## **Evaluation Summary of Orris Root Extract for Use as a Cigarette Ingredient**

Orris is the common name used to identify several species of *Iris* in the botanical family *Iridaceae*. The part used in orris is the root (*iridis rhizoma*) consisting of the peeled and dried rhizome. The terms orris root, orris root extract, and orris root oil are used interchangeably throughout this evaluation summary to identify the product derived from orris plants.

Orris root extract is approved by U.S. Food and Drug Administration (21 CFR § 172.510) as a direct food additive, and by the Flavor and Extract Manufacturers Association (FEMA No. 2830) as a generally recognized as safe (GRAS) flavor for addition to food.<sup>1</sup> It is also approved as a flavoring substance for use in food by the Council of Europe (CoE No. 241).<sup>2</sup>

A thorough search of available literature revealed only a limited number of specific reports describing studies conducted solely with orris root extract. Since one of the primary constituents of orris root is myristic acid, a summary of the relevant studies conducted with myristic acid were reported in this evaluation summary.

There are no indications from existing studies in genetic toxicology assays that orris root/myristic acid is mutagenic.<sup>3,4</sup> The long history of medicinal, food and cosmetic use in humans without adverse reports other than rare allergic reactions indicates that low-level, long-term exposure to orris root or myristic acid does not pose significant health risks.<sup>5-31</sup>

Consumption of orris root extract/myristic acid is considered safe at present levels of use. Long historical use of orris root extract as flavoring and fragrance ingredient has resulted in only a few reports of allergic reactions. Although the toxicological database is limited, existing data suggest that orris root/myristic acid is relatively non-toxic.<sup>20,32-41</sup>

Orris root extract is currently used worldwide at levels below 100 ppm in selected cigarette brands manufactured and/or distributed by Philip Morris USA Inc. (PM USA) and/or Philip Morris Products SA (PMP SA). Orris root extract may be applied directly to the tobacco as an additive, flavoring or flavoring agent, and as such, may be subject to pyrolysis-type reactions during the smoking process. Orris root extract may also be applied to the filter as a flavoring material where it would not be subjected to pyrolysis temperatures.

As suggested by purge and trap studies conducted by PM USA,<sup>42</sup> orris root extract would not be expected to distill at 100°C. At the higher temperatures used in the pyrolysis studies conducted by PM USA, orris root extract applied to tobacco would distill as its constituents, and would not be expected to pyrolyze.<sup>43</sup>

Orris root extract was part of a PM USA testing program that was designed to evaluate the potential effects of 333 ingredients added to typical commercial blended test cigarettes on selected biological and chemical endpoints.<sup>44-47</sup> Orris root extract was added to test cigarettes at target concentrations of 86, 258, 399 and 1197 ppm. No significant effects were noted in cytotoxicity, mutagenic studies or in respiratory tract endpoints in 90-day rat inhalation studies. In addition, smoke chemistry studies from cigarettes containing a mixture of flavors including orris root extract did not significantly alter the smoke chemistry profile compared to control

cigarettes. Based on the results of these studies, the authors concluded that these ingredients (including orris root extract) added to tobacco do not add significantly to the overall toxicity of cigarettes.

Currently, information is only available for tests utilizing orris root extract in a mixture of ingredients applied to cigarette tobacco. Studies are ongoing to address the use of orris root extract as a single ingredient. Published studies show there is no meaningful difference in the composition or toxicity of smoke from cigarettes with added ingredients (including orris root extract) compared to the smoke from cigarettes without added ingredients.<sup>48-54</sup> Based on the best available data, the ingredients used in PM USA and/or PMP SA cigarettes do not increase the overall toxicity of cigarette smoke.

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