacco legislation across Member States. Important aspects for e-cigarettes will be restrictions placed on ingredients, such as flavours, and on nicotine content. The revised rules propose using three main criteria to classify e-cigarettes as tobacco or medicinal products: the nicotine concentration, the total nicotine content and the pharmacokinetic performance of nicotine delivery. Nicotine-containing products that have nicotine levels above 2 mg per dosing unit, nicotine concentrations higher than 4 mg/ml or lead to peak concentrations in plasma of 4 ng/ml will be classified as medicinal products.¹⁷ Most currently available e-cigarette brands would become subject to pharmaceutical regulation. So far, however, Tobacco Products Directive has been agreed only at the European Council level and must undergo negotiation in the European Parliament. The proposal, therefore, might be subject to change by Member States. Some Member States, such as the UK, however, have decided independently to regulate e-cigarettes as pharmaceutical products and will advocate for this approach within the European Union.¹⁴

¹²European Commission. Revision of the Tobacco Products Directive. <http://ec.europa.eu/health/tobacco/products/revision/> (accessed 9 Aug, 2013).

¹³European Commission. Proposal for a directive of the European Parliament and of the Council on the approximation of the laws, regulations and administrative provisions of the Member States concerning the manufacture, presentation and sale of tobacco and related products. http://ec.europa.eu/health/tobacco/docs/com_2012_788_en.pdf (accessed 9 Aug, 2013).

¹⁴MHRA. Press release: UK moves towards safe and effective electronic cigarettes and other nicotine-containing products. <http://www.mhra.gov.uk/NewsCentre/Pressreleases/CON286855> (accessed 9 Aug, 2013).

5.2 E-Cigarette regulation in the Americas

Canada

According to a 2009 notice from Health Canada, “Electronic smoking products fall within the scope of the Food and Drugs Act ... All of these products require market authorization prior to being imported, advertised or sold in Canada ... In the absence of evidence provided by the sponsor, an electronic smoking product delivering nicotine is regulated as a new drug.”¹⁵ In addition, the delivery system within an electronic smoking kit that contains nicotine must meet the requirements of the medical devices regulations.¹⁵ The Health Canada position on the commercialization of e-cigarettes containing 4 mg nicotine or less of per dosing unit is that they would be considered to be a natural health product, similar to other smoking cessation aids.¹⁶ For e-cigarettes containing more than 4 mg nicotine per dosing unit, the products would be deemed prescription drugs.¹⁷ So far, however, no e-cigarettes containing nicotine have been authorized under the above guidelines.

USA

In addition to food, drugs and cosmetics, in 2009 the FDA was granted the authority to regulate tobacco products.¹⁸ Until 2010 e-cigarettes were regulated as unapproved drug-device combination products and import was refused. Following a legal challenge by a manufacturer, the Supreme Court concluded that e-cigarettes should be regulated as tobacco products unless they were to be marketed for therapeutic purposes.¹⁹ The FDA has since stated that it will issue regulations to bring e-cigarettes, among other categories of tobacco products, under the regulatory scope of the “The Family Smoking Prevention and Tobacco Control Act”, which is part of the food, drugs and cosmetics legislation.²⁰ The scope of the new regulations are not yet clear, but a letter to stakeholders in 2011 stated that “The additional tobacco product categories would be subject to general controls, such as registration, product listing, ingredient listing, good manufacturing practice requirements, user fees for certain products, and the adulteration and misbranding provisions, as well as to the premarket review requirements for new tobacco products”.²¹

South America

Importation, sales, and use of e-cigarettes are banned in Brazil.

¹⁵Health Canada. Notice – to all persons interested in importing, advertising or selling electronic smoking products in Canada. http://www.hc-sc.gc.ca/dhp-mps/prodpharma/applic-demande/pol/notice_avis_e-cig-eng.php (accessed 9 Aug, 2013).

¹⁶Justice Laws Website. Natural Health Products Regulations (SOR/2003-16). <http://laws-lois.justice.gc.ca/eng/regulations/SOR-2003-196/> (accessed 9 Aug, 2013).

¹⁷Food and Drugs Regulations. http://laws-lois.justice.gc.ca/eng/regulations/C.R.C.,_c._870/index.html

¹⁸US Food and Drug Administration. Tobacco Control Act. <http://www.fda.gov/TobaccoProducts/GuidanceComplianceRegulatoryInformation/ucm298595.htm> (accessed 9 Aug, 2013).

¹⁹United States Court of Appeals, District of Columbia Circuit (2010). *Sottera, Inc., doing business as NJOY, appellee, v. Food & Drug Administration, et al., appellants*. 627 F.3d 891.

²⁰US Food and Drug Administration (2011). FDA Center for Tobacco Products update (January 16, 2011 – April 30, 2011). <http://www.fda.gov/TobaccoProducts/NewsEvents/ucm253996.htm> (accessed 9 Aug, 2013).

²¹US Food and Drug Administration (2011). Regulation of e-cigarettes and other tobacco products, 25 April 2011. <http://www.fda.gov/NewsEvents/PublicHealthFocus/ucm252360.htm> (accessed 9 Aug, 2013).

5.3 E-Cigarette regulation in the Asia-Pacific Region

In the Asia-Pacific region, access status is also heterogeneous (Table 3).

Table 3: Summary of national approaches to sales of e-cigarettes in the Asia-Pacific region

Countries	Current access status*	Observations
Australia	Restricted	New poisons legislation applies to the sale of e-Juice or cartridges containing nicotine
Brunei	Banned	Sales prohibited because of imitation of tobacco products; a fine of \$10,000 can be imposed
China	Permitted	No regulations
Hong Kong	Banned	Sale and possession of e-cigarettes is currently prohibited in Hong Kong.
India	Permitted	No regulations
Indonesia	Banned	Imports banned, as deemed dangerous by the national Drug Agency
Japan	Restricted	Nicotine containing versions considered as medical products under the Pharmaceutical Act.
Malaysia	Restricted	Nicotine a regulated poison under 1952 Poison Act
New Zealand	Restricted	Regulated under the Medicines Act and cannot be sold except as a registered medicinal products
Philippines	Restricted	Considered as health products, but none registered before or since the 2009 Food and Drug Administration Act
Singapore	Banned	No sales allowed of confectionary, food products, toys or any other articles that resemble tobacco products or related packaging
South Korea	Permitted	Products containing nicotine are regulated as tobacco product. Products without nicotine are regulated as pharmaceutical products
Taiwan	Restricted	E-cigarettes considered as medicinal products under the Pharmaceutical Affairs Act and cannot be sold unless licensed
Thailand	Banned	No import or sale allowed
Vietnam	Banned	No manufacturing, buying, selling, importing, storing or transportation of articles that resemble tobacco products or related packaging allowed

*Banned=sales and/or import of e-cigarettes is banned

*Restricted=e-cigarettes fall under medicinal device, food or tobacco regulation, dependent on function, possible use of tobacco and claims, which means the nicotine content or delivery can be regulated separately, which might mean that sales, import, product design or a combination of are restricted by the requirement of approvals and/or registrations of materials, deliveries, claims etc.

*Permitted=sales and/or import of e-cigarettes is permitted by law, unregulated or not controlled according to the sources currently used.

Appendix A: Electronic cigarette nomenclature

Term	Meaning	Synonyms	Preferred terminology
510	An e-cigarette type with a thread size of 7mm diameter with 0,5 mm pitch between battery and cartomizer.		
Atomizer	Typically a heated wire wrapped around a fibrous wick that converts e-liquid into vapour by heating; the vapour quickly condenses to form an aerosol	—	Heater
Battery	The power source for the heater (atomizer); typically a lithium ion battery	—	Battery
Cartomizer	Combination of a heater (atomizer) and a cartridge which is disposable	Carto	Cartomizer
Cartridge	E-liquid reservoir that connects to the heater (atomizer) in a three-piece e-cigarette	Cart	Cartridge
Coil	Typically a resistive metal component of the heater (atomizer) that is in contact with the wicking material and, when supplied with current from a battery during puffing, heats up and converts e-liquid into vapour that quickly condenses to form an aerosol	—	Heater
Cut-off	An automatic shutdown feature on some models that prevents excessively long draws, to prevent overheating	—	—
Dual coil	A two-coil heater (atomizer) to increase surface area of the heating unit	—	
eGo	A style of electronic cigarette that employs a threaded junction between the battery and cartomizer. Uses thread size of 7 mm diameter with 0,5 mm pitch.		
E-liquid	E-cigarette liquid containing nicotine, flavour components and propylene glycol and/or glycerol	Juice, e-juice, smoke juice, smoke oil	E-liquid
Filler	Absorbent wicking material that holds the liquid in the cartridge	Stuffing	Absorbent
Glycerin/ Glycerol	E-liquid constituent used as the excipient (carrier). Usually of vegetable origin.		
LED	Light-emitting diode at the end of e-cigarettes that glows when the device is activated	—	LED
Mod	A user-configured product comprising separately purchased components battery, heater (atomizer) or cartridge	—	Modification
Nicotine Level	The concentration of nicotine present in the e-liquid either in mg/ml or % v/v	—	Nicotine concentration
Personal vaporizer	Another term for an electronic cigarette or a device to vaporize various liquid and solid materials	—	Personal vaporizer
Propylene glycol	E-liquid constituent used as the excipient (carrier)	—	Propylene glycol (PG)
Passthrough	USB adapter for the electronic cigarette that connects to the heater (atomizer) to supplement or replace battery power with power drawn from a USB port	—	Passthrough charging device
Primer puff	A short, quick puff on the e-cigarette to activate the heater (atomizer) before a full puff	—	Primer puff
Vaping	The act of using an electronic cigarette	—	—
Vapour	Commonly used term to refer to the visible “smoke” produced by electronic cigarettes	—	Aerosol
Wick	Porous or fibrous material for transfer of liquid from the storage reservoir to the heater coil	—	Absorbent
Tank	A storage reservoir for e-liquid that is in direct contact with the heating coil	—	—