

Theoretical and Experimental Investigation of the Flame-Retarding Characteristic of R245fa

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A mixture containing 1,1,1,3,3-pentafluoropropane (R245fa) and flammable refrigerants was expected to be a drop-in replacement for tri-chlorofluoromethane (R11) or 1,2-dichloro-1,1,2,2-tetrafluoroethane (R114) in future. The flame-inhibiting characteristic of R245fa had great significance on evaluating the security of that mixture. This paper analyzed the mechanism of R245fa on flammable refrigerants, and the factors affecting flammable limits of refrigerants. Under conditions of ignition with an electric igniter and a common lighter, flame-retarding characteristics of R245fa on propane (R290), difluoroethane (R152a), dimethyl ether (DME), isobutene (R600a) were studied by experiments. A new index (flame-inhibiting coefficient K) that evaluated the flame-retarding effect was put forward. The test results showed that the flammable limits of refrigerants were greatly affected by ignition power and modes, the flame-retarding effect of R245fa on hydrofluorocarbons (HFCs) was worse, and was a little better on hydrocarbons (HCs), which was both worse than that of 1,1,1,2-tetrafluoroethane (R134a).