

CHAPTER I

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The tendency For further lowering of exhaust emissions levels continues Worldwide . This has led to reassessment and introduction of the low emission vehicle (LEV) and the super ultra-low emission vehicle (SULEV)Legislations hopefully that the zero emission vehicle (ZEV) becomes a reality (**Brück et al, 1999; Otto et al, 1998**) . Major advances toward reducing cold start emissions have been reported (**Pfalzgraf et al,1996; Patil et al 1998, Hanel et al, 1996 & 1997; Burch et al, 1996 Oser et al, 1994; Golunski et al, 1995**). All the reported components of exhaust systems are capable of reducing cold-start emissions, none of these systems seem to be effective enough to allow reaching the SULEV legislation limits when used alone .

In the 1980's U.S. Environmental Protection Agency (EPA) proposed regulations to phase down the amount of lead (tetra-ethyl lead) expressing concern about potential health risk from lead (**U.S.-EPA, 1994; NESCAUM, 2002**) . The Clean Air Act Amendments of 1990 took further steps toward reducing motor vehicle emissions by using two types of gasoline reformulations: oxygenated gasoline and reformulated gasoline, RFG, (**Piel, 1989; Piel and Thomas, 1990**) . Oxygenated gasoline contains an average of 2.7 wt.% oxygen to reduce wintertime emissions of carbon monoxide RFG contents at least 2.0 wt.% oxygen and a reduced contents of benzene and other aromatics to decrease the emission of ozone- forming hydrocarbons and total air toxics in nine areas of the U.S. with the worst ozone levels (**U.S.-EPA,1994**) .

Oxygenates used in oxyfuel and RFG include ethers, such as methyl tertiary butyl ether (MTBE) which is the most frequently used at the present time, and alcohols such as ethanol. Other oxygenates such as ethyl tertiary butyl ether (ETBE) and tertiary amyl methyl ether (TAME) have recently started being used (Furey and Perry, 1990; 1991) . With the extensive use, MTBE has been detected in some domestic water wells in U.S. In response to concerns about MTBE in domestic wells, EPA formed a Blue Ribbon Panel of different experts . The panel recommended accelerated study of health effects and characteristics of compounds that may be used as replacement (Blue Ribbon Panel, 1999) .

Rapid population growth continues to exacerbate Egypt's environmental problems, including air pollution from transportation and industry . Egypt plans to improve air quality by increasing the number of natural gas vehicles (NGVs) in Cairo and other major urban centers . and phasing out the use of leaded gasoline . The MTBE has been used to replace lead in motor gasoline to cut lead emissions and improve air quality .

In this investigation, different ether oxygenates were tested mainly as octane enhancers . These tests include blending MTBE, ETBE and TAME to different formulations of all-hydrocarbon gasolines to produce a range of octane levels to satisfy vehicle varieties . Tailpipe exhaust emissions of the obtained oxygenated gasoline formulations were examined using a test vehicle .