



图 6 胶料的热扩散系数与炭黑用量的关系  
注同图 5

从图 6 可以看出,胶料中炭黑用量在 25 ~ 40 份范围内,炭黑用量增大 1 份,则胶料的热扩散系数增大 5%。除炭黑之外的其它组分,如氧化锌、硫化促进剂、增塑剂、抗降解剂和硫化剂等,由于其各自的性能以及用量较小的缘故,对热扩散系数的影响不明显。

### 3 结论

多层复合橡胶厚制品——轮胎在硫化过程

中,由于各部位与热源距离不同,胎体内部会形成不均匀的温度场,造成轮胎各部位硫化程度不均匀,故可采用分段硫化的方法来优化轮胎的硫化过程。研究、分析轮胎硫化过程中影响传热的因素发现,热扩散系数降低时制品的硫化时间延长;而胶料中炭黑用量在 25 ~ 40 份范围内时,炭黑用量增大 1 份,则胶料的热扩散系数增大 5%。分析所得结果对提高轮胎硫化过程中的热扩散系数和传热效率、确定合理的等效硫化时间、提高产品质量及降低能耗等具有重要意义。

### 参考文献:

- [1] 傅彦杰. 轮胎硫化测温[J]. 轮胎工业, 1999, 49(12): 745.
- [2] Steen J, Aben W J, Wapenaar K E D. Optimization of the vulcanization process of rubber products[J]. Polym. Eng. Sci., 1993, 33(3): 185.
- [3] Bafrnec M, Juma M, Toman J, et al. Thermal diffusivity of rubber compound[J]. Plastics, Rubber and Composites, 1999, 28(10): 483.

收稿日期: 2001-12-13

## Analysis of heat transfer during tire vulcanization

GAO Chang-yun, TANG Yue, LU Bai-yuan

(Qingdao Institute of Chemical Technology, Qingdao 266042, China)

**Abstract:** The heat transfer during the tire vulcanization was analyzed based on the heat transfer principle, the advantages of multi-stage vulcanization were pointed out, and the effect of the heat diffusivity on the curing state of rubber and the effective factors on the heat diffusivity were investigated. The results showed that the curing time of product extended when the heat diffusivity decreased; the heat diffusivity of the compound, in which the addition level of carbon black was in the range of 25 ~ 40 phr, increased by 5% as the addition level of carbon black increased by every 1 phr.

**Key words:** tire; heat transfer; multi-stage vulcanization; heat diffusivity

### 我国第一条沙漠高速公路全线铺通

中图分类号: U412.36+6 文献标识码: D

我国第一条沙漠高速公路——榆(林)靖(边)高速公路的 116 km 路基工程最近全线铺通。榆靖高速公路是榆林市承担修建的等级最高、规模最大、一次性投资最多的公路建设项目。截至目

前,高速公路上的立交桥、跨线桥、涵洞、通道等施工已全部结束,15 座大桥主体工程全部完工,无定河特大桥全幅架通,路基整形已经通过验收,正全面实施道路两侧的绿化工程,已累计完成投资 9.35 亿元,占工程投资总额的 53%。

(摘自《中国汽车报》,2002-05-06)