

**CHEMICAL MEETING THE CRITERIA FOR LISTING AS CAUSING
CANCER VIA THE AUTHORITATIVE BODIES MECHANISM:
ANTHRAQUINONE**

**Package 19a.5
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Reproductive and Cancer Hazard Assessment Branch
Office of Environmental Health Hazard Assessment
California Environmental Protection Agency

Anthraquinone meets the criteria for listing under Proposition 65¹ via the authoritative bodies listing mechanism as known to the State to cause cancer. The regulatory requirements for listing by this mechanism are set forth in Title 22, California Code of Regulations, Section 12306² and include provisions covering the criteria for evaluating the documentation and scientific findings by the authoritative body to determine whether listing under Proposition 65 is required.

The National Toxicology Program (NTP) is one of five institutions that have been identified as authoritative bodies for identification of chemicals as causing cancer for the purposes of Proposition 65 (§12306(1)). The NTP has identified anthraquinone as causing cancer. The Office of Environmental Health Hazard Assessment (OEHHA) has found this chemical has been “formally identified” as causing cancer as required by §12306(d). Anthraquinone is the subject of a report published by the authoritative body that concludes that the chemical causes cancer. Also, the document specifically and accurately identifies the chemical, and the document meets one or more of the criteria outlined in §12306(d)(2).

OEHHA also finds that the criteria given in regulation for “as causing cancer” (§12306(e)) have been satisfied for anthraquinone. In making this evaluation, OEHHA relied upon the discussion of data by the authoritative body in making its finding that the specified chemical causes cancer. A brief discussion of the relevant carcinogenesis studies providing evidence for the finding is presented below. The statement in bold reflects data and conclusions that satisfy the criteria for the sufficiency of evidence for carcinogenicity (§12306(e)). The full citation for the authoritative body document is given in this report.

¹ The Safe Drinking Water and Toxic Enforcement Act of 1986, codified at Health and Safety Code section 25249.5

² All further references are to Title 22 of the California Code of Regulations, unless otherwise indicated.

Chemical Meeting the Criteria for Listing as Known to the State to Cause Cancer

| Chemical | CAS No. | Chemical Use | Reference |
|-----------------|----------------|---|------------------|
| Anthraquinone | 84-65-1 | Intermediate in the manufacture of dyes and pigments; additive in pulp and paper industry; catalyst in isomerization of vegetable oils, accelerator in nickel electroplating; bird repellent. | NTP (2005) |

Anthraquinone (CAS No. 84-65-1)

Increased incidence of malignant and combined malignant and benign tumors in male and female mice; increased incidence of combined malignant and benign tumors in female rats.

The National Toxicology Program (NTP, 2005) has concluded that there is clear evidence of the carcinogenic activity of anthraquinone in male and female B6C3F₁ mice and in female F344/N rats.

NTP (2005) exposed B6C3F₁ mice and F344/N rats to anthraquinone via diet for two years. In male mice, anthraquinone exposure resulted in statistically significant dose-dependent increases in the incidences of hepatocellular adenoma (21/50, 32/50, 38/50, 41/49 for control, low-, mid- and high-dose animals, respectively), hepatocellular carcinoma (8/50, 13/50, 17/50, 21/49) and hepatoblastoma (1/50, 6/50, 11/50, 37/49). Statistically significant increases in hepatocellular neoplasms were also observed in female mice. The incidence of hepatocellular carcinoma was 2/49, 3/50, 8/50, 8/49 for control, low-, mid-, and high-dose females, respectively. The combined incidence of hepatocellular adenoma or hepatocellular carcinoma in these groups was 6/49, 30/50, 30/50, and 41/49, respectively.

In female rats, anthraquinone exposure resulted in a statistically significant increase in combined renal tubule adenoma or carcinoma. The incidence was 0/50, 6/50, 9/50, 8/50 and 14/49 for animals exposed to 0, 469, 938, 1,875 and 3,750 ppm anthraquinone, respectively. The historical control incidence of these tumors in female rats in recent NTP feed studies was 1/901. The NTP (2005) also concluded that observed increases in the incidences of urinary bladder transitional epithelial papilloma or carcinoma (combined) and of hepatocellular adenoma were related to anthraquinone exposure. In male rats, increases in renal tubule adenomas were also observed at all doses (1/50, 3/50, 9/50, 5/50, 3/50) but were only significant in animals exposed to 938 ppm anthraquinone.

The historical control incidence of this tumor type in male rats in recent NTP feed studies was 7/902. Transitional epithelial papillomas of the urinary bladder occurred in all groups of exposed males and were significant in animals exposed to 1,875 ppm anthraquinone. The NTP (2005) concluded that there was some evidence of carcinogenic activity of anthraquinone in male F344/N rats.

REFERENCES

National Toxicology Program (NTP, 2005). *Toxicology and Carcinogenesis Studies of Anthraquinone (CAS No. 84-65-1) in F344/N Rats and B6C3F₁ Mice (Feed Studies)*. NTP Technical Report Series No. 494. NIH Publication No. 05-3953. U.S. Department of Health and Human Services, Public Health Service, National Institutes of Health, NTP, Research Triangle Park, NC.