# Global Attributes and Advantages of KeroTech Refinery Products

The attributes and advantages of KTI KSA White Spirits that contains no detectable Aromatics or Sulphur Contents are confirmed by the listing below of the documented effects [as documented by WHO (World Health Organisation) and the US department of environment of common White Spirits (straight-run) as well as Law Aromatic White Spirits (LAWS) currently in the market, as follows:

- Consumption volume of 60% of solvents usage in European paint industry is White Spirits.
- The absence of Aromatic content would dramatically reduce the products volatility into the atmosphere with its consequential affects to the environment.
- White spirits that have no Aromatics content and no Sulphur content would be of a higher molecular weight and hence spillages are easily absorbed into organic matter in soil or water resulting in an efficient biodegradation. Biodegradation of C7 to C12 hydrocarbons is expected to be significant under environmental conditions favourable to micro-bio-oxidation.
- Inhalation dangers for indoors paint industry applications of Aromatic content has recorded a Time Weighted Average inhalation levels of up to 6200 mg/m3 (6200 ppb) particularly during warmer climate. Dry cleaning TWA (Time Weighted Average) up to 210 mg/m3 (210 ppb). Vehicle washers using White Spirits measured up to 805 mg/m3 (805 ppb). The highest reported levels measured for workers in airline hangers of up to 8,860 mg/m3. Bearing in mind that the maximum allowable exposure limit over 8 working hours TWA should only be 200 mg/m3 (200 ppb).
- When aliphatic, alicyclic and aromatic hydrocarbons were compared, it was noted that aromatics produced the highest concentrations in blood. The aromatic hydrocarbons are distributed from blood to other tissues, and a human fat vs blood partition coefficient of 47 has been calculated. Thus, white spirit aromatics content has been detected in blood 66 hours after a single inhalation exposure. The half-life in adipose tissue has been estimated to be 46-48 hours.
- The aromatics odour threshold of white spirit is quite low, and vapours can be detected at levels of 0.5-5 mg/m3 (0.5 – 5 ppb). Hence, the advantages of zero aromatic content.
- Aromatic content of 14% result in high levels of volatility resulting in eye irritation has been reported in connection with acute exposure down to a level of 600 mg/m3 (600 ppb). At higher aromatic levels respiratory irritation and more pronounced eye irritation occur. Acute CNS (Central Nervous System). Symptoms such as headache, "drunkenness", dizziness and fatigue have been reported in several cases of occupational exposure.
- Controlled 7-h exposure to 15% aromatic white spirit levels of 600 mg/m3 or more resulted in impaired balance during walking and to a decreased reaction time. Exposure to 4000 mg/m3 for 50 min resulted in impaired performance in tests for perceptual speed and short-term memory.
- In cases of 15% Aromatic white spirit; cyanosis, apnoea and cardiac arrest after excessive inhalation exposure during painting has been reported.
- The oral exposure & ingestion of a 5-10% Aromatic white spirit has been reported to produce gastrointestinal irritation with pain, vomiting and diarrhoea. Lesions of the mucous membranes in the oesophagus and the gastrointestinal tract had followed.
- Aromatic content in white spirits would reduce the product viscosity and surface tension by default. Hence, it poses a risk of aspiration into the lungs following oral exposure. A few millilitres of Aromatic solvent aspirated into the lungs are able to produce serious bronchopneumonia and 10 – 30 millilitres may be fatal.
- In cases of acute toxicity to the kidney, liver and bone marrow have been reported following exposure to Aromatic white spirits and LAWS at high levels.
- There have been reports concerning the haematological or biochemical effects of Aromatic white spirits and LAWS. However, clinical studies reveal decreased erythrocyte, leukocyte and platelet counts, and increased mean corpuscular volume (MCV red blood-cells) in exposed workers. Similar haematological changes have been observed in animal studies. There are no consistent serum biochemical changes; reduced aspartate aminotransferase and lactate dehydrogenase activity and elevated creatinine kinase enzyme activity have been observed.
- Numerous epidemiological studies have been performed involving painters with long-term exposure to Aromatic White Spirit. Increased incidences of complaints of memory impairment, fatigue, impaired concentration, irritability, dizziness, headache, anxiety and apathy have been demonstrated in several cross-sectional studies. Studies including neuropsychological tests have shown impaired ability in performing some of the tests. In some studies, an overall reduction in cognitive functioning was noted to a degree that

corresponded to a diagnosis of chronic toxic encephalopathy. In a few studies a dose-response relationship was established. This was the case in a comprehensive study in which painters predominantly exposed to Aromatic White Spirit were compared with non-exposed bricklayers. Painters with low aromatic solvent exposure were comparable to non-exposed bricklayers with regard to neuropsychological test results. However, the prevalence of impaired functioning increased with increasing exposure in the groups of painters with medium and high aromatic white spirit exposure.

- Similar complaints and neuropsychological test results, although more severe, were reported from clinical studies in which painters predominantly exposed to Aromatic White Spirit had been referred to occupational medical clinics for detailed examinations because of health complaints and suspected chronic toxic encephalopathy (brain functioning disease) due to the long-term aromatic solvent exposure.
- In case-control studies, increased odds ratios for the award of disability pension because of mental disturbances were found for painters compared to other occupational groups not exposed to Aromatic White Spirit.
- Several case-control studies have shown a high risk of glomerulonephritis (kidneys acute inflammation) among painters. They are consistent with the hypothesis that painters have an increased risk of glomerulonephritis and renal dysfunction.
- Several studies concerning reproductive effects in humans have been undertaken. Parental exposure to Aromatic White Spirit may have an untoward effect on the offspring. However, there is no adequately reported information directly related to Aromatic White Spirit.
- Epidemiological (disease incidence, distribution & control) studies of cancer in humans exposed solely to Aromatic White Spirits are available. Increased risks of respiratory, pancreatic and kidney cancer have been reported in three studies on dry cleaners where Aromatic White Spirit is the predominant cleaning solvent. For painters, an occupational group widely exposed to Aromatic White Spirit, evidence has been found of increased cancer risks, particularly in the lung and bladder.
- There are some increases in cytogenetic (chromosomes & cell behaviour) damage in a number of humans exposed mainly to Aromatic White Spirit vapours.
- Human exposure to White Spirit Aromatic & Benzene contents has been associated with a range of acute and long-term adverse health effects and diseases, including cancer and aplastic-anaemia (deficiency in blood cells).
- Exposure can occur occupationally and domestically as a result of the ubiquitous use (omnipresent) of Aromatic & Benzene containing White Spirits.
- Therefore, acute occupational exposure to White Spirit Aromatic & Benzene contents may cause narcosis: headache, dizziness, drowsiness, confusion, tremors and loss of consciousness.
- Therefore, White Spirit Aromatic & Benzene contents is a well-established cause of cancer in humans. The International Agency for Research on Cancer has classified White Spirit Aromatic & Benzene contents as carcinogenic to humans.
- White Spirit Aromatic & Benzene contents causes acute myeloid leukaemia (acute non-lymphocytic leukaemia), and there is evidence that White Spirit Aromatic & Benzene contents also cause acute and chronic lymphocytic leukaemia, non-Hodgkin's lymphoma and multiple myeloma (bone marrow malignant tumour).
- Therefore, chronic exposure to White Spirit Aromatic & Benzene contents can reduce the production of both red and white blood cells from bone marrow in humans, resulting in aplastic anaemia.
- Both B-cell proliferation and T-cell proliferation are reduced by White Spirit Aromatic & Benzene contents. Decreased host resistance to infection has been reported in several laboratory animals exposed to Aromatic & Benzene containing white spirits.
- Chromosomal aberrations in human peripheral lymphocytes are associated with occupational exposure to White Spirit Aromatic & Benzene contents. Chromosomal aberrations, micronuclei, sister chromatid exchange and sperm head abnormalities have been seen in laboratory species treated in vivo (treated in a living organism).
- White Spirit Aromatic & Benzene contents is fetotoxic in mice and rabbits following maternal exposure by inhalation, causing a reduction in birth weight. It is not, however, teratogenic (an agent that can disturb the development of embryo or foetus) in experimental animals, even at maternally toxic doses.