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The Challenge of Testing Tobacco Products in the 21st Century

Legislation like the EU TPD and plain packaging may seem like an economical and logistical hurdle, but in the long run they could aid innovation and development in the market.

By Patrick Murphy

Legislation to control tobacco products is becoming more stringent and the ability to operate in this sector is becoming increasingly complex with new and ever-changing requirements. The EU Tobacco Products Directive (TPD) is one example of the significant changes, the effects of which may well be felt globally and include new requirements for regulation and composition of both combustibles and e-cigarettes.

The vaping industry is still in its infancy compared to the tobacco market, but the external environment is just as complex. New regulations—such as the EU TPD and the Standardised Packaging of Tobacco Products Regulations 2015 in the UK—will affect the vaping as well as the tobacco industry. The TPD states that manufacturers must submit a notification to the authorities in each of the markets that they plan to sell their products detailing a list of all the ingredients included in the e-cigarette, the emissions resulting from its use, information on nicotine doses and the toxicological data. In order to gain this information and comply with the stricter regulations, manufacturers must work with testing and research laboratories—such as Essentra Scientific Services—to anal-
products.

Essentra Scientific Services was one of the first laboratories in the world to be accredited for testing tobacco products and filters to ISO 17025 and UKAS (United Kingdom Accreditation Service), and for testing products against the US Food and Drug Administration’s abbreviated and expanded Harmful and Potentially Harmful Constituents (HPHC) lists. As such, the Essentra Scientific Services team has been at the forefront of method development for the analysis of traditional tobacco products, and the laboratory has the capacity to provide a wide range of analytical services. As a natural progression, these services have now been expanded to include e-cigarettes.

In order to provide the best quality testing, Essentra’s laboratories include a range of industry-leading research and testing equipment, including gas chromatographs (GCs) with a triple detector system. When used for e-liquids and e-cigarette emissions, gas chromatographs enable the measurement of multiple analytes from a single vaping test. A thermal conductivity detector can measure the sample of water, while a second detector can analyse it for propylene glycol, glycerol and the nicotine level. Nicotine is currently the most measured compound in e-cigarettes, mainly because it is the most regulated. Under the TPD, nicotine-containing liquids can only be sold if the nicotine concentration does not exceed 20mg/ml. This concentration allows for a delivery of nicotine that is similar to the permitted dose derived from a standard cigarette. Lastly, the third detector uses mass selective detection to analyse the sample for diethylene glycol and ethylene glycol, and other potential contaminants in e-cigarette vapour.

Another popular machine that is used in e-cigarette testing is an ultra-high pressure liquid chromatograph (UHPLC), which measures carbonyl compounds in e-vapour. Carbonyl compounds are slightly toxic and, after nicotine, are the most measured emissions from e-cigarettes. High levels of carbonyl compounds can be responsible for the ‘burnt’ taste occurring when the nichrome wire in the e-cigarette is heated, and reaches high temperatures.

Furthermore, in order for the machines to test the e-cigarettes efficiently and accurately, it is essential that the machines have the correct specialist components and the environment, such as humidity and temperature, is strictly controlled. An example of such a component is the inclusion of an electronically programmed start control linked into the smoking machine electronics that automatically pushes the button on tank based systems every time the machine puffs. As consumers highly value the puffing resistance with e-cigarettes, a gauge is vital to ensure that measurements can be made precisely as the e-cigarette generates vapour.

Some machines can be shared and used to test both cigarettes and e-cigarettes. Though the specific GCs and UHPLCs are dedicated to measuring e-cigarette emissions, some instruments can measure both as the processes and equipment needed are very similar. Liquid chromatographs with tandem mass detection (LC-MS) can be used to measure tobacco specific nitrosamines in cigarette smoke, e-cigarette vapour and e-liquids—particularly those which have a tobacco flavour. Gas chromatographs with mass detection (GC-MS) can also be used, measuring volatile organic compounds such as toluene, benzene and isoprene, or minor tobacco alkaloids.

With stricter regulation and wider awareness of health concerns, the requirement for regulatory testing is likely to continue to grow. If the obligation to provide enhanced reporting on additives in both combustibles and e-cigarettes is implemented, testing laboratories will become more important than ever.

Legislation and consumer tastes will continue to be the main focuses of companies going forward, but it is essential that companies manage these two trends in tandem. Consumer preferences are always in flux and companies must work hard to innovate their products to reflect current trends. However, they must ensure that all innovations comply with the appropriate legislation, whether the trends point towards cigarettes, e-cigarettes or flavoured e-liquids. Whilst legislation such as the EU TPD and plain packaging may at first seem like an economical and logistical hurdle for tobacco companies to overcome, in the long run they could aid innovation and development in the market.