and for pure chemical vapors. The mice were first exposed to a chemical vapor mixture emitted from a heated carpet sample for two exposures per day (each exposure 1 hour in duration) for 2 days. Total VOCs emitted were analyzed and general signs of toxicity, respiratory rate decreases, and breathing patterns of respiratory irritation in the mice were noted. In a second set of experiments, 2,2,4-trimethylpentane was one of 11 identified VOCs that were tested as pure chemical vapors (single 30-minute exposures). 2,2,4-Trimethylpentane, along with four other VOCs, exhibited RD_{50} values that were each greater than 1000 ppm, indicating that these VOCs are nonirritating chemicals when present alone.

4.4.1.3. *Dermal*

In a dermal study (Exxon, 1987), doses of 0.2 g/kg and 3.15 g/kg 2,2,4-trimethylpentane were applied to the abdominal area of New Zealand White (NZW) rabbits (four/group) for 24 hours with no mortality reported. At necropsy, in the low-dose group, one animal appeared to be normal, three had dark livers, and two had mottled livers. In the high-dose group, four animals had dark livers, two animals had mottled livers, and one had a pale kidney.

4.4.1.4. *Ocular*

Exxon (1987) also conducted an eye irritation study in NZW rabbits. 2,2,4-Trimethylpentane (0.1 mL, or ~70 mg) was instilled into the conjunctival sac of one eye of six rabbits. The ocular reactions were graded at 1 and 4 hours, and at 1, 2, 3, 4, and 7 days after instillation. The results showed that 2,2,4-trimethylpentane was nonirritating to the eye.

4.4.2. Genotoxicity

There are a few reports on testing of 2,2,4-trimethylpentane for genetic toxicity. There are no available reports of testing for mutagenic activity in bacterial cells (e.g., the Ames Salmonella test) or for chromosome breaking activity in vitro or in vivo.

4.4.2.1. *Mutation and Chromosome Effects*

TK6 cells, a human lymphoblastoid cell line, were treated with a saturated (5% v/v) solution of 2,2,4-trimethylpentane in cell culture medium for 3 hours in the presence and absence of rat liver S9 fraction (Richardson et al; 1986). There were no detected increases in gene mutations at the thymidine kinase (TK) locus or in sister chromatid exchanges (SCE).

4.4.2.2. *DNA Damage*

McLaren et al. (1994) investigated the induction of DNA double-strand breaks and poly-ADP-ribosylation in the renal cortex of male Wistar rats administered 12 mmol/kg (~1370 mg/kg) of 2,2,4-trimethylpentane via gavage for 5 consecutive days. Treatment failed to

Table 4-1. Summary of renal effects specific to male rats reported in 2,2,4-trimethylpentane studies

Study (route, dose, duration)	Accumulation of α_{2u}-globulin hyaline droplets	Cytotoxicity, necrosis of tubule epithelium	Sustained regenerative tubule cell proliferation	Intralumenal granular casts and papillary mineralization	Foci of tubule hyperplasia
Short et al. (1989) (inhalation, 50 ppm [234 mg/m3] 6 h/d, 5 d/w, 3–50 w)	X	X	X		
API (1983) (oral, 0.5 or 2.0 g/kg/d, 5 d/w, 4 w)	X	X		X	
Short et al. (1986) (oral, 50–500 mg/kg/d, 21 d)	X	X	X	X	X
Saito et al. (1992) (oral, 50 mg/kg/d, 14 d)	X				
Borghoff et al. (1992) (oral, 0.95–30 mg/kg/d, 10 d)	X		X		
Lock et al. (1987a) (oral, 1370 mg/kg/d, 10 d)	X				
Saito et al. (1996) (oral, 171 mg/kg/d, 7 d)	X				
Blumbach et al. (2000) (oral, 500 mg/kg/d, 5 d)	X				
Burnett et al. (1989) (oral, 50 mg/kg, 1 d)	X				
Lock et al. (1987b) (oral, 500 mg/kg, 1 d)	X				
Stonard et al. (1986) (oral, 34–2740 mg/kg, 1 d)	X				